V415/V450/I515/V550 Data Science in Public & Env Affairs

Instructor's Name: Roger Morris   **Phone**: 812-855-8336
Instructor's email: morrisr@indiana.edu   **Office:** SPEA 428

Office Hours: By Appointment.
Class Time: MW 1:15-2:30p
Location: SPEA 272

Course Goal: By the end of the semester, students will be able to apply practical data analytical methods and present findings to a wider audience. This course will teach you how to harness the power of data by mastering the ways it is stored, organized, and analyzed to enable better decisions.

Course Description/Statement: Data is being rapidly generated in staggering volumes from a wide range of sources, including social media, weather stations, customer loyalty programs, smart phones, credit card purchases, environmental and industrial sensors, the Internet of Things, and the list goes on. Data Science is an immature and steadily evolving field that attempts to deal with this situation. Those with the skills to turn raw data into insight will be the leaders and decision makers of tomorrow.

This course provides a practical experience for students to acquire useful, marketable skills in the area of Data Science. As students enter various fields (healthcare, law, public management, environmental protection, etc.) this course will help to prepare students to effectively manage, analyze and communicate data with the purpose of finding solutions to difficult or complex issues. You will get hands-on experience by solving problems using a variety of powerful, computer-based data tools virtually every organization uses. You will also learn to make more impactful and persuasive presentations by learning the key principles of presenting data visually.

Learning Objectives:

- Describe the big data environment
- Identify components of technology that make Data Science possible
- Locate and identify relevant data for fields of study
- Identify and correct problems with data sets to facilitate analysis (ie., cleaning data)
- Assess the quality of a data source
- Analyze data sets using pivot tables
- Identify meaning in textual data using text mining
- Determine when advanced analytics techniques are required
- Predict events using association mining
- Discuss ethical considerations related to data science
- Effectively communicate findings

Prerequisites & Expectations of Student IT Background
No course prerequisites are required for this course. The course will use MS Excel and Tableau software. Students should possess an foundational skill level with Microsoft Excel. No prior experience with Tableau is necessary. Students with a non-technical background should be able to complete this course successfully.

Text
No text required. All readings provided online via Canvas. See the IU Library's **SkillPort** for some readings.

Class structure
The course is normally taught in a computer lab, is activity based, and involves minimal lecture. Students will work individually and in pairs or teams on activities, assignments and projects. Students should expect daily in-class activities that will be completed in a short period of time and submitted on Canvas. Access to a computer outside of class is imperative.

Broad Content Area Modules:

1. The Data Environment
2. Working with Data (choosing, cleansing, combining, trusting)
3. Analyzing Data
4. Communicating Data

Course Activities Outline:

    a. Individual Assignments (smaller, building-blocks for projects)
    b. Project and hackathons (in teams):
        i. Create a Data Analysis Plan
        ii. Cleaning data
        iii. Analyze a data set using tools (Excel, Tableau)
        iv. Present findings/evidence
    c. Applied Practice (2 content areas: Excel and Tableau)
    d. Quizzes/Warm Ups (brief, delivered on Canvas)
    e. Class participation --Daily Deliverable (in-class activities/submissions)

Evaluation of Student Performance

Course Requirements and Grading	
Item	**Points**
Assignments	425

Team Project	400
Google Qwiklabs	250
Hackathons (4-100 pts each)	400
Excel/Tableau Applied Practice	100
Quizzes & Warm Ups	100
Daily Deliverables	200
Total	**2050**

Grading Scale

A+	A	A-	B+	B	B-
100%-96.6%	96.5%-93.3%	93.2%-90%	89.9%-86.6%	86.5%-83.3%	83.2%-80%
C+	C	C-	D+	D	F
79.9%-76.6%	76.5%-73.3%	73.2%-70%	69.9%-66.6%	66.5%-60%	< 60%

Late Deliverable Policy

Assignments and projects will be accepted up to **1 day** after the due date with a **20%** point penalty **reduction**. Other arrangements must be made no later than one day PRIOR to the due date. A deliverable (assignment, weekly question response, or online quiz) is considered late if it is submitted after the beginning of class. No late deliverables will be accepted without penalty. Your request for an extension before the due date must be approved by the instructor.

