

## Interactive electronic lectures on genes and chromosomes

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Brunel University is proud to present computer-based courseware implanted in an interactive virtual learning environment (VLE) in the chromosomal aspects of genetics. This courseware can be used either as a revision aid (supporting previously delivered didactic lectures) or as a means of primary delivery of courseware (which can then be supported by seminars). In our experience, some students prefer the latter approach as it allows them to learn the material in their own time, at their own pace, using their own learning processes and in a place of their own choosing. In this way the students learn the material using their computer terminals and are supported with face-to-face seminars in which any problems, directions for further reading and examination technique can be addressed. A further bonus to this approach is that tutors occasionally report that, although they are spending less time talking at the students, the time they do spend is more quality time and more enjoyable as a result.

In this case the virtual learning environment (VLE) developed by Evans and Edwards (1999) was used with adaptations. This VLE, written in *Macromedia Authorware 6.0* contains a series of design features that ensure that the courseware is delivered in a manner that does not include the interactivity and usability mistakes common to much online learning material (Evans and Edwards 1999; Evans, Gibbons, Shah and Griffin 2004). For instance the VLE has a navigation bar visible at all times, the courseware is broken into a series of topics and subtopics and, within each subtopic, the material is delivered by 'electronic page turning.' The material is broken up into 'chunks' allowing it to be readily learned and the use of multi-media, interactions and self-assessment questions are a common feature of the courseware (Evans and Edwards 1999). In our studies we have established that, in order for virtual lectures to work properly, they must be presented in a VLE such as this one: simply putting notes and pictures on the web is not sufficient (Evans et al. 2004).

In the courseware, the following topics are included:

1. Revision of mitosis, meiosis, chromosome formation and structure (this will contain videos of cell division and chromosome coiling);
2. Meiosis, Genetics and Genetic mapping;
3. Chromosome preparation, banding and staining (with a series of pictures and examples);
4. Karyotyping and chromosomal disorders (with a practical exercise);
5. Incidence and origin of aneuploidy;
6. Chromosome mosaicism;
7. Chromosomal disorders in the clinic;
8. Fluorescence in-situ hybridisation;
9. Physical gene mapping;
10. Chromosomes and cancer; and
11. Chromosome evolution;

The teaching of genetics in university biological science courses is widespread and a component of most undergraduate degree programs. However, chromosomal aspects of genetics (e.g., karyotyping, fluorescence in-situ hybridisation (FISH), chromosomal configurations at meiosis) are often under-taught. This is, we surmise, because the majority of genetics lecturers have done their post-doctoral research with a molecular background and relatively few in a cytogenetic setting. In our opinion the principles of genetic mapping, FISH, chromosomal disorders, genetic basis of infertility are best taught from a chromosomal perspective and molecular cytogenetics has a lot to offer in terms of understanding physical gene mapping, cancer genetics and the genetic basis of disease in general. We thus perceive a particular need to present courseware in this area and therefore the above topics were included.

We are hopeful that our courseware will meet a need common to many biological sciences departments. Our confidence is based on a number of factors.

- First, we are now using this form of delivery in several of our modules.
- Second, the provision of this courseware will cut down on lecture preparation time. We think this will be particularly attractive for new lecturers who have to balance a series of commitments involving teaching, research and administration.
- Third, teaching of this type can be student centred and thus in keeping with the latest pedagogical theories on the best way in which students should be taught.
- These lectures are easy to use and freely available from the Centre for Bioscience.

## **Acknowledgements**

We would like to acknowledge Dr Chris Evans of Brunel University, whose interface was used in this project.

## **References**

- Evans, C. and Edwards, M. (1999) Navigational Interface Design for Multimedia Courseware, *Journal of Educational Multimedia and Hypermedia*, **8**,15–174.
- Evans, C., Gibbons, N.J., Shah, K. and Griffin, D.K. (2004) Virtual learning in the biological sciences: pitfalls of simply ‘putting notes on the Web’, *Computers and Education*, **43** (1–2), 49–61.

*This article first appeared in the Centre for Bioscience Bulletin (number 14, Spring 2005). The Centre for Bioscience is part of the subject network of the Higher Education Academy.*