COURSE OBJECTIVES: While this seminar will cover some technical aspects, the main focus is to increase a student’s understanding of the steps involved in conceptualizing inferential models in a GIS environment. Although many of the concepts of model-building and integrating spatial analysis and GIS discussed here are general enough to be appropriate for other types of applications, examples will focus on ecological models in general, and species distribution models (SDM) in particular. There is no formal lab component although students are expected to be familiar enough with a GIS software package (ESRI ArcGIS is recommended) in order to perform analysis for their final project as well as for a group modeling exercise. Additional experience with spatial statistics or other statistical analysis is highly recommended. An introductory GIS course is the only prerequisite, although students are expected to be very computer proficient in general.

READINGS: The main discussion will focus around 2-5 required articles per week that pertain to a specific technical or conceptual aspect of ecological modeling, as well as an article presented by a student. All of the readings (listed in references below) are available on-line. Students should use the list of recommended references to select a paper to present and discuss. Please let me know if you have any trouble getting an electronic version of any of the papers on the required or recommended list.

ASSESSMENT: Your grade will be determined based on an article report, SDM exercise, final paper/project, and contribution to class discussion.

- Article report (20%): Each student will select one article from the list of recommended references to read, review, and report to the class.
- SDM exercise (20%): Students will work in groups implementing all steps of developing a species distribution model using the same dataset; results are due April 5.
- Final paper/project (50%): The final paper/project will allow each student to implement a modeling project using real data within a GIS. The final paper should be written in manuscript format (~20 pages double-spaced; follow Ecological Modelling guidelines here: http://www.elsevier.com/wps/find/journaldescription.cws_home/503306/authorinstructions) and will be due by 5 pm on May 11. A rubric will be available on Blackboard.
- Participation (10%): Seminars depend on class discussion--be prepared to read and talk a lot!

CLASS STRUCTURE: In order to facilitate the discussion-oriented seminar format, all required readings must be read by the assigned date. Obviously in a class that meets only once a week, attendance is very important. Please see me ahead of time if you must miss a class.

TENTATIVE CLASS SCHEDULE:

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic(s)</th>
<th>Required readings</th>
<th>Student discussant(s)</th>
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<tbody>
<tr>
<td>Jan. 19</td>
<td>Introduction/course overview</td>
<td></td>
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<tr>
<td>Date</td>
<td>Topic(s)</td>
<td>Required readings</td>
<td>Student discussant(s)</td>
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<td></td>
<td>Prospectus due</td>
<td>TBA</td>
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<td>Feb. 23</td>
<td><strong>No class</strong></td>
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<td>Mar. 15</td>
<td><strong>Spring Break</strong></td>
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<tr>
<td></td>
<td><strong>SDM exercise results due</strong></td>
<td>TBA</td>
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<tr>
<td>Apr. 19</td>
<td>SDM issues: ?</td>
<td>TBA (x4)</td>
<td>14. 15.</td>
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<td>Apr. 26</td>
<td>Student paper presentations I</td>
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<td>May 3</td>
<td>Student paper presentations II</td>
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**Final paper due by 5 pm, Friday May 11**

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<tr>
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**MISCELLANEOUS DETAILS AND INFORMATION FOR GRRG396T (SP2012):**

**ARTICLE REPORT:** The report should take the form of a written (2-3 pages typed) and oral (10-15 minutes) summary and critique of the article. The summary should focus on the weekly topics we’ll cover in class (research question – data – model(s) – results) and should aim to place the article in the context of what we discuss. The student will also be responsible for leading the discussion about his/her chosen article, but all students are required to read the articles presented by other students and be prepared to participate in class discussion about them.

**PROSPECTUS:** A 1-2 page prospectus that outlines your plan for the final project will be due at the beginning of class on Feb. 16. The prospectus should consist of your research question, data, and the methods you intend to use, as well as what your intended spatial information product (SIP). I’ll provide additional resources for appropriate data if you don’t have your own.

**MODEL SOFTWARE EXERCISE:** Students will ‘compete’ in groups using the same data and a SDM method. The groups will follow the modeling steps outlined in class (conceptualization, formulation, assessment) and provide me with a GIS map of their SIP, a species distribution map, on April 5. Each group will submit a report outlining the steps they took and each individual’s contribution.

**REQUIRED REFERENCES:**


**Recommended References for Student Presentations:**

**Response data:**


**Scale/Predictor variables:**


Assessing outcomes:
• Fitzpatrick, M.C. et al., 2007. The biogeography of prediction error: why does the introduced range of the fire ant over-predict its native range? Global Ecology and Biogeography, 16(1), pp.24-33.

Uncertainty:
• Diniz-Filho, J.A.F. et al., 2009. Partitioning and mapping uncertainties in ensembles of forecasts of species turnover under climate change. Ecography, 32(6), pp.897-906.

Simulated Data:

Spatial autocorrelation:

**Spatial nonstationarity:**

**Effects of climate change:**