

An Introduction to Honours in Biochemistry

The intention of the Discipline of Biochemistry Honours course is to provide students with the critical know-how and technical skills required for their future participation in both the scientific and general communities. We believe that this is best achieved through an academic program that combines intellectual rigour and stimulation, with broad technical training.

The Future of Biochemistry Research

A major focus for the Discipline of Biochemistry in the last few decades has been the identification of genes, and description of their organization and expression. Now, given the availability of whole genome datasets for literally hundreds of organisms and exponential growth in gene expression and proteome information, much of this basic descriptive activity is drawing to a close. The attention of molecular biologists is increasingly turning to the exploration of the functional and regulatory aspects of genes and gene products, and how these components combine to produce biological "systems." Furthermore, the astonishing progress in the development of sophisticated experimental techniques has made plausible the ambitious goal of understanding how the activities of the basic building blocks of genes and proteins collaborate to produce the emergent properties of higher order biological systems such as the brain.

Training students for participation in this exciting future is a key activity of the Discipline of Biochemistry. We submit that future breakthroughs in molecular biology will come to those who, in addition to training in a specialty area, gain a broad understanding of a variety of biological disciplines, including developmental biology, stem cell biology, protein structure, protein chemistry, gene regulation, neuroscience, and systems biology. All these areas are represented strongly in the various research programs within the Discipline. All Honours graduates from the Discipline of Biochemistry can expect to have acquired specialist skills and knowledge in some of these areas, and a general intellectual appreciation of all these areas. Graduates with this exposure and experience will clearly dominate employment opportunities at the level of basic research, and in the burgeoning biotechnology industries.

The Honours Year in the Discipline of Biochemistry

The major purpose of the Honours course is educative and intended to give you experiences and skills that prepare you for the activities of a research scientist. First, the Honours year starts with participation in a class Journal Club during which you will learn how to read and understand the current molecular biological literature, how to analyze and criticize scientific data, and how to condense an area of research and communicate and discuss its essential features with an audience. Secondly, you will prepare a Research Proposal, an activity that encourages you to think speculatively, critically and/or creatively in an area of science, and refines your scientific written and oral communication skills. Thirdly, your Thesis Research will develop your ability to plan, execute, interpret and analyze purposeful experiments and to communicate the results. The thesis project is research based and occupies most of your year.

Honours students each join a Biochemistry (or Biochemistry affiliate) research group and pursue their own project within the overall research aims of that group. At the end of the year the students present their data, interpretations and discussion as a thesis, which is read and defended orally before all the academic staff. Each of the staff mark the thesis research (40% of final grade) and the supervisor submits a grade (20%).

The Honours journal clubs are held once a fortnight over a number of weeks early in the year. Each journal club will require a short written assessment of the article under discussion, and each meeting will be run by one or two Honours students acting as discussion leaders. Student performances are marked each week by an academic staff member who sits in on the journal club. The final mark for the journal club (15%) is a sum of the individual session marks and comments are returned to the students via their supervisor.

The Honours Research Proposals are presented in mid-year. From your general reading you pursue an area that interests you and either propose a biological mechanism, structure, purpose, pathway or whatever, and suggest appropriate experiments, or criticize published interpretation of published data, or some long held dogma, and suggest appropriate experiments, or present a description

of an area of research that you would argue worthy of activity, and present experiments. In short, you are expected to come up with an original, testable proposition. The Research Proposal is presented (written and verbal) and defended before the academic staff, each of whom grade it (25% of final grade).

Employment Opportunities

Honours graduates from the Discipline of Biochemistry have traditionally had little difficulty in finding placements. The breadth of the training provides a suitable platform for entry into postgraduate training in most areas of biological research, medical and agricultural research and biotechnology. Many of our graduates now hold key positions locally, nationally and overseas in universities, research institutions and companies. Importantly, the analytical and technical skills acquired during the Honours year are highly valued by employers both within and outside the scientific field.

Facilities

The School of Molecular and Biomedical Science is well equipped for all aspects of research. It owns or has access to all basic equipment required for molecular and cell biology; a state of the art three-laser fluorimager/ phosphoimager, a 600MHz NMR spectrometer, spectrophotometers, high quality light microscopes, confocal and electron microscopy, digital imaging and computationally intensive image processing, cell sorting, cell culture facilities, transgenesis, protein sequencing, mass spectrometry, high- performance computing, HPLC and FPLC, and zebrafish facilities. We also take advantage of a range of sophisticated protein analysis tools in the new Adelaide Proteomics Center located on the first floor of the MLS Building.

Honours students are considered full members of the research groups and are provided with bench and desk space, and have access to equipment on the same terms as all other researchers. All research consumables, technical support, computing equipment, washup, stationery, photocopying and photography are provided by the Discipline.