Overview: Several broad subjects in molecular biology will be selected as 'blocks' for the course. Examples might include riboswitches, gene silencing, DNA repair, miRNA specificity, lncRNAs, 'junk' DNA and constructive neutral evolution, nonsense-mediated decay, global analyses of mRNA and protein abundances and their relationship, evolution of the genetic code, stochasticity in gene expression, and translational fidelity. Each block will consist of ~4-6 class sessions. The instructor will use one class to provide background at a deeper level than students will have seen in basic Molecular Biology or Cell Biology classes; reviews and excerpts from textbooks will be used for background reading. The remaining 3-5 classes for each block will entail close reading, presentation, and discussion of scientific papers,usually 2 to 3 within a block such that one primary scientific paper will be read each week, in addition to background textbook and scientific review articles. Students will have shared responsibility for presenting aspects of each paper, as assigned by the instructor.

In terms of content, this module is most similar to YSC3257 Molecular Biology but is completely different in terms of structure and expectations, and the depth with which topics will be discussed. YS3257 is mostly a conventional lecture and textbook based course that covers a broader set of topics than this module does, but does so in a more superficial manner

Learning Goals: On successful completion of the course a student should be familiar with the skills that are expected of those continuing in science as a profession, and have made progress in acquiring and practicing those skills themselves. In particular, students will be expected to have
(i) read the primary scientific literature in a range of topics within the field of molecular biology,
(ii) presented papers to an audience in a comprehensible manner, effectively using graphics beyond those used in the paper,
(iii) engaged in group discussion about the methods used and the conclusions reached,
(iv) engaged in debate about the qualifications and caveats that apply any conclusions reached, and
(v) be able to think about additional experiments that might help resolve uncertainties.

Assessments

Contributions to discussions : 20%

It is expected that students will show up for every class for which they do not have an MC or AD note, and they will participate actively in every discussion. This portion of the grade is independent of the assessment of oral presentations

Paper section presentations: 50%

As enrolment in this advanced module can be expected to be sufficiently small, it should be possible to assign a bite-sized role to every student in presenting every primary paper we read. Papers will be divided up based on the figures (including supplementary figures) and methods, and students will be given the job of summarizing what was done, how, and what the interpretation is. It is expected that presentations regarding methods will entail the use of graphics other than those available in the paper. As there will be 5 or 6 subject blocks with 2 or 3 papers in each block, it is anticipated that there will be roughly one presentation per week (13 in total) upon which to base this 50% of the grade.

Written exercises in the assessment of paper figures: 30% (3x10)

For any three of the subject blocks, students are to identify a related paper that contains at least four figures. They are to choose the one figure they consider best, whether because it is the single most important bit of evidence for the conclusions of the paper or because it is a good model of effective scientific communication. Students are to write at least 250 words explaining their choice.