Disclaimer:

Assignments and due dates may be adjusted during the course of the semester at the instructor's discretion. Adequate notice will always be provided and no change will negatively impact students.

Attendance Policy

As this course is all online, attendance will not be taken and is not required for grading. All course sessions will be recorded and posted on Canvas. It is the student's responsibility to review those recordings and contact the instructor if there are questions. Students are expected to complete the Daily Deliverable activities covered during class by the due date/time.

Canvas Notifications

You are responsible for properly configuring your Canvas account to receive timely notifications. See the following link: https://kb.iu.edu/d/bfdl

Standards of Professional Conduct

Technology: Students may use computers, tablets and laptops for the purpose of class participation. Texting and non-germane communications during class time is a distraction to your peers and to your instructor. Please refrain from all non-essential use of smartphones during class. If there is an emergency, please excuse yourself from class. The instructor reserves the right to adjudicate class participation grades based on abuses of texting, chatting, video viewing, recording, tweeting, web surfing, etc.

Academic Dishonesty:

SPEA faculty do not tolerate cheating, plagiarism, or any other form of academic dishonesty. If you have not done so, you should read the IU Code of Student Rights, Responsibilities, and Conduct, which can be accessed at https://studentcode.iu.edu/ as well as https://myspea.indiana.edu/doc/ugrad-doc/ugrd-student-honor-code.pdf so you will be sure to understand what these terms mean and what penalties can be issued for academic dishonesty.

Several commercial services have approached students regarding selling class notes/study guides to their classmates. Selling the instructor's notes/study guides in this course is not permitted. Violations of this policy will be reported to the Dean of Students as academic misconduct (violation of course rules). Sanctions for academic misconduct may include a failing grade on the assignment for which the notes/study guides are being sold, a reduction in your final course grade, or a failing grade in the course, among other possibilities. Additionally, you should know that selling a faculty member's notes/study guides individually or on behalf of one of these services using IU email, or via Canvas may also constitute a violation of IU information technology and IU intellectual property policies; additional consequences may result.

Online Course Materials: The faculty member teaching this course holds the exclusive right to distribute, modify, post, and reproduce course materials, including all written materials, study guides, lectures, assignments, exercises, and exams. While you are permitted to take notes on the online materials and lectures posted for this course for your personal use, you are not permitted to re-post in another forum, distribute, or reproduce content from this course without the express written permission of the faculty member. Any violation of this course rule will be reported to the appropriate university offices and officials, including to the Dean of Students as academic misconduct.

O'Neill School expectations of civility and professional conduct:

The O'Neill School takes matters of honesty and integrity seriously because O'Neill is the training ground for future leaders in government, civic organizations, health organizations, and other institutions charged with providing resources for the public, and for

members of society who are vulnerable and who are lacking in power and status. Precisely because O'Neill graduates tend to rise to positions of power and responsibility, it is critical that the lessons of honesty and integrity are learned early.

O'Neill requires that all members of its community – students, faculty, and staff – treat others with an attitude of mutual respect both in the classroom and during all academic and nonacademic activities outside the classroom. A student is expected to show respect through behavior that promotes conditions in which all students can learn without interruption or distraction. These behaviors foster an appropriate atmosphere inside and outside the classroom:

- Students are expected to attend class regularly and to be prepared for class.
- Students must be punctual in their arrival to class and be present and attentive for the duration of the class. Eating, sleeping, reading the newspaper, doing work for another class, wandering in and out of the classroom, and packing up or leaving class early are not civil or professional behaviors.
- Students must abide by the course policy regarding use of electronic devices in the classroom.
- Students must responsibly participate in class activities and during team meetings.
- Students must address faculty members, other students, and others appropriately and with respect, whether in person, in writing, or in electronic communications.
- Students must show tolerance and respect for diverse nationalities, religions, races, sexual orientations, and physical abilities.
- Students must not destroy or deface classroom property nor leave litter in the classroom.

