RUTGERS
School of Public Health

Course Title: GIS in Public Health

Course Number: EPID 0641J - 030

Course Prerequisite(s): None

Course Location: Rutgers School of Public Health - Piscataway 2A

Course Date & Time: Tuesday; 6:00pm – 8:00 pm

Course Instructor: Nisha Jani PhD, MPH

nisha.jani@rutgers.edu

Office Hours: By Appointment Only

Course Assistant: None

Course Website: https://canvas.rutgers.edu/

Required Text:

For Required Course Readings:

Cromley, E. K., & McLafferty, S. L. (2012). GIS and Public Health (Second ed.). New York: The Guilford Press. (ISBN13: 978-1609187507).

For In-Class Exercises and Homework Assignments:

Kurland, K. S., & Gorr, W. L. (2012). GIS Tutorial for Health (Fifth ed.). Redlands, CA: ESRI Press. (ISBN13: 978-1589483729).

GIS Software and Data

ESRI's Geographic Information Systems (GIS) software, ArcGIS 10.8 will be necessary for this class. This software will be used for in-class exercises as well as homework assignments. You are also able to download a one-year student for license ArcGIS 10.8 for $100 via ESRI's website (https://www.esri.com/en-us/arcgis/products/arcgis-desktop-student-trial). The data will be free data sources on line and the CD supplied from GIS Tutorial for Health (data can also be downloaded https://esripress.esri.com/bookResources/index.cfm?event=catalog.book&id=7),

Course Description: The purpose of this course is to provide a broad introduction to the use of GIS in analyzing and addressing health problems. This course is designed to help students become conversant with some fundamental concepts in how GIS can be used to map and analyze the geographical distributions of populations at risk, health outcomes, and risk factors; to explore associations between risk factors and health outcomes; and to address health

problems. We will use variety of downloadable software for various spatial analysis applications. Additional reading materials are in the form of articles and will be supplied to students by the instructor.

Competencies Addressed:

The competencies addressed in this course include:

- Use epidemiological principles to describe and analyze causes of disease and illness
- Appropriately incorporate determinants of health (environmental, social, cultural, behavioral, and biological) when studying the causation of disease and access to health services
- Provide an environmental description for the major causes of communicable and non-communicable diseases and their pathology
- Effectively present a current public health issue/topic using spatial analysis

Course Objectives: By the completion of this course, students will be able to:

- Define and discuss fundamental and technical concepts related to public health mapping, geographic information systems (GIS), and cartography
- Identify sources for health-related spatial data and maps
- Collect and record spatial and attribute data for public health mapping uses
- Identify and evaluate the characteristics of effective maps used in public health settings
- Interpret and describe map results to a non-technical audience
- Understand and analyze applications of GIS in the public health field

Course Requirements and Grading:

Course Format: The course combines lectures, in-class exercises, workbook/reading assignments, and a final project with presentation.

Homework: All registered students for this course will have access to the course on Canvas. Here you can access the article readings and upload your homework assignments. Assignments are due on the stated due date via Canvas by 11:59 PM. **Late assignments will not be accepted.**

Final Project and Presentation: The final project provides a synthesis of most ArcGIS skills learned throughout the semester in the form of a series of maps and a brief PowerPoint presentation. You will be provided ample time to work on the project during the final third of the semester. You will select a geographic area and a specific health topic for your final project. Phases 1 and II of the project will consist of a set of required maps, such as an overview of your state/county/region, population, demographics, socioeconomics, and locations of schools,

health services, and so on. Phase III of the project consists of a set of maps that address a medicine or public health related topic. The final set of maps will have to demonstrate a set of required ArcGIS skillsets that you have learned throughout the semester. During the final class or classes, you will present a brief PowerPoint presentation of your project to the class that illustrates all required phases and techniques that the project requires, as well as your own interpretations and findings.

Grading

Class Participation/Attendance	*10 pts.*
Workbook/Reading Assignments	*45 pts.*
Final Project	*35 pts.*
Final Project Presentation	*10 pts.*
Total:	*100 pts.*

Grading Policy:

94 – 100	*A*
90 – <94	*A-*
87 – <90	*B+*
84 – <87	*B*
80 – <84	*B-*
77 – <80	*C+*
70 – <77	*C*
<70	*F*

Course Schedule: (subject to change during semester)

Week 1: 1/21/2020	Topic	Intro to GIS Concepts, Public Health Applications to GIS, and ArcMap Software	
	In Class Exercise	Overview of GIS Mapping and data manipulation	
	Homework Assignment		
	Online 30	• Cromley & McLafferty: Introduction	2/4

