Course Change Request

New Course Proposal

Date Submitted: 02/13/24 10:13 pm

Viewing: GGS 432 : Spatial Modeling for Public Health

Last edit: 02/15/24 12:15 pm

Changes proposed by: nburtch

In Workflow

1. **GGS Chair**
2. **SC Curriculum Committee**
3. SC Assistant Dean
4. Assoc Provost-Undergraduate
5. Registrar-Courses
6. Banner

Approval Path

1. 02/15/24 12:16 pm Nathan Burtch (nburtch): Approved for GGS Chair

Are you completing this form on someone else's behalf?

No

Effective Term:	Fall 2024		
Subject Code:	GGS - Geography & Geoinformation Science	**Course Number:**	432
Bundled Courses:			
Is this course replacing another course?	No		
Equivalent Courses:			
Catalog Title:	Spatial Modeling for Public Health		
Banner Title:	Spatial Modeling Public Health		
Will section titles vary by semester?	No		
Credits:	3		
Schedule Type:	Lecture		
Hours of Lecture or Seminar per week:	3		
Repeatable:	May be only taken once for credit, limited to 3 attempts (N3)	**Max Allowable Credits:**	

9

Default Grade Mode: Undergraduate Regular

Recommended Prerequisite(s):

Recommended Corequisite(s):

Required Prerequisite(s) / Corequisite(s) (Updates only):

GGS 311

Registrar's Office Use Only - Required Prerequisite(s)/Corequisite(s):

And/Or	(	Course/Test Code	Min Grade/Score	Academic Level	)	Concurrency?

Registration Restrictions (Updates only):

Registrar's Office Use Only - Registration Restrictions:

Field(s) of Study:

Class(es):

Level(s):

Degree(s):

School(s):

Catalog Description:

Discusses spatial modeling as a tool in public health, particularly for explaining, predicting, and responding to diseases within human and ecological systems. Hands on development of models using geospatial data.

Justification:

What: Creation of a new spatial modeling for public health course

Why: This course has been offered as a special topics in prior semesters. Our main professor for this course, Dr. Taylor Anderson, has been working in research in this field for several years and supports undergraduate

and graduate student research. This course will add to our GIS/spatial modeling offerings at the undergraduate level.

Does this course cover material which crosses into another department? Yes

Impacted Departments:

Department
GCH - Global & Community Health

Learning Outcomes:

Will this course be scheduled as a cross-level cross listed section?

Attach Syllabus

GGS 432 Syllabus.pdf

Additional Attachments

Staffing:

Dr. Taylor Anderson is the primary professor for this course

Relationship to Existing Programs:

Upon its addition to the Catalog, we will likely add it to our BS Geography and GIS minor.

We are flagging Global and Community Health as a department to ensure this course is not duplicating efforts in other programs.

Relationship to Existing Courses:

This course adds to our undergraduate offerings in GIS and spatial modeling, using GGS 311 as a prerequisite.

Additional Comments:

Reviewer Comments

Key: 18590

GGS 432: Spatial Modeling for Public Health (3 credits)

**Syllabus is subject to change

Semester

Instructor: Taylor Anderson
Email: tander6@gmu.edu
Phone: 703-993-6716
Course type: In-person
Meeting hours:
Office hours:
Course website: Blackboard
Final Exam: None

Course Description

Models are critical to explain and predict the spread of diseases in and between human and ecological systems. Furthermore, these models can be used to better understand and predict health outcomes and prescribe the most optimal policy actions that mitigate negative impacts. This course offers a combination of theory, techniques, and practical considerations related to spatial agent-based models of infectious diseases. Topics include foundations in spatial epidemiology, agent-based models, complexity, synthetic populations, health behaviors, mobility and movement, model evaluation, and application of models. Although we briefly touch on a range of different modeling approaches and disease applications, our focus is on the agent-based approach in the context of infectious human diseases. Students will develop hands on experience in developing a spatially explicit model of diseases.

