

FYOS 1001 - ECOLOGY OF INFECTIOUS DISEASES

John M. Drake

Fall 2018

Course Information

Class time: Mondays, 2:30-3:20

Location: Ecology 117

Instructors: Dr. John Drake (Office: 26 Ecology, email: jdrake@uga.edu)

Overview. The University of Georgia is world leader in the ecology of infectious diseases. In this class, students will learn about ongoing research projects from laboratories in the Center for the Ecology of Infections Diseases (CEID) through readings, discussion, and direct interaction with faculty scientists. Students will tour labs, discuss research, and read papers from CEID faculty housed in four different schools and colleges: College of Veterinary Medicine, School of Ecology, College of Public Health, College of Agricultural and Environmental Sciences. In this way, students will come to appreciate how different disciplinary perspectives address the ecology of infectious diseases and will be introduced to a variety of technical research methodologies and student research opportunities. This multi-disciplinary approach further shows how two of UGA's signature research themes—Inquiring & Innovating to Improve Human Health and Safeguarding & Sustaining Our World—are related. The research function of the university will be emphasized, focusing on how this research helps to achieve the service mission of UGA with applications in ecosystem conservation, public health, economic development, and international security.

Course objectives. The aim of this course is to understand the new interdisciplinary field of disease ecology. As a First Year Odyssey Seminar, the course has three goals:

1. Introduce first-year students to the importance of learning and academics so that we engage them in the academic culture of the University.
2. Give first-year students an opportunity for meaningful dialogue with a faculty member to encourage positive, sustained student-faculty interactions.
3. Introduce first-year students to the instruction, research, public service and international missions of the University and how they relate to teaching and learning in and outside the classroom so that we increase student understanding of and participation in the full mission of the University.

Format and assignments. Class sessions will consist of presentations by leading researchers and discussions of course readings. These sessions are designed to cultivate habits of mind that facilitate critical thinking and to introduce techniques of oral discourse. Students are expected to have read the assigned reading and be prepared for discussion. Short writing assignments will be used as a platform for exploration and knowledge development, to hone written communication skills, and to provide a basis for sustained reflection.

Readings. The readings for this class are written reports on research conducted by UGA scientists at UGA. All the readings are drawn from the *primary literature*, that is they are the journal articles in which researchers first publish their findings.

Attendance. Attendance is essential. More than one unexcused absence may result in a lowering of your final score by one letter grade. An excused absence is constituted by the student notifying the instructor in advance and documenting reason of absence immediately upon return to the class.

Grade calculation.

- 50% Participation and class discussions
- 40% Short writing assignments
- 10% Student sharing during final class session

Accommodations. Please contact the instructor if you require special accommodations due to learning disabilities, religious practices, physical or medical needs, or for any other reason.

Official University Policy. The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary. All academic work must meet the standards contained in *A Culture of Honesty*. Students are responsible for informing themselves about those standards before performing any academic work.

Schedule of topics

Date	Instructor	Reading	Topic
Aug 13	Drake	-	Introduction
Aug 20	Strand	Strand (2018)	Life history of mosquitoes
Aug 27	Hall	Murray et al. (2016)	Food subsidy and wildlife diseases
Sep 4	NO CLASS		
Sep 10	Gottdenker	Gottdenker et al. (2014)	Deforestation and disease transmission
Sep 17*	Murdock	Tesla et al. (2018)	Vector-borne diseases
Sep 24	Handel	Handel (2017)	Computer models of infectious diseases
Oct 1*	Byers	Keogh et al. (2017)	Trematode parasites
Oct 8	Ezenwa	Ezenwa et al. (2016)	Social living and parasitism
Oct 15	Altizer	Satterfield et al. (2015)	Animal migration and parasitism
Oct 22	Park	Bharti et al. (2011)	Measles in Niger
Oct 29*	Schmidt	Schmidt, J.P. et al. (2017)	Ebola spillover
Nov 5	Stephens	Stephens et al. (2016)	
Nov 12	Glenn	Eisen and Eisen (2018)	Ticks and wildlife disease reservoirs
Nov 19	NO CLASS		
Nov 26	Tredennick	Han and Drake (2016)	Forecasting infectious diseases
Dec 3	Drake	-	Wrap up

*Writing assignment due

Readings

Bharti, N., A. J. Tatem, M. J. Ferrari, R. F. Grais, A. Djibo, and B. T. Grenfell. 2011. Explaining seasonal fluctuations of measles in niger using nighttime lights imagery. *Science* 334(6061):1424–1427.

Eisen, R. J., and L. Eisen. 2018. The blacklegged tick, ixodes scapularis: An increasing public health concern. *Trends Parasitol.* 34(4):295–309.

Ezenwa, V. O., R. R. Ghai, A. F. McKay, and A. E. Williams. 2016. Group living and pathogen infection revisited. *Current Opinion in Behavioral Sciences* 12:66–72.

Gottdenker, N. L., D. G. Streicker, C. L. Faust, and C. R. Carroll. 2014. Anthropogenic land use change and infectious diseases: A review of the evidence. *Ecohealth* 11(4):619–632.

Han, B. A., and J. M. Drake. 2016. Future directions in analytics for infectious disease intelligence: Toward an integrated warning system for emerging pathogens. *EMBO Rep.* 17(6):785–789.

Handel, A. 2017. Learning infectious disease epidemiology in a modern framework. *PLoS Comput. Biol.* 13(10):e1005642.

Keogh, C. L., O. Miura, T. Nishimura, and J. E. Byers. 2017. The double edge to parasite escape: Invasive host is less infected but more infectable. *Ecology* 98(9):2241–2247.

Murray, M. H., D. J. Becker, R. J. Hall, and S. M. Hernandez. 2016. Wildlife health and supplemental feeding: A review and management recommendations. *Biol. Conserv.* 204:163–174.

Satterfield, D. A., J. C. Maerz, and S. Altizer. 2015. Loss of migratory behaviour increases infection risk for a

butterfly host. *Proc. Biol. Sci.* 282(1801):20141734.

Schmidt, J.P., Park, A.W., Kramer, A.M., Han, B.A., Alexander, L.W., and Drake, J.M. 2017. Spatiotemporal fluctuations and triggers of ebola virus spillover. *Emerging Infectious Diseases* 23(3):415.

Stephens, P. R., S. Altizer, K. F. Smith, A. Alonso Aguirre, J. H. Brown, S. A. Budischak, J. E. Byers, T. A. Dallas, T. Jonathan Davies, J. M. Drake, V. O. Ezenwa, M. J. Farrell, J. L. Gittleman, B. A. Han, S. Huang, R. A. Hutchinson, P. Johnson, C. L. Nunn, D. Onstad, A. Park, G. M. Vazquez-Prokopec, J. P. Schmidt, and R. Poulin. 2016. The macroecology of infectious diseases: A new perspective on global-scale drivers of pathogen distributions and impacts. *Ecol. Lett.* 19(9):1159–1171.

Strand, M. R. 2018. Composition and functional roles of the gut microbiota in mosquitoes. *Current Opinion in Insect Science* 28:59–65.

Tesla, B., L. R. Demakovsky, E. A. Mordecai, S. J. Ryan, M. H. Bonds, C. N. Ngonghala, M. A. Brindley, and C. C. Murdock. 2018, April. Temperature drives zika virus transmission: Evidence from empirical and mathematical models.