Week 2: 1/28/2020	Topic	Introducing GIS and health applications	
	In Class Exercise	GIS Tutorials 1-1 to 1-5	
	Homework Assignment	Kurland & Gorr Assignments 1-1 and 1-2	Due: 2/6
	Online 30	• Kurland & Gorr: Chapter 1: Introducing GIS and Health Applications (pp. 1-13)	Due: 2/4
Week 3: 2/4/2020	Topic	Health Data Sources and the Basics of ArcMap Software	
	In Class Exercise	GIS Tutorials 2-1 to 2-10	
	Homework Assignment	Kurland & Gorr Assignments 2-1 and 2-2	Due: 2/13
	Online 30	• Cromley & McLafferty: Chapter 1: Geographic Information Systems	Due: 2/11
Week 4: 2/11/2020	Topic	Creating and Designing Maps of Health-Related Data in ArcMap	
	In Class Exercise	GIS Tutorials 3-1 to 3-8	
	Homework Assignment	Kurland & Gorr Assignments 3-1 and 3-2	Due: 2/20
	Online 30	• Cromley & McLafferty: Chapter 2: Spatial Data (pp. 43-74) • Kessler, F.C. (2009). Projections. In R. Kitchin & N. Thrift (Eds.)	Due: 2/18
Week 5: 2/18/2020	Topic	Projections, Coordinate Systems, and Prevalence Maps	
	In Class Exercise	GIS Tutorials 4-1 to 4-9	
	Homework Assignment	Kurland & Gorr Assignments 4-1 and 4-2	Due: 2/27
	Online 30	• Cromley & McLafferty: Chapter 3: Spatial Databases for Public Health • Martin, D. (2009). Census Mapping. In R. Kitchin & N. Thrift (Eds.)	Due: 2/25

Week 6: 2/25/2020	Topic	GIS Data Access and Review	
	In Class Exercise	Discussion regarding final project and lecture	
	Homework Assignment	Project Concept Paper	Due: 3/5
	Online 30	• Cromley & McLafferty: Chapter 10: Locating Health Services (pp. 338-376)	Due: 3/3
Week 7: 3/3/2020	Topic	Geocoding and Comparison Maps	
	In Class Exercise	GIS Tutorials 5-1 to 5-8	
	Homework Assignment	Revise Project Concept Paper	Due: 3/13
	Online 30	• Cromley & McLafferty: Chapter 11: Health Disparities (pp. 377-406) • Flint, J. (2009). Neighborhoods and Community. In R. Kitchin & N. Thrift (Eds.), *International Encyclopedia of Human Geography* (pp. 354-359). Oxford: Elsevier. [article supplied]	Due: 3/10
Week 8: 3/10/2020	Topic	Geocoding and Comparison Maps	
	In Class Exercise	GIS Tutorials 5-1 to 5-8 _continue	
	Homework Assignment	Kurland & Gorr Assignments 5-1 and 5-2	Due: 3/26
	Online 30	• Cromley & McLafferty: Chapter 6: Analyzing Environmental Hazards (pp. 183-233) • Dunn, J. (2009). Housing, Neighborhoods and Health. In R. Kitchin & N. Thrift (Eds.), *International Encyclopedia of Human Geography* (pp. 201-206). Oxford: Elsevier. [article supplied]	Due: 3/24
Week 9: 3/17/2020		Spring Break	

Week 10: 3/24/2020	Topic	Transforming Data	
	In Class Exercise	Tutorials from instructor	
	Homework Assignment	Project	
	Online 30	• Cromley & McLafferty: Chapter 7: Analyzing the Risk and Spread of Infectious Disease (pp. 234-262) • Koch, T. (2009). Disease Mapping. In R. Kitchin & N. Thrift (Eds.), *International Encyclopedia of Human Geography* (pp. 234-241). Oxford: Elsevier. [article supplied]	Due: 3/31
Week 11: 3/31/2020	Topic	Outbreaks and Field Epidemiology	
	In Class Exercise	Lecture from Instructor	
	Homework Assignment	Final Project Phase I Maps	Due: 4/9
	Online 30	• Murad, A.A. (2007). Creating a GIS Application for Health Services at Jeddah City. *Computers in Biology and Medicine*, 37(6), 879-889 [article supplied] • Elebead, F., Hamid, A., Hilmi, H., & Galal, H. (2012) Mapping Cancer Disease Using Geographic Information System (GIS) in Gezira State-Sudan. *Journal of Community Health,* 37(4), 830-839. [article supplied]	Due: 4/7
Week 12: 4/7/2020	Topic	Real-World GIS Applications to Public Health	
	In Class Exercise	Lecture, Reading Discussion, Work on Final Project	
	Homework Assignment	Final Project Phase II Maps	Due: 4/16
	Online 30	• Cromley & McLafferty: Chapter 12: Public Participation GIS and Community Health (pp. 407-424) • Simao, A., Densham, P.J., & Haklay, M. (2009). Web-Based GIS and Collaborative Planning and Public Participation: An Application ot the Strategic Planning of Wind Farm Sites. *Journal of Environmental Management,* 90(6), 2027-2040. [article supplied]	Due: 4/14

Week 13: 4/14/2020	Topic	Processing and analyzing spatial data	
	In Class Exercise	GIS Tutorial 7-1 to 7-3	
	Homework Assignment	Final Project	Due: **<u>**Sunday 4/26****</u>
	Online 30		
Week 14: 4/21/2020	Topic	Web-Based and Public Participation GIS (PPGIS)	
	In Class Exercise	Lecture, reading Discussion, Work on Final Project	
	Homework Assignment	Final Project	Due: **<u>**Sunday 4/26****</u>
	Online 30		
Week 15: 4/28/2020	Final Project Presentations		
Week 16: 5/5/2020	Final Project Presentations		

Learning Management System: Canvas will be used extensively throughout the semester for course syllabus, assignments, announcements, communication and/or other course-related activities. It is the student's responsibility to familiarize themselves with Canvas and check it regularly. If you have difficulties accessing Canvas, please inform the instructor and Canvas Support (help@canvas.rutgers.edu). Canvas is accessible at canvas.rutgers.edu.