Prerequisites and Prior Experience

The prerequisite for GGS 432 is GGS 311. Prior experience with programming languages or simulation platforms and software is not required.

Difference between GGS 432 and 632

The learning objectives are different between the two levels, where GGS 432 will focus on learning key concepts in spatial epidemiology and simulation modeling and GGS 632 will focus on applying and thinking critically about these concepts. Beyond GGS

432, the students in GGS 632 will read and present a paper that uses models to investigate spatial processes driving disease spread. GGS 432 students will benefit from watching and discussing the presentations. While both GGS 432 and 632 have the opportunity to develop their own model, GGS 632 will go beyond simply describing their model using part of the ODD protocol to write a full academic paper with a literature review, methods, results and discussion.

Blackboard Login Instructions

Access to MyMason and GMU email are required to participate successfully in this course. Please make sure to update your computer and prepare yourself to begin using the online format BEFORE the first day of class. Check the IT Support Center website. Navigate to the Student Support page for help and information about Blackboard. In the menu bar to the left you will find all the tools you need to become familiar with for this course. Take time to learn each. Make sure you run a system check a few days before class. Become familiar with the attributes of Blackboard and online learning.

Readings

Some recommended texts:

1. Railsback, Steven F., and Volker Grimm (2012). *Agent-Based and Individual-Based Modeling: a Practical Introduction.* Princeton University Press.
2. Vynnycky, E., & White, R. (2010). *An introduction to infectious disease modelling.* OUP Oxford.
3. Crooks, A., Malleson, N., Manley, E., & Heppenstall, A. (2018). *Agent-based modelling and geographical information systems: a practical primer*. Sage.

Course Learning Outcomes

Upon completion of this course, students will be able to:

1. Describe foundational concepts in spatial epidemiology
2. Identify advantages and limitations in different disease modeling approaches
3. Describe a spatially explicit model of disease spread
4. Consider the potential insights disease models offer decision and policy makers

Technology Requirements

Hardware: You will need access to a Windows or Macintosh computer with at least 2 GB of RAM and access to a fast and reliable broadband internet connection (e.g., cable, DSL). A larger screen is recommended for better visibility of course material. You will

need speakers or headphones to hear recorded content and a headset with a microphone is recommended for the best experience. For the amount of Hard Disk Space required taking a distance education course, consider and allow for:

1. the storage amount needed to install any additional software and
2. space to store work that you will do for the course.

If you consider the purchase of a new computer, please go to Patriot Tech to see recommendations.

Software: Many courses use Blackboard as the learning management system. You will need a browser and operating system that are listed compatible or certified with the Blackboard version available on the myMason Portal. See supported browsers and operating systems. Log in to myMason to access your registered courses. Some courses may use other learning management systems. Check the syllabus or contact the instructor for details. Online courses typically use Acrobat Reader, Flash, Java, and Windows Media Player, QuickTime and/or Real Media Player. Your computer should be capable of running current versions of those applications. Also, make sure your computer is protected from viruses by downloading the latest version of Symantec Endpoint Protection/Anti-Virus software for free here.

Students owning Macs or Linux should be aware that some courses may use software that only runs on Windows. You can set up a Mac computer with Boot Camp or virtualization software so Windows will also run on it. Watch this video about using Windows on a Mac. Computers running Linux can also be configured with virtualization software or configured to dual boot with Windows.

Note: If you are using an employer-provided computer or corporate office for class attendance, please verify with your systems administrators that you will be able to install the necessary applications and that system or corporate firewalls do not block access to any sites or media types.

Course-specific Hardware/Software: This course uses a range of open-source software including NetLogo and proprietary software like ArcGIS Pro.

