Topics: Ecological Forecasting
FREC 5884
Fall 2018

TIME & ROOM
Wednesdays, 10:15 - 11:15 AM
Cheatham Hall 217

INSTRUCTORS
Lead instructor: Dr. Quinn Thomas
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Office hours by appointment

Co-instructor: Dr. Cayelan Carey
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Office hours by appointment

COURSE OVERVIEW
How are our ecosystems going to change in the future? How do human activities affect this trajectory? The application of ecological forecasting – i.e., making predictions about the future state of ecosystems and the services they provide, with fully explicit uncertainties in those predictions – provides much promise for answering these questions. Due to recent advances in data availability and models, the ecological research community is poised to increasingly use forecasting techniques to predict many different ecosystem services, which will greatly improve management and society as a whole. However, there are many challenges to improving our ability to make forecasts, such as the need for improvements in ecosystem models, model-data fusion, and the quantification and analysis of uncertainties. This course will be centered on reading discussions, supplemented by additional papers from the literature. The capstones of the course will be: 1) analyzing the background and methods of *Ecological Forecasting*; and 2) identifying how forecasting could be applied to your own research.

LEARNING OBJECTIVES
By the end of this course, we expect all students to be able to:
- Understand the context of why ecological forecasting is an emerging subdiscipline within ecology
- Describe the forecasting cycle and workflow
- Understand the basic methods of ecological forecasting
- Analyze and critique peer-reviewed papers in ecological forecasting
- Identify how forecasting can be integrated into your own research

COURSE POLICIES
Your success in this course is dependent on your participation. You will be expected to regularly attend class, complete all of the readings beforehand, ask questions, provide feedback, and contribute to discussion. Being successful in science requires clear verbal communication of ideas, and we expect students to engage and lead discussions

throughout the course. Classes are structured around analysis and discussion of the reading materials, and you will be asked to work in teams to lead paper discussions. Please let us know beforehand if you will miss a class period or be late for research or personal reasons. If you feel that you are falling behind, I encourage you to seek help from your peers and from your instructors. Much of ecological forecasting is new and we are learning these methods as well. Please schedule a meeting with your instructors through email or by talking after class. Any student with special needs or circumstances should make arrangements to meet with us during the first week of classes.

REQUIRED TEXTBOOK: *Ecological Forecasting*, by Michael C. Dietze. Princeton University Press, 2017. You will need a copy of the textbook for course discussions; supplemental paper readings will be available through Canvas.

The book is available as an ebook:
https://login.ezproxy.lib.vt.edu/login?url=https://ebookcentral.proquest.com/lib/VT/detail.action?docID=4866481

PREREQUISITES: Graduate standing

COURSE PROJECTS
Ecological Forecasting peer review (due November 14): The course instructors collaborate closely with the author of the *Ecological Forecasting* textbook, who has requested feedback on the book in preparation for a second edition. For this assignment, all students are requested to provide a minimum of a 1-page peer review that can be shared with the author (Dietze) on the aspects of the book that they find useful and what needs revision.

Applications of forecasting into your research (due November 28): The second course capstone is a required paper (maximum 3 pages) on how forecasting can be implemented into your graduate research. Using the tools and information that you have learned in the course, develop a research question and outline the methods you would use to create ecological forecasts.

ASSESSMENT
Assessment of student performance will be based upon a pass/fail grading scale. Assessment will be based on the following assignments:

Assignment	Percent of final grade
Participation: attendance and contributions to discussion	70
Ecological Forecasting peer review	10
Applications of forecasting paper	20

Students are expected to abide by the principles of the Virginia Tech Honors System. The Honor Code pledge that each member of the university community agrees to abide by states: "As a Hokie, I will conduct myself with honor and integrity at all times. I will not lie, cheat, or steal, nor will I accept the actions of those who do." If you have any

questions about how the Honor Code applies to any assignment, you are responsible for obtaining specific guidance from me before submitting the assignment. You may work together on the presentations, GLM analysis, literature blitzes, science communication video, and debate preparation but you are expected to individually complete your research proposal. The Virginia Tech Honor Code can be found at: http://www.honorsystem.vt.edu.

SEMESTER COURSE SCHEDULE
Note: The topics covered and timing are subject to change

Week	Month	Day	Class plan	Topic
1	Aug	22	Clark et al. 2001, Dietze et al. 2018	Background and foundational concepts
2		29	EF Ch 1	Forecasting cycle and work flow
3	Sept	5	EF Ch 3 and 4	Informatics
4		12	EF Ch 5	
5		19	EF Ch 6	
6		26	EF Ch 8	
7	Oct	3	EF Ch 9	
8		10	EF Ch 11	
9		17	EF Ch 13 and 14	
10		24	EF Ch 14	
11		31	EF Ch 16	
12	Nov	7	EF Ch 17	
13		14	Paper reading	
14		21	Thanksgiving break; no class	
15		28	Paper reading; Class conclusion	

FEEDBACK AND EVALUATION
This course is for you to learn important fundamental concepts and ideas on which to build your understanding of ecological forecasting. We will do our best to create a positive learning environment. But because learning styles differ among individual students, some activities or approaches may not be optimal for you. If this happens, please let your instructors know! Because we need to keep the interest of all students in mind, we cannot promise that we will change the course, but we will listen and try to implement your suggestions.