EVSC90026 Modelling Species Distributions & Niches

Credit Points:	12.5
Level:	9 (Graduate/Postgraduate)
Dates & Locations:	2016, Parkville This subject commences in the following study period/s: Semester 2, Parkville - Taught online/distance.
Time Commitment:	Contact Hours: 50 hours - subject is taught wholly online Total Time Commitment: 180 hours
Prerequisites:	At least one of the following or equivalent statistical knowledge:

Subject	Study Period Commencement:	Credit Points:
BIOL90002 Biometry	June	12.5
EVSC90020 Environmental Modelling	Semester 1	12.5
EVSC90016 Environmental Monitoring and Audit	Semester 2	12.5
MAST90044 Thinking and Reasoning with Data	Semester 1	12.5

Corequisites:	None
Recommended Background Knowledge:	Experience with the statistical program R is recommended. This is provided by the prerequisites.
Non Allowed Subjects:	None
Core Participation Requirements:	For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Student Support and Engagement Policy, academic requirements for this subject are articulated in the Subject Overview, Learning Outcomes, Assessment and Generic Skills sections of this entry. It is University policy to take all reasonable steps to minimise the impact of disability upon academic study, and reasonable adjustments will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact on meeting the requirements of this subject are encouraged to discuss this matter with a Faculty Student Adviser and Student Equity and Disability Support: http://services.unimelb.edu.au/disability
Coordinator:	Assoc Prof Jane Elith, Dr Jose Lahoz-Monfort
Contact:	**jose.lahoz@unimelb.edu.au (mailto:jose.lahoz@unimelb.edu.au)**
Subject Overview:	This online subject focuses on statistical models of the distribution of species and ecophysiological models of species niches. These two areas of environmental modelling have grown substantially in the last decade or two, and have become core parts of ecology. They are closely related, but they differ philosophically and practically. They are both used for understanding and predicting the distributions of species. The statistical models (also known as habitat suitability models, bioclimatic envelopes or ecological niche models) use observed geographical distributions to characterise relationships between a species and its environment and can be considered ‘top-down’ in approach. Ecophysiological (or mechanistic) models take a ‘bottom-up’ approach by characterising the physiological processes influencing a species’ distribution and integrate models of microclimates, energy balance, heat balance, and water balance. You will learn about both approaches from lecturers who are world experts in these topics. The subject will help you to understand the merits and drawbacks of the two approaches to species modelling and equip you with important skills that are in high demand in ecology and conservation. The subject includes the following topics: compilation, processing and

	management of data, fitting models by statistical estimation and empirical measurement, spatial prediction of distributions (mapping), and model evaluation.
Learning Outcomes:	On successful completion of this subject, students should be able to: 1 Understand theory about niches and distributions, and how this links to statistical and mechanistic modelling methods; 2 Select a modelling method appropriate for a given question and dataset; 3 Source appropriate data and prepare it for fitting models; 4 Fit statistical models with traditional regression methods and machine learning methods; 5 Develop mechanistic models using biophysical techniques for microclimates and organisms; 6 Use both models to predict spatial distributions; 7 Evaluate the models and predictions; 8 Gain experience using the free statistical program, R, for modelling and for working with spatial data.
Assessment:	Seven short answer exercises,150-200 words each, testing aspects of modelling – equivalent to 1250 words - due through the semester (25%). Develop and interpret a model of the niche of a species and write a report – equivalent to 1250 words due early-mid semester (25%). Fit and evaluate a species distribution model and write a report – equivalent to 1250 words due mid-late semester (25%). Write a report comparing mechanistic and correlative species distribution models – equivalent to 1250 words due end of semester (25%).
Prescribed Texts:	None
Breadth Options:	This subject is not available as a breadth subject.
Fees Information:	Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees
Generic Skills:	# Analytic skills – the course will improve students analytical abilities because they will deal with data and models and program in R; # Problem-solving skills – both through lectures and practical work the students will learn to think about the aim of modelling and the available data and choosing the correct way to analyse it; # Written communication – assignments and feedback from them will improve written communication; # Skills in planning a work flow – the two assignments require work flow planning; the pracs will teach the necessary skills.
Related Majors/Minors/ Specialisations:	Environmental Science Tailored Specialisation