Course Schedule **Full details can be found on Blackboard and is subject to change. **Note that the weeks are organized from Wednesday (class) to Tuesday (journal prompt due).**

WEEK (W-Tu)		MEETING (Wednesday @4:30-7:10)	Topic	Journal Prompt (JP) (following Tuesday @11:59pm)	Paper Presentation Response (following Tuesday @11:59pm)	Project
1	Jan 17-23	Jan 17	Introduction to Infectious Disease Spread	JP1		
2	Jan 24-30	Jan 24	Introduction to Compartmental Modeling	JP2		
3	Jan 31-Feb 6	Jan 31	Complexity	JP3		
4	Feb 7-13	Feb 7	Agent-Based Modeling I	JP4		Group formation required (if applicable) by Feb 13
5	Feb 14-20	Feb 14	Agent-Based Modeling II	JP5		
6	Feb 21-27	Feb 21	Geographic Information Systems	JP6		
7	Feb 28-Mar 1	Feb 28	Synthetically Generated Populations		Population composition (x2)	Proposal Due March 1 @11:59pm
	Mar 1-10	March Break				
8	Mar 13-19	March 13	Mobility and Movement	JP7	Mobility and movement (x2)	
9	Mar 20-26	March 20	Networks	JP8	Contact or social networks (x2)	
10	Mar 27-Apr 2	March 27	Health Behavior	JP9	Health behavior (x2)	

WEEK (W-Tu)		MEETING (Wednesday @4:30-7:10)	Topic	Journal Prompt (JP) (following Tuesday @11:59pm)	Paper Presentation Response (following Tuesday @11:59pm)	Project
					First round of presentation discussion due Apr 2 @11:59	
11	Apr 3-9	Apr 3	Model Evaluation	JP10	Policy interventions (x2)	
12	Apr 10-16	Apr 10	Applications and Future		Student Choice (x2)	
13	Apr 17-23	Apr 17	Project Work		Student Choice (x2)	
14	Apr 24-29	Apr 24	Project Presentations		Second round of presentation discussion due Apr 29 @11:59	Project Presentations Due Apr 24 in class. Final Paper Due Apr 29 @11:50pm

Assignments Description

DELIVERABLE	% OF FINAL GRADE
Journal Prompts	**50**
Paper Presentation Responses	**10**
Project	**40**

Journal Prompts

Throughout the course of the semester, you will complete responses to 10 journal prompts (each worth 5% of your final grade). Think of each response as a progress update on both your understanding of the conceptual material and your progress on model development. You will receive the prompt at the beginning of the week (on Wednesday) and are encouraged to reflect on it throughout the week. Your responses to each journal prompt are due at the end of each week (the following Tuesday).

Presentation Discussions

Graduate students in the course will be creating and posting presentations to examine the use of ABM to explore the role of one of the following spatial processes on disease dynamics: population composition, mobility and movement, contact or social networks, health behavior, policy interventions, or other. Each week, you will watch the recorded presentations and respond to their presentation with questions and comments.

Project

You will have the opportunity to either find and modify an existing ABM or develop your own ABM of disease spread (either individually or in a group of undergraduate students). The project component is composed of a project proposal, a presentation, and a complete ODD protocol that describes the model.

Course Policies

Late Assignments:

One Extension Policy: Any student may propose a reasonable deadline extension for any course deliverable, subject to my approval, once during the semester. Students must justify in writing why they need this extension and provide a plan for how they will complete the work prior to the submission deadline.

One Revision Policy: Any student may revise and resubmit one major project deliverable within two weeks, after it is graded, either for a new grade or for up to a 15% increase on their prior grade provided the revisions are significant (not just error corrections).

Late Assignment Deduction Policy: Any late deliverable will earn a flat 10% grade deduction as long as the deliverable is completed within 7 days of the deadline. If it is not completed within 7 days of the deadline, the student will receive a 0.

Instructor-Student Communication: I will respond to your emails within 48 hours. If I will be away from email for more than one day, I will post an announcement in the Blackboard course folder. Before sending an email, please check the following (available on your Blackboard course menu) unless the email is of a personal nature:

1. Syllabus
2. Ask the Instructor Blackboard Discussion
3. On-demand Blackboard videos on how to use Blackboard features, and Technical Requirements.

Feel free to respond to other students in the Ask Professor forum if you know the answer.

