CBMS833

Functional Proteomics

S2 Day 2015

Dept of Chemistry & Biomolecular Sciences

Contents

General Information

Unit convenor and teaching staff
Unit Convenor
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Credit points
4

Prerequisites
Admission to MBiotech or MBiotechMCom or MLabQAMgt or PGDipLabQAMgt or GradDipLabQAMgt or GradCertLabQAMgt or MRadiopharmSc or MMarScMgt or MBioBus

Corequisites

Co-badged status
The 4 credit point unit CBMS833 outlines chemical principles underlying the most recent developments in protein science. From 2013 onwards, CBMS833 will be co-taught with CBMS733 which is a postgraduate unit for students in the Masters of research degree program. The unit extends previous work undertaken in CBMS832, which included an understanding of the emerging new disciplines of proteomics, structural biology and bioinformatics. There is no formal prerequisite to complete CBMS832, but it is desirable. CBMS833 focuses on the proteomic methods used in the biotechnology and pharmaceutical industries to isolate, characterize, analyse and purify proteins using advanced proteomic technologies. The practical includes 1D and 2D protein gel separation, in-gel digestion of separated proteins, mass spectrometric analysis, database searching for protein identification, and shotgun proteomic quantitation. The specific postgraduate learning outcomes are focused on understanding current scientific literature in the field of proteomics. Students are required to research an essay topic based on an analysis of relevant literature, and present their work as a scientific review article suitable for publication. In addition, the practical laboratory report is required to be analysed and presented in a format suitable for publication. The 3 credit point unit CBMS333 shares the same lectures and tutorials as CBMS833. However, CBMS333 students are not required to submit the literature review essay, submit a laboratory practical report in a different format, are subject to different assessment marking schema, sit a different exam paper, and can expect distinct learning outcomes. CBMS833 is offered internally in second semester only. There are two hours of lecture time and two hours of tutorial time per week, plus a five full day practical component taught during semester break.

Unit description
Functional proteomics is the study of protein expression in living systems, considered in a functional context. This allows us to better understand how protein networks become dysfunctional, which in turn enables the manipulation of protein functions and cellular phenotypes through the use of drug treatment, or genetic or environmental intervention. This unit covers the principles and applications of functional proteomic techniques, and assumes basic knowledge of protein electrophoresis and mass spectrometry. Topics include: a detailed study of advanced techniques, instrumentation and protein identification software in mass spectrometry; two-dimensional differential gel electrophoresis; label-free and isotope-labelling quantitation in proteomics; application of different types of peptide- and protein-based shotgun proteomics approaches; characterisation of protein post-translational modifications including phosphorylation, glycosylation and others; and application of proteomics in the pharmaceutical industry. Students must attend a compulsory one week laboratory session during the session break.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

Become familiar with the process of preparing written work in formats suitable for publication in peer-reviewed scientific journals

Communicate to their peers a summary of a recent publication in a contemporary area of proteomics, and produce their own peer-review of that publication

Develop skills in critical thinking and analysis, and written and oral presentation of scientific information

Extract and summarise from the scientific literature information required to develop a research plan within a relevant area of proteomics

Understand technologies used in proteomics

Comprehend the chemical, biochemical and biophysical processes involved in proteomics

Exhibit a sound knowledge of how to apply proteomics technologies to answer biological questions

Gain hands-on practical experience in a range of proteomics techniques

Assessment Tasks

Name	Weighting	Due
Mini-Review Essay	15%	9am Friday September 4th
Oral Tutorial Presentation	15%	Variable
Continuing assessment	5%	variable
Mid-semester test	5%	mid-semester
Practical Report	20%	Friday October 16th
Final Exam	40%	To be advised

Mini-Review Essay

Due: **9am Friday September 4th**
Weighting: **15%**

Mini-Review Essay (Due 9am Friday September 4th) 15%

Topic: Compare and contrast the way in which proteomics studies are performed in current literature as opposed to those performed ten years ago.

