



8 | Support for Numerical Methods – NuMBers



It is widely recognised that bioscience undergraduates need good quantitative skills (Tariq, 2004; Tariq et al. 2005). The NuMBers (Numerical Methods for Bioscience Students) project was funded by the UK Centre for Bioscience Departmental Teaching Enhancement Scheme and aimed to strengthen the integration of statistical and other numerical methodologies into the biosciences curriculum. This project built on a highly successful module and text book called 'Biomeasurement' (Hawkins, 2005) was designed to improve these skills through the creation of a web based resource centre containing technique specific "toolkits".

The approach taken was to produce "toolkits" for each technique, in total 30 are included within the resource. The toolkits were initially accessible through a central intranet access point (WebCT) to facilitate the collection of usage statistics. The toolkits were then moved to a stand alone web based resource available at <http://web.anglia.ac.uk/numbers/>. This is an open resource available to the wider bioscience community.

A key aim of the resource design was not only to provide guidance on how to apply a specific technique, but also to help with the decision over which suitable technique should be applied to a data set. To achieve this each toolkit can be accessed via either an alphabetical list of techniques or a 'test selector' which helps students choose the appropriate statistical test.

Each toolkit consists of six main sections:

- When to use or apply: A summary of when it is appropriate to use the technique.
- How to use or apply: Instructions on how to perform the technique.
- Example data sets, relating to modules: Datasets explicitly supporting class work and assessment exercises involving the technique across a range of biomedical discipline areas.
- Self-assessment: Self tests which can be used for formative assessment.
- Further Information: Links to other sources of information and support such as Mathtutor (www.mathtutor.ac.uk/)
- Links to a glossary.

The key features of the toolkits are:

- Consistent and familiar environment to promote ease of use.
- Emphasis on when and how to do the techniques rather than why they work to promote the idea of maths as a tool for biologists.
- Specific subject and precise examples to promote motivation to learn.

- Explicit links to modules to promote integration of support of statistical and other numerical methodologies into the bioscience curriculum.

The project was monitored and evaluated over a full academic year to gather the views of students and staff together with usage statistics. The project had a positive impact on the staff and students in the Department of Life Sciences where it was trialled. This evidence came from a number of formal and informal sources including discussions with staff and students and qualitatively from WebCT access data. Eighty five per cent of the toolkits were identified as being used in at least one bioscience module.

The most popular resources relate to the biostatistical part of NuMBers particularly the Mann-Whitney U test and the Two-way Chi-square test toolkits. This was the first material produced and so was available for the longest and promoted more effectively by staff. Other popular toolkits were simple topics such as measurement, solving equations, variables, concentrations and powers.

The evaluation of the NuMBers resource highlighted two key issues. Some of the numerical techniques being provided for the students in the Department of Life Sciences were equally applicable to a range of other disciplines. Additionally some students were impeded from using numerical methods because of a lack of confidence in core basic skills, such as solving equations or understanding logarithms or powers. We have added some extra resources to the NuMBers site however cannot address all topics and the needs of potential users within this project. On this basis we are developing a cross- discipline numerical support package, the Students Upgrading Maths Skills (SUMS) project to address these issues (www.step-up-to-science.com/SUMS/).

References

- Hawkins, D. (2005) *Biomeasurement*: 2nd Edition, Oxford, Oxford University Press
- Tariq, V. (2004) Numeracy, Mathematical Literacy and the Life Sciences. *MSOR Connections*, 4, 25-30
- Tariq, V., Stevenson, J. and Roper, T. (2005) Maths for Biosciences: Towards Developing an Innovative E-learning Resource for Post-GCSE Students. *MSOR Connections*, 5, 1-5

Dawn Hawkins, Toby Carter and Jacqui McCary

Anglia Ruskin University
dawn.hawkins@anglia.ac.uk
toby.carter@anglia.ac.uk
jacqui.mccary@anglia.ac.uk