Overview course handout for DB4 Cellular Mechanisms of Development

Important: this overview handout does NOT cover the details of what we will do in each session (it cannot, because you shape the course yourselves, as will be explained below). Detailed information will appear only on the course web page, at the following address:
http://golgi.ana.ed.ac.uk/coursenotes/honours.htm.

Learning method: Cellular Mechanisms of Development is now done as a course of interactive seminars rather than didactic lectures. The reason for this is that a university education, especially one at Honours level, should lead you to develop strong skills at the upper levels of Bloom's taxonomy of learning[1,2] (Fig 1 – I assume you have long been familiar with it): lecture courses drive most students to concentrate only on the lower level activities at the base of the pyramid[3,4]. The upper levels are very important for everyone, not just those who will go on to do PhDs – indeed, it is *even more* important for people who will leave science that they develop good upper level skills, because an employer outside science will select you (or not!) for these higher level skills and not because you remember every detail of the Wnt signalling pathway.

Fig 1: Bloom's Taxonomy of Learning[1], as adapted by Anderson & Krathwohl[2].

Seminars require your active engagement as a group[5], both during the seminar sessions themselves, when you will discuss important problems and issues in development, and try to make sense of things, and also in 'homework' between the seminars.

The syllabus will begin with a very broad analysis of problems in developmental biology, and the output of your discussions will be used to set the broad syllabus of the rest of the semester (which will be published on the web just after the first seminar has ended). At the end of each week's session, we will consider the topic for the next week and I will guide you to design appropriate 'homework' tasks so that you, as a group, gather sufficient factual material to make the next week's seminar a success. I can act as a source of information too, of course, but my knowledge will not be enough for the depth of problems we want to discuss – we will all need to work together. We will take a coffee break half-way through, in the Swann cafeteria.

Overall Learning Outcomes: by the end of this course, you should be able to:

- Create and present reasonable hypotheses to account for observed data on development.
- Design experiments (in outline), with appropriate controls, to test hypotheses about developmental cell biology.
- Analyze experimental data from experiments to draw conclusions (and avoid unsafe ones)
- Write coherent arguments about where (in the context of development) biological control lies, how complexity arises, the balance between 'nature' and 'nurture' in development, and why life may have evolved in the way it has.
- Draw on examples of real data to support any arguments you make.

(Remember, these are the over-arching outcomes – we add detail together).

Cont...

Core text: until the syllabus is written (by you), I do not know how useful this book will be, but it did grow out of the cellular mechanisms course: Davies JA (2013) *Mechanisms of Morphogenesis*, 2nd Edition. Elsevier.

Feedback:

- I provide 'real-time' constructive feedback in seminar sessions (don't worry – in such a public environment I do this by highlighting what is good: I do not dwell on negatives).
- In the last session, devoted to revision, I will provide feedback on your group efforts to plan exam essays etc.
- You are welcome to contact me (jamie.davies@ed.ac.uk) or see me (Hugh Robson Building – but e-mail to make an appointment) to request more detailed individual feedback on your work.

References (to support statements made in this document, not for the course itself)

1. Bloom BS. (1956) *Taxonomy of Educational Objectives* (1956). Allyn and Bacon, Boston
2. Anderson, LW, Krathwohl DR. (2001) *A Taxonomy for Learning, Teaching, and Assessing: A Revision of Bloom's Taxonomy of Educational Objectives*. Allyn & Bacon. Boston.
3. Saran R, Nieser B (2004) *Enquiring minds: Socratic dialogue in education*. Trentham books.
4. Anderson JH, Bellenkes AH (2013) *Dynamic Seminars: a practical handbook for university educators*. Palgrave.
5. Laughlin P, Hatch E, Silver J, Boh L (2006) Groups perform better than the best individuals on letters-to-numbers problems: effects of group size. *J. Personal and Soc Psychol* 90: 644-651