- 2000 word mini-review article suitable for publication (not including references, diagrams, tables or figures that are encouraged)

- Must conform to the Instructions for Authors for a review article submitted to “Proteomics”. Look up the Proteomics website at

[www.proteomics-journal.com] and find the most recent instructions and follow them.Each year a special issue is published that contains only review articles. Make sure you read at least one of these before you start writing.

On successful completion you will be able to:

- Become familiar with the process of preparing written work in formats suitable for publication in peer-reviewed scientific journals
- Develop skills in critical thinking and analysis, and written and oral presentation of scientific information
- Extract and summarise from the scientific literature information required to develop a research plan within a relevant area of proteomics

- Understand technologies used in proteomics
- Exhibit a sound knowledge of how to apply proteomics technologies to answer biological questions

Oral Tutorial Presentation

Due: **Variable**
Weighting: **15%**

Oral Tutorial Presentation **15%**

Choose one publication from the Tutorial Papers List on the iLearn site (on a first-come first-served basis)

Present your critique of the topic as a short Powerpoint seminar (10-12 minutes, with 5 minutes for questions, but we may adjust that depending on class numbers)

Participation in all other group's topics contributes to your final mark

Include your own brief peer-review of your chosen paper - tell us whether you think this paper should have been published and why.

- **NEW from 2014**: The research tutorial presentation will now be accepted as a video presentation uploaded in advance to youtube. It must include figures, graphics, text (and some footage of the presenter). You can either record straight to video camera, or use software such as iMovie or Windows Movie Maker which is also good for this.

On successful completion you will be able to:

- Communicate to their peers a summary of a recent publication in a contemporary area of proteomics, and produce their own peer-review of that publication
- Develop skills in critical thinking and analysis, and written and oral presentation of scientific information
- Extract and summarise from the scientific literature information required to develop a research plan within a relevant area of proteomics
- Understand technologies used in proteomics
- Exhibit a sound knowledge of how to apply proteomics technologies to answer biological questions

Continuing assessment

Due: **variable**
Weighting: **5%**

Continuing assessment: Weekly Speaker Questions **5%**

You will be given 5 minutes at the end of each lecture in which you are required to write down and submit a question concerning the lecture for the the day. This must demonstrate some understanding of the topic that has been presented.

On successful completion you will be able to:

- Develop skills in critical thinking and analysis, and written and oral presentation of scientific information

Mid-semester test

Due: **mid-semester**
Weighting: **5%**

Mid-semester test **5%**

This will typically be a multiple choice quiz aimed at helping students assess their area of strength and weakness prior to the final exam.

On successful completion you will be able to:

- Develop skills in critical thinking and analysis, and written and oral presentation of scientific information
- Understand technologies used in proteomics
- Comprehend the chemical, biochemical and biophysical processes involved in proteomics

Practical Report

Due: **Friday October 16th**
Weighting: **20%**

Practical Report (Due Friday October 16th) **20%**

Non-submission ***will*** mean a Fail grade is recorded in CBMS833. You must present your work in a format suitable for publication in Proteomics.

On successful completion you will be able to:

- Become familiar with the process of preparing written work in formats suitable for publication in peer-reviewed scientific journals
- Develop skills in critical thinking and analysis, and written and oral presentation of scientific information
- Extract and summarise from the scientific literature information required to develop a research plan within a relevant area of proteomics
- Understand technologies used in proteomics

- Comprehend the chemical, biochemical and biophysical processes involved in proteomics
- Exhibit a sound knowledge of how to apply proteomics technologies to answer biological questions
- Gain hands-on practical experience in a range of proteomics techniques

Final Exam

Due: **To be advised**
Weighting: **40%**

Final Exam (2.5 hrs, date and time to be advised), 40%

2.5hr exam covering all practical and theoretical components of CBMS833

Questions are a mix of long and short answer questions

You are required to achieve a satisfactory grade in the final exam to pass CBMS833

On successful completion you will be able to:

- Develop skills in critical thinking and analysis, and written and oral presentation of scientific information
- Understand technologies used in proteomics
- Comprehend the chemical, biochemical and biophysical processes involved in proteomics
- Exhibit a sound knowledge of how to apply proteomics technologies to answer biological questions

Delivery and Resources

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Other important items

We do not work from a textbook but we do have one book that is recommended reading and is available in the University bookstore: Proteomics for Biological Discovery, by Tim Veenstra and John R. Yates, published by Wiley Press.

