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Teaching mathematical modelling in ecology: experiences from a new interdisciplinary course

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Although many of the most important academic problems lie at the interface of traditional disciplines, undergraduate students are rarely exposed to true interdisciplinary learning in their courses. Indeed, despite the necessity for mathematical and computational skills in modern biological and environmental research, most life science students lack any experience with higher-level mathematics or how to apply it. Here, I present experiences from a newly developed interdisciplinary Mathematical Modelling in Ecology course taught by myself (in the Department of Environmental and Ocean Sciences) and a colleague (Dr. Amanda Ruiz in the Department of Mathematics) at the University of San Diego (USD). In this course, both Environmental and Ocean Sciences majors and Mathematics majors and minors learned about how mathematical concepts can be applied to address ecological questions. This course used a novel “linked” design in which the two groups of students were enrolled in separate classes but that were offered at the same time; this allowed the two student groups to learn at different paces, but to sometimes be combined to facilitate peer learning and collaborative problem solving. In addition, each week there was a joint 3-hour lab, in which students from both classes worked together in groups on complex interdisciplinary assignments to address ecological questions using both mathematical and computational techniques. I will discuss both the successes and challenges from our first time teaching this course, both from a faculty perspective, and from end-of-the-semester student surveys. Lastly, I present potential future directions for this course and similar courses at other universities with the aim of further developing interdisciplinary curriculum at the interface of mathematics and biology.

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