Communication between Faculty and Students:
In order to verify the identity of all parties involved, effective September 1, 2004, all email communication from current OSPEA students to OSPEA staff must originate from an Indiana University email account. For email communication with OSPEA faculty, current OSPEA students should refer to course syllabi for instructors' preferences (Canvas, Webmail, etc.). This policy applies to current students only. Instructions for forwarding your IUB email to another account can be found at:
http://kb.indiana.edu/data/beoj.html

Course Withdrawals:
Students who stop attending class without properly withdrawing from the class may receive a grade of F. It is important to withdraw from a course within specified timeframes (see chart below). Note that withdrawals after Week 12 of a regular session or Week 4 of a summer session are rarely granted. Poor performance in a course is not grounds for a late withdrawal.
No withdrawal forms will be processed in the Office of the Registrar after the last day of classes. Any requests for a late withdrawal after the last day of classes must go through the grade appeal process, but each student should remember that in accordance with campus policy, SPEA does not permit a student to withdraw from a course if he/she has completed the course requirements. Grade replacement should be used in this case. To withdraw, obtain a withdrawal slip (DROP/ADD Form) from the SPEA Student Services window. Instructions for completing it are given on the form.

Withdrawal Deadlines:

	Week 1 (last day)
Course deleted from record, no grade assigned, 100% refund (Advisor signature IS NOT required)	
	Week 2– Week 7 (regular session)
Withdrawal with automatic grade of W (Links to an external site.) (Advisor signature IS required)	
Withdrawal with grade of W or F (Links to an external site.) (Advisor and instructor signatures ARE required)	Week 8 – Week 12 (regular session)

Summary Suspension Policy:

"A student may be summarily suspended from the university and summarily excluded from university property and programs by the Provost or designee of a university campus. The Provost or designee may act summarily without following the hearing procedures established by this section if the officer is satisfied that the student's continued presence on the campus constitutes a serious threat of harm to the student or to any other person on the campus or to the property of the university or property of other persons on the university campus."

The Provost has determined that refusal to comply with the public health requirements specified in the Student Commitment form, including the requirement of wearing a mask in all IU buildings, constitutes "a serious threat of harm to other persons" within the meaning of the summary suspension policy. In addition, the Provost has determined that a person who does not comply with these requirements, as evidenced by three credible violations of the policy reported to the campus from any source, constitutes "a serious threat of harm to other persons" within the meaning of the summary suspension policy.

Incompletes:
A grade of incomplete (I) indicates that a 'substantial portion' of the work in a course has been satisfactorily but not entirely completed by the student as of the end of the semester. The incomplete can be given to a student facing a hardship such that such that it would be unjust to hold the student to the established time limits for completing the work. To be eligible for the incomplete in a SPEA course, the student's work must be of passing quality, and the student must have completed 75% of the course requirements. Poor performance in a course is not grounds for an

incomplete. SPEA follows the campus guidelines in awarding incompletes which may be accessed at the Office of the Registrar's website at: https://registrar.indiana.edu.

Incompletes must be removed within a time period not to exceed one year after the semester in which the student was enrolled in the course. The incomplete will revert to an 'F' if the work is not completed within the allotted timeframe established by the instructor. Additional information: https://policies.iu.edu/policies/aca-67-incompletes/index.html

Students Called to Active Duty:
SPEA encourages any student who is in the Indiana Military Reserves and is called to active duty to finish his/her coursework if possible. Students who cannot complete their courses have the option of withdrawing with 100% fee refund, but this request must be made within one week of being called to active duty. Students who are called to active duty may qualify for an incomplete (provided that all the above criteria have been met). For further information, please see the Office of the Registrar's website at: https://registrar.indiana.edu.

Final Exam Schedule:
If a final exam is given, it must be held on the day and time set in the final exam schedule. If an instructor has changed the final exam date, the student should first consult with the instructor. Students who have more than three final exams in one day or insufficient time to get from one exam to another should consult with their instructors to resolve these conflicts. Exams may not be given in the week before the final exam week. If a student is not able to resolve a final exam problem with the instructor, the student may report the problem to the Director of Undergraduate or Graduate programs. The final exam week schedule can be found at the Office of the Registrar's website at: https://registrar.indiana.edu/calendars/exam-schedule.shtml

Counseling and Psychological Services:

For information about services offered to students by CAPS: http://healthcenter.indiana.edu/counseling/index.shtml.

Disability Services for Students:

For information about support services or accommodations available to students with disabilities, and for the procedures to be followed by students and instructors: https://studentaffairs.indiana.edu/student-support/disability-services/index.html

Sexual Harassment:

As your instructor, one of my responsibilities is to help create a safe learning environment on our campus. Title IX and our own Sexual Misconduct policy prohibit sexual misconduct. If you have experienced sexual misconduct, or know someone who has, the University can help.