Campus Closure: If the campus closes or class is canceled due to weather or other concern, students should check Blackboard for announcements.

Grading Scale

GRADE	PERCENTAGE
A+	**96 to 100**
A	**93 to 95.9**
A-	**90 to 92.9**
B+	**86 to 89.9**
B	**83 to 85.9**
B-	**80 to 82.9**
C+	**76 to 79.9**
C	**73 to 75.9**
C-	**70 to 72.9**
D	**60 – 69.9**
F	**< 60**

University Policies and Resources

a. Academic Integrity: Mason is an Honor Code university; please see the Office for Academic Integrity for a full description of the code and the honor committee process. The principle of academic integrity is taken very seriously, and violations are treated gravely. What does academic integrity mean in this course? Essentially this: when you are responsible for a task, you will perform that task. When you rely on someone else's work in an aspect of the performance of that task, you will give full credit in the proper, accepted form. Another aspect of academic integrity is the free play of ideas. Vigorous discussion and

debate are encouraged in this course, with the firm expectation that all aspects of the class will be conducted with civility and respect for differing ideas, perspectives, and traditions. When in doubt (of any kind) please ask for guidance and clarification.

b. Course materials and student privacy: All course materials posted to Blackboard or other course site are private; by federal law, any materials that identify specific students (via their name, voice, or image) must not be shared with anyone not enrolled in this class. Video recordings of class meetings that include audio or visual information from other students are private and must not be shared. Live Video Conference Meetings (e.g. Collaborate or Zoom) that include audio or visual information from other students must be viewed privately and not shared with others in your household. Some/All of our synchronous meetings in this class will be recorded to provide necessary information for students in this class. Recordings will be stored on Blackboard [or other secure site] and will only be accessible to students taking this course during this semester.
c. Names and pronouns: If you wish, please share your name and gender pronouns with me and indicate how best to address you in class and via email. I use "she/her" for myself, and you may address me as "Taylor" or "Dr. Anderson" in email and verbally.
d. Computing: Students must follow the university policy for Responsible Use of Computing
e. Communication: Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students solely through their Mason email account. Students must use their Mason email account to receive important University information, including communications related to this class. I will not respond to messages sent from or send messages to a non-Mason email address.
f. Devices: Students must follow the university policy stating that all sound emitting devices shall be turned off during class unless otherwise authorized by the instructor.
g. Student services: The University provides range of services to help you succeed academically and you should make use of these if you think they could benefit you. I also invite you to speak to me (the earlier the better).
    a. The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance. Counseling Center: Student Union I, Room 364, 703-993-2380.
    b. Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor, in writing, at the beginning of the semester. All academic accommodations must be arranged through that office. Please note that accommodations MUST BE MADE BEFORE assignments or exams are due. I cannot adjust your grade after the fact.
    c. The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing. University Writing Center: Robinson Hall Room A114, 703-993-1200. The writing center includes assistance for students for whom English is a second language.
h. Diversity: This course seeks to create a learning environment that fosters respect for people across identities. We welcome and value individuals and their differences, including gender expression and identity, race, economic status, sex, sexuality,

ethnicity, national origin, first language, religion, age and ability. We encourage all members of the learning environment to engage with the material personally, but to also be open to exploring and learning from experiences different than their own.

i. Use of generative AI: Any student use of Generative-AI tools should follow the fundamental principles of the Honor Code. For more information, please see recommendations on our Generative AI Support page.

j. Sexual Harassment: As a faculty member, I am designated as a "Non-Confidential Employee," and must report all disclosures of sexual assault, sexual harassment, interpersonal violence, stalking, sexual exploitation, complicity, and retaliation to Mason's Title IX Coordinator per University Policy 1202. If you wish to speak with someone confidentially, please contact one of Mason's confidential resources, such as Student Support and Advocacy Center (SSAC) at 703-993-3686 or Counseling and Psychological Services (CAPS) at 703-993-2380. You may also seek assistance or support measures from Mason's Title IX Coordinator by calling 703-993-8730, or emailing titleix@gmu.edu.