

**GEO 4306/6938 GEOGRAPHY OF VECTORED DISEASE**

**UNIVERSITY OF FLORIDA, DEPARTMENT OF GEOGRAPHY SPRING 2020**

**TUR 3006**

**MONDAY, WEDNESDAY, FRIDAY PERIOD 7 (1:55-2:45)**

Please note that this syllabus is being constructed, WILL change before the class begins, and MAY change as the semester progresses.

Most Recent Revision: 31 December 2019

Instructor: Dr. Gregory E. Glass

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Office Hours: Wednesdays 3:00 – 4:30

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**COURSE DESCRIPTION**

Vector-borne diseases (VBDs) are caused by pathogens transmitted between humans or animals via an intermediate animal, such as a mosquito or tick. There are many human and animal VBDs. Some cause significant morbidity and mortality today, such as malaria and dengue, while others, such as West Nile Virus, Zika and Chikungunya have recently caused headlines through their emergences in new areas. Some VBD's also impose massive economic and agricultural burdens. This course introduces the geography and spatial epidemiology of VBDs and modern methods to monitor, map and model them. We will discuss the geography of VBDs, the general mechanisms that cause them and how changes in land use, land cover, climate, transportation and lifestyle result in explosive changes in their epidemiology. An overview of VBDs will be presented, including the mechanisms of transmission, their distributions, history and effects on human and animal populations. General topics covered will include the predictive mapping of vector distributions, spatial analysis of disease transmission levels, quantifying populations at risk of VBDs, simple models of disease transmission and quantification of the risk of global VBD movements. Weekly computer labs will provide hands-on introductions to methods for mapping, modeling and understanding the geography of VBDs, using tools such as Google Earth, GIS and the R statistical programming language.

## **PREREQUISITES**

This course is intended as an introduction to geographical aspects of vector borne infectious diseases. There are no requirements for the course but understanding some of the basic biology of pathogen transmission OR experience in basic GIS is helpful (but, again, not required). You should discuss any questions and concerns with the instructor.

## **COURSE OBJECTIVES**

The course will provide a forum to discuss, share experiences, and intellectual resources for graduate students to be able to write effective, successful research proposals.

The purposes of this course are: 1) to examine the early stages of research (research question definition, library research, planning, research design, variable selection, proposal writing); 2) to write several formats of research proposals; 3) to learn the process of constructive criticism in reviewing other's proposals (your proposal will be evaluated by three peers and the instructor), and; 4) to understand at a broader level, the grantsmanship process.

## **TOPICS**

- Introducing VBDs
- History of VBD-human interactions
- Animal VBDs
- The spatial distributions of VBDs
- Socioeconomic effects of VBDs
- Drivers of VBD geography
- Vector biogeography
- Measuring VBDs
- Controlling vs eliminating VBDs
- Quantifying populations at risk and burdens
- Transport networks and VBD spread
- Modelling VBDs
- Climate change and VBDs
- Land use and land cover change and VBDs

## **LABS**

Weekly computer-based labs will help students explore ideas and implement methods discussed in the lectures. The labs require basic familiarity with usage of a PC, but no detailed prior knowledge of software packages or spatial techniques are expected. Step-by-step introductions to approaches for the analysis of VBD-related data will be provided,

enabling the student to explore different datasets, ideas and techniques. These will be implemented principally using Microsoft Excel, ArcGIS, the R statistical programming language and Google Earth. Lab topics will include:

- Mapping VBD risk: geostatistical approaches to create continuous disease risk maps from community sample data.
- Mapping vector distributions: explore approaches to present and future species distribution mapping based on sample field data and environmental and climatic surfaces.
- Quantifying populations at risk of VBDs: approaches to mapping human populations and consequently deriving estimates of populations at risk of VBDs.
- Estimating the risks of VBD importation and vector dispersal: examination of the use of transport network data for estimating VBD importation risk.
- Predict future changes: combining various spatial datasets to examine the likely future epidemiology of a VBD.