If you are seeking help and would like to speak to someone confidentially, you can make an appointment with:

1. The Sexual Assault Crisis Service (SACS) at 812-855-8900
2. Counseling and Psychological Services (CAPS) at 812-855-5711
3. Confidential Victim Advocates (CVA) at 812-856-2469
4. IU Health Center at 812-855-4011

It is also important to know that federal regulations and University policy require me to promptly convey any information about potential sexual misconduct known to me to our campus' Deputy Title IX Coordinator or IU's Title IX Coordinator. In that event, they will work with a small number of others on campus to ensure that appropriate measures are taken and resources are made available to the student who may have been harmed. Protecting a student's privacy is of utmost concern, and all involved will only share information with those that need to know to ensure the University can respond and assist.

I encourage you to visit http://stopsexualviolence.iu.edu/help/index.html to learn more.

Commitment to Diversity: Find your home and community at IU

Asian Culture Center
Address: 807 East Tenth Street, Bloomington, IN 47408
Phone: 812-856-5361
Email: acc@indiana.edu
Website: https://asianresource.indiana.edu/index.html

First Nations Educational & Cultural Center
Address: 712 E 8th St., Bloomington, IN 47408
Phone: 812-855-4814
Email: fnecc@indiana.edu
Website: https://firstnations.indiana.edu/contact/index.html

LGBTQ+ Culture Center
Address: 705 E 7th St., Bloomington, Indiana 47408
Phone: 812-855-4252
Email: glbtserv@indiana.edu
Website: https://lgbtq.indiana.edu/contact/index.html

La Casa Latino Culture Center
Address: 715 E 7th St., Bloomington IN, 47408
Phone: 812-855-0174
Email: lacasa@indiana.edu
Website: https://lacasa.indiana.edu/

Spring 2024 V415/I515/V450 Schedule

Week	Class Day	Date	Unit Topic/Event	Data Set	Items Due During Week*
1	1	1/8	Course Intro/Why DS?	Simple Eg. w/ Excel	
	2	1/10	The DS Discipline--Intro to DS		
2	3	1/15	*MLK Day--No Class*		
	4	1/17	Intro to Data/Sources of Data	Excel (car fuel econ.)	1-DA Plan
3	5	1/22	Evaluating data	Excel practice data	
	6	1/24	Viewing Data	Excel practice data	2- Excel Skill
4	7	1/29	**Hack1-Excel**		Hack1
	8	1/31	Intro to Tableau	USDA Food Env. Atlas	
5	9	2/5	Communicating with Data	Student Loans Data	3-Tableau 1
	10	2/7	Storytelling with Infographics		IRTI proposal
6	11	2/12	**Excel & Tableau Exam**		Excel in class, Tableau take home
	12	2/14	Dirty Data & Data Cleansing	Business Orders	4-Cleaning DS
7	13	2/19	Choosing Relevant Data	US Flight Data	Tableau Prep Builder
	14	2/21	Evaluating KPIs	US Flight Data	
8	15	2/26	Working with Diverse Data	US Elections & Congress	DA Plan/Exec Summary;
	16	2/28	Creating Interactive Dashboards	Pew Research on Journalism	
9	17	3/4	open -- practice, project work or review		5-Interactive Dashboard
	18	3/6	**Hack2-Tableau for Viz**		Hack2
		3/10-3/18	*SPRING BREAK*		
10	19	3/18	Big Data Storage and Retrieval		
	20	3/20	Aggregating Data in Tableau	NCAA Basketball Player Data	6-Tableau 3 Data Analysis
11	21	3/25	Non-numerical Data	Word frequency/analysis	
	22	3/27	Sentiment Analysis		
12	23	4/1	**Hack3-TBD**		Hack3
	24	4/3	Web Scraping	Tweets	
13	25	4/8	Solar Eclipse Day--No class!		
	26	4/10	Predictive Analytics		7-Twitter Analysis; 8-IRTI
14	27	4/15	Predictive Analytics with Tableau	Business Orders	
	28	4/17	**Hack4-Prediction**		
15	29	4/22	TBD		
	30	4/24	open -- practice, project work		Final Project due last day of semester