Review of Learning and Teaching

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Dundee Learning & Teaching

- you like it (NSS & league tables, 96% satisfied)
- Employers not always so sure (Unistats 60%)
- Graduates not as competitive as they could be with e.g. Europe... (Bologna)

Delivery complex...

1. 130 credits
2. 330 credits
3. >600 credits
4. >800 credits + projects

...lots of choice, therefore lots of variability in knowledge

'degrees by accretion, not by design'
### What should a life sciences degree (at Dundee) be?

- Fewer facts and figures – they’re on a computer or in a book somewhere
- More judgement – how to find, assess, and use the information
- Less demonstration, more preparation
  - Principles and skills from the beginning
  - Lab classes should be about discovering things, not being shown them – that needs confidence, and confidence takes time...
- The opportunity to be part of one of the world’s finest life science research environments – because if you’re given the skills early to take advantage of it, then you’ll do well later...

### The Plan

- Reduced in content, focused on laboratory skills and competencies, core principles and knowledge.
- Aligned with research, making best use of the resource available in SR for delivering world class undergraduate degrees.
- Single-entry degree approach with specialization (i.e., use the choice of subjects at levels 3 and 4 to define the degree), so degrees are more fully integrated
- Include an Integrated Masters option, to support the aim of producing graduates who are competitive in the research market, and hence of value to all markets.

### Timescale?

- New level 1 course – 2011/12
- Level 1 entry 2010, would see changes to levels 3 and 4, with the option of an Integrated Masters;
- Current Level 1 students: we would look to rationalise level 3 and change level 4 before you get there;
- Current Level 2: some changes at level 4, and could add the integrated Masters for you (but this needs change at level 4). Level 3 largely unchanged;
- Current Level 3: no significant change

### LTC 17/5/2010 Questions

- Working across Schools & Colleges (shared modules)
- Assessment diets – avoid exams?
- Synoptic testing: working across modules
- Personalised education: level 2 entry
- How much, and how wide a choice?
Annex II: What should a Life Sciences degree be?

Discovery Days 2010

The world has changed: thirty years ago, a University education in biology was an opportunity to explore the wonders of the life sciences while learning how to live, how to question, how to make judgements, both good and bad. It allowed a relatively small number of people to enjoy the pleasures of discovery, and produced people who have made significant contributions to pushing back those boundaries of biological sciences: understanding our world, and our place in it; and understanding ourselves, our health and how to improve it: there is no doubt that biological research over these past thirty years has made an enormous difference to everybody’s life.

Thirty years ago, a degree in zoology was an intensive immersion in zoology: it was an essentially whole organism discipline, full of black boxes: areas where there was no holistic understanding of how things worked, or why. This made it a subject of facts, not principles: of learning what happened, not how.

Thirty years ago, Margaret Thatcher became Prime Minister: Since then, a great deal of change has happened in Higher Education, primarily driven by two things: the cost of Higher Education, and the inherent unfairness of a system that only allowed 10% of any year group access to higher education. Under that 1979 Tony government, the perceived excesses of the University sector were looked at, and a squeeze on resource began which carried on for many years. As times changed, and more especially when Labour came to power, the number of students in Higher Education started to climb dramatically, ostensibly addressing the fairness issue through the debate on widening participation and access to education. It is the combination of these pressures, coupled with changes in the primary and high school curricula, that give us the kinds of headlines we see every year, about the devaluing of degrees, ‘because they are not like they were thirty years ago’.

So all subjects taught at University have had to address these challenges, and there have been enormous developments in moving from a very personal education system to a successful mass education system, using different pedagogic approaches, and taking advantage of e-learning approaches; helping students become self-learners, a strategy which is seen as much the best way of helping individuals develop all through their lives, not just at University.

Why are the biological sciences any different? If we go back to our example of the zoology degree, several things have happened in the development of the biosciences over the last thirty years which have made this old approach not only too expensive, but not relevant, and it has to do with those black boxes, and the concept of ‘systems biology’.

There has long been a debate that, to understand how something works, you need to get really down into the detail of the smallest part: the reductionist approach that so characterises many aspects of the physical sciences. In biology, it was long felt that this approach would work here as well, a debate that, for many years, led to a split between reductionists and whole organism researchers. I am being extreme, but these differing approaches to the study of life did lead to the development of apparently distinct subjects – the biochemical, cellular and molecular sciences, and the organismal, community and population approaches. Systems Biology is a new approach that tries to integrate these different approaches, because it was becoming clear that the black boxes I mentioned before could be opened.
at different levels: that an understanding of a cellular process could help explain a behavioural or community action.

At the same time as these developments were taking place, biology was becoming a data-rich subject – the reductionist approach was producing huge amounts of information, about sequence, gene structure and expression, all managed and analysed through the increasing computing power available to the individual biologist, culminating in whole genomes being sequenced but not immediately understood – myriad examples of systems which were each part of a greater picture, and so the reductionists recognised that they needed to understand the organism at a higher level. Likewise, those who were studying communities and populations found that the tools provided by these reductionist approaches, things called PCR and DNA fingerprinting, could be used as very efficient research tools, and all of a sudden a systems approach makes sense: both approaches complement each other, to give a better overall understanding of the lives being studied.

Let’s go back to that zoology degree: now, as well as all the material on form and function, taxonomy, morphology and physiology which already filled the average undergraduate degree, zoologists also needed to learn genetics, biochemistry, molecular biology, neuroscience, and maths – quite a lot of maths! Unfortunately, it seems to be a trait of biologists that they find it difficult to get rid of material quite as rapidly as they introduce new material.

So it’s time to reassess what a biology degree should be, and perhaps all that knowledge is no longer directly necessary: we are surrounded by information, and the trick is to know what information is useful and what is not. We need to define the basic set of information a biologist needs, and the skills to use it in pursuit of other knowledge – in other words, train our students to use the principles now being developed through a systems approach as the basis for their own learning development in the life sciences: all those things that people say higher education should be about; critical review of the evidence, synthesis and the personal experience of discovery in a laboratory environment. All of these are skills that can then be applied to any challenging job the country needs doing.

Why Dundee? Two reasons, one Scottish and one Dundonian: the Scottish education system, with its broader secondary base, and its longer University experience, lends itself much better to this move from specialist to generalist than anywhere else in the UK; on top of that, Dundee Life Sciences has a deeper understanding of the difference between knowing what and knowing how than almost any other institution in the UK: together it becomes possible to change the world.

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Wednesday, 06 January 2010