

**Intended learning outcomes for scientific enquiry, experimental design and data exploration/analysis**

*At the end of third year, a Zoology graduate should be able to:*

1. Describe how science proceeds
2. Identify scientific questions based on observations
3. Understand the purpose of null and alternative hypotheses ( $H_1$  &  $H_0$ ) & be able to formulate testable hypotheses
4. Have a knowledge & understanding of the language of experimental design
5. Design an experiment to test a hypothesis
6. Identify a sampling method which will produce data to adequately test the hypothesis
7. Have an understanding of Type I and II errors (recognize when they might occur and how to minimize the risk)
8. Identify data type
9. Use Excel to graph data (including standard error bars) and to calculate summary statistics using formulae
10. Describe variability of data
11. Describe what that data means in biological terms
12. Understand the need for statistics as a tool to analyse biological data
13. Have an understanding of the mechanics of
  - a. Groups comparisons (t-test & ANOVA)
  - b. Relationships (Correlation & regression)
  - c. Goodness of fit (chi-squared analysis)and match each type of test to the type of biological question it addresses
14. Have an understanding of the assumptions underpinning those tests & an awareness of the non-parametric alternatives
15. Correctly interpret p-values and relate statistical significance to the biological question being asked.
16. Critical assess the reliability of experimental results
17. Be able to read and understand a framework for choosing an appropriate statistical test
18. Have experience with a statistical package.