

# Experimental Design for the Life Sciences (2<sup>nd</sup> Edition)

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Rather than being a book in which one dips to search for the answer to a particular question or for a desired fact, *Experimental Design for the Life Sciences* is a book to read through in its entirety: the student begins at the beginning and works through, learning how to design a good experiment in the life sciences.

Although it is black and white throughout (something that is now almost unheard of in high-school texts), the book is clear and accessible. It is well written and uses unadulterated language to explain each point, and the authors make no assumptions about the knowledge of the reader. In particular, they do not assume that the student is a mathematician. The common-sense approach addresses many of the mistakes we have all made (for example, “Keep more than one copy of your data!”).

The book’s main focus is on experimental design with living subjects, be they mice, people or cabbages. There are more examples that use animals than plants, but the emphasis is on the methodology involved in acquiring data and its treatment. The authors discuss experiments in controlled environments, such as labs, and examples from the field, such as vets gathering data about pet diets or samples collected from the wild.

One of the key points that the authors are keen to put across is that numbers – and statistics – are not everything. Just because you have lots

of bits of information and a pretty graph does not mean you have performed a useful or valid experiment. A well-designed experiment will actually reduce the need for statistical analysis.

This is a good point for two reasons: it reduces the work that needs to be done to reach a useful conclusion, and it reduces the strain on the organisms being investigated. To enhance the text, several tactics are used: key points are highlighted and repeated, and extra details are outlined in boxes. I found two parts of the book particularly useful.

First, throughout the text, the learning experience is enhanced by carefully crafted questions. Referred to as ‘self-test’ questions, they would also provide perfect stimuli for discussion and debate in small groups, or form the basis of essay topics. Answers are provided, but they are sometimes deliberately vague, and, in one case, the authors admit *we don’t know*. There is plenty of scope for students to go into greater detail, or even produce a completely different answer that can also be correct.

Second, the idea of ethics is repeatedly brought to the fore. Life sciences invariably involve living organisms, and they are often capable of suffering. The suffering that experiments cause – either directly or indirectly – was not something that required much thought when I was at school in the early 1980s, but is now something that, quite rightly, should be consid-

ered. The authors introduce questions of balance that could cause a lot of discussion amongst suitably motivated students (such as, should a small number of animals be treated several times, to reduce the total number that suffer, or should a large number be treated once per animal, to reduce the amount of discomfort that each animal experiences?).

The book would be as useful to students studying solely vegetable or microbial subjects as to those permitted to perform tests on animal or human subjects.

Would I use this book? Yes. It would certainly be useful to A-level classes (ages 16-18) and undergraduate students in the life sciences, even if it is not on their official reading lists. I would even consider using it to extend more able GCSE classes (ages 14-16).

## Details

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