Additional reading material is also included at the end of most lectures. It is your job to look it up.

Technologies used and required. Lecture notes will be made available on the unit website in iLearn. Notes will be made available a few days in advance of the lecture whenever possible,

and it is your responsibility to print them out.

Technologies used and required. All of the important information during semester will be communicated to you via the unit website on iLearn. It is your responsibility to check it regularly for announcements and other information.

The practical class is 5 days long and runs during semester break, so make plans now to be available for a week long practical class during that time.

Technologies used and required. Students will need to have access to a computer and printer, and be able to use Word, Excel, Powerpoint, and a reference manager program such as EndNote.

This unit is designed to build upon CBMS832 Protein Discovery and Analysis. That unit is not a prerequisite for entry into CBMS833 but passing CBMS832 is strongly recommended.

What is changed? The unit is updated every year with revised lecture content and numerous new tutorial research papers. This reflects the rapidly changing state of the field.

What is changed? from 2013 onwards the unit will also be offered at 700 level to Masters of Research students.

What is changed? **new for 2014**: The research tutorial presentation will now be accepted as a video presentation uploaded in advance to youtube. It must include figures, graphics, text (and some footage of the presenter). You can either record straight to video camera, or use software such as iMovie or Windows Movie Maker.

Unit Schedule

LECTURE, TUTORIAL and PRACTICAL TIMETABLE

Lectures: Mondays 11:00 am - 1:00 pm July 27th - November 2nd, Room E7B100

Tutorials: Fridays 11:00 am - 1:00 pm, July 31st - November 6th, Room E6A 133

NOTE: the first scientific content lecture will be held in the first tutorial timeslot, Friday July 31st 11 – 1pm in E6A 133.

Practicals: Are held in a one-week block during semester break. You must be available for all of September 21st- 25th. Practical classes run all day, approximately 9am – 5 pm. This is the equivalent of 3+ hours per week for the whole semester, we just do it all at once. Attendance is compulsory - if you are not able to attend the practical class all week, for any reason, do not

enrol in this unit.

The practical course includes differential display 2D gel electrophoresis, in-gel protein digestion, peptide spectrometry (MALDI-TOF/TOF and nanoESI-Linear ion trap), protein identification using Mascot and XTandem, shotgun proteomic analysis using SDS-PAGE protein fractionation, and label-free protein quantitation using normalized spectral abundance factors.

Up to date timetable information is found at timetables.mq.edu.au

All unit information is distributed using the unit website on ilearn, accessed via ilearn.mq.edu.au

Lectures Mondays 11am-1pm, starting July 27th, E7B100

Week	Date	Lecture Title
1	**MONDAY** July 27th E7B100	Subject Outline and Assessment Process, Scientific Writing, Intro
1	**FRIDAY** July 31st E6A133	Mass Spectrometry Fundamentals (***in tutorial timeslot***)
2	August 3rd	Protein Identification from MS data
3	August 10th	2D gel Sample Preparation and troubleshooting
4	August 17th	2D-DIGE and experimental design
5	August 24th	Differential display and shotgun proteomics
CBMS833 Essay Due 9am Friday September 4th		
6	August 31st	Quantitative proteomics (I) label-free
7	Sept 7th	Quantitative proteomics (II) isotope labels
Practical: 5 Days, 21nd-25th September (*during semester break*)		
8	Sept 28th	Multiple reaction monitoring and proteomics validation
9	*Monday October 5th is a public Holiday; no lecture.*	

10	October 12th	Protein-Protein Interactions
11	October 19th	Post-translational modifications (I) Glycoproteomics

(continued)

Practical report due 9am Friday October 16th		
12	October 26th	Post-translational modifications (II) Phosphoproteomics
13	November 2rd	revision

Assignments and practical reports are to be handed in at the Science Centre in E7B, and