School of Public Health Honor Code: The School of Public Health Honor Code is found in the School Catalog (sph.rutgers.edu/academics/catalog.html). Each student bears a fundamental responsibility for maintaining academic integrity and intellectual honesty in his or her graduate work. For example, all students are expected to observe the generally accepted principles of scholarly work, to submit their own rather than another's work, to refrain from falsifying data, and to refrain from receiving and/or giving aid on examinations or other assigned work requiring independent effort. In submitting written material, the writer takes full responsibility for the work as a whole and implies that, except as properly noted by use of quotation marks, footnotes, etc., both the ideas and the works used are his or her own. In addition to maintaining personal academic integrity, each student is expected to contribute to the academic integrity of the School community by not facilitating inappropriate use of her/his own work by others and by reporting acts of academic dishonesty by others to an appropriate school authority. It should be clearly

understood that plagiarism, cheating, or other forms of academic dishonesty will not be tolerated and can lead to sanctions up to and including separation from the Rutgers School of Public Health.

Students with Disabilities: Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student must apply for Services by first completing a Registration Form with the Rutgers Office of Disability Services (ODS) at ods.rutgers.edu. The student will also be required to participate in an ODS intake interview and provide documentation. If reasonable accommodations are granted, ODS will provide you with a Letter of Accommodations which should be shared with your instructors as early in your courses as possible.

Commitment to Safe Learning Environment: The Rutgers School of Public Health is committed to helping create a safe learning environment for all students and for the School as a whole. Free expression in an academic community is essential to the mission of providing the highest caliber of education possible. The School encourages civil discourse, reasoned thought, sustained discussion, and constructive engagement. Provocative ideas respectfully presented are an expected result. An enlightened academic community, however, connects freedom with responsibility. The School encourages all students to disclose any situations where you may feel unsafe, discriminated against, or harassed. Harassment or discrimination of any kind will be not tolerated and violations may lead to disciplinary actions.

Reporting Discrimination or Harassment: If you experience any form of gender or sex-based discrimination or harassment, including sexual assault, sexual harassment, relationship violence, or stalking, know that help and support are available. You may report such incidents to the RBHS Title IX Office or to the School of Public Health's Office of Student Affairs. Rutgers University has staff members trained to support survivors in navigating campus life, accessing health and counseling services, providing academic and housing accommodations, and more. If you experience any other form of discrimination or harassment, including racial, ethnic, religious, political, or academic, please report any such incidents to the School's Office of Student Affairs. The School strongly encourages all students to report any incidents of discrimination or harassment to the School. Please be aware that all Rutgers employees (other than those designated as confidential resources such as advocates, counselors, clergy and healthcare providers as listed in Appendix A to Policy 10.3.12) are required to report information about such discrimination and harassment to the School and potentially the University. For example, if you tell a faculty or staff member about a situation of sexual harassment or sexual violence, or other related misconduct, the faculty or staff member must share that information with the RBHS Title IX Coordinator. If you wish to speak to a confidential employee who does not have this reporting responsibility, you can find a list of resources in Appendix A to University Policy 10.3.12. For more information about your options at Rutgers, please visit Rutgers Violence Prevention and Victim Assistance.

Graduate Student Computer Policy: Students are required to possess a personal laptop, no older than approximately two years, that must meet minimum requirements which may be found online at: sph.rutgers.edu/student-life/computer-support.html

Policy Concerning Use of Recording Devices and Other Electronic Communications Systems: When personally owned communication/recording devices are used by students to record lectures and/or classroom lessons, such use must be authorized by the faculty member or instructor who must give either oral or written permission prior to the start of the semester and identify restrictions, if any, on the use of mobile communications or recording devices.

Policy Concerning Use of Turnitin: Students agree that by taking this course all required papers may be subject to submission for textual similarity review to Turnitin.com (directly or via learning management system, i.e. Canvas) for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such

papers. Use of the Turnitin.com service is subject to the Usage Policy posted on the Turnitin.com site. Students who do not agree should contact the course instructor immediately.

Withdrawal/Refund Schedule: Students who stop attending their course(s) without submitting a completed Add/Drop Course form will receive a failing grade. Furthermore, students dropping to zero credits for the semester are considered withdrawn and must submit a completed Leave of Absence form from the School of Public Health's Office of Student Affairs. The School of Public Health refunds tuition only. Administrative and technology fees are non-refundable. You may find the Withdrawal/Refund Schedule on the School of Public Health website at:
sph.rutgers.edu/academics/academic-calendar.html