## SCHEDULE

Week	Topic
1	Introduction to the course: Overview of course content, requirements.
2	Vector-borne diseases
3	Measuring rates of disease
4	Break
5	Mapping diseases
6	Measuring human and malaria movements
7	Insect vectors of disease
8	Mapping arthropod vectors
9	Climate change and vector-borne diseases
10	Human movement and VBDs
11	Mapping human populations
12	Global transport networks and insect-borne disease spread

## ASSIGNED READINGS

Assigned reading for the week will be identified and uploaded at least the week prior to the scheduled topic on the Canvas website.

### Related background info websites

For those interested in various topics discussed some of the links to other resources are provided here. If dead links are found please let the professor know and they will try to track down the correct source.

<http://www.healthmap.org/en>

<http://www.nature.com/avianflu/google-earth/index.html>

<http://www.map.ox.ac.uk/>

<http://www.wrbu.org/mosqMap/index.htm>

<http://www.promedmail.org> <https://www.epi.ufl.edu>

<http://sedac.ciesin.columbia.edu/gpw/>

<http://www.issg.org/database/welcome/>

<http://gamapserver.who.int/mapLibrary/>

<http://www.waikato.ac.nz/igci/hotspots/>

<http://www.cs.princeton.edu/~schapire/maxent/> <http://www.r-project.org/>

<http://www.who.int/heli/risks/vectors/vector/en/index.html>

<http://bioval.jrc.ec.europa.eu/products/gam/index.htm>

<http://www.doh.state.fl.us/Environment/medicine/arboviral/index.html>

## EVALUATIONS:

- The **laboratories** comprise all of the final grade. **Eight lab assignments** will be established. Labs will be discussed in the lectures also and there will be linkage between the material covered in lectures and lab periods. Each lab report must be typed within the document provided.
- The weightings of each evaluation component towards the final grading are as follows:  
8 lab assignments: 12.5% each

## UF GRADING POLICIES

Please see the UF Registrar's grading policies for current guidelines not discussed in class.

<https://catalog.ufl.edu/UGRD/academic-regulations/grades-grading-policies/>

**GRADING SCALE:**A = 90 or above, 4.0; A- = 87-89.0, 3.67; B+ = 84-86.9, 3.33; B = 80-83.9, 3.0; B- = 77-79.9, 2.67; C+ = 74-76.9, 2.33; C = 70-73.9, 2.0; C- = 67-69.9, 1.67; D+ = 64-66.9, 1.33; D = 60-63.9, 1.0; D- = 57-59.9, 0.67; E = 56.9 or below, 0.0; **Note: A grade of C- is not a qualifying grade for major, minor, Gen Ed, Gordon Rule or College Basic Distribution credit.**

## **REQUIRED TEXT:**

There is no required text for this course. Most readings will be posted on Canvas course site or located directly on an internet site. There will be assigned readings for each week that will be used to supplement the lectures and labs.

The course website will be used to post background reading, lab instructions and useful datasets.

## **CLASS ATTENDANCE, MAKEUP WORK**

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Briefly, weekly attendance is expected for all students. To encourage uninterrupted participation in class, it is expected that cell phone and pagers and other electronics be turned off or to vibrate prior to entering the classroom.

Absences may be excused if they are documentable. For expected absences, you must provide two or more business days of the absence. Acceptable reasons for absences include but are not limited to personal or family illness or emergency, religious holidays, etc. Oversleeping, missing the bus, etc. are not excusable excuses.

In-class activities are designed to credit class attendance, and cannot be made up. Students are responsible for material missed during any class session (lab or lecture). S/he should obtain notes from a peer for the material covered in class. If the absence is unexcused, assignments not turned in at the assigned time will be considered late and a penalty applied.

## **STUDENTS WITH DISABILITIES**

**Students with disabilities:** Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation. <http://www.dso.ufl.edu/drc/>

**Other Concerns:** Please be aware that the University Counseling Center (392-1575), the Student Health Care Center (392-1161) and Student Mental Health (392-1171) can assist students as they work through personal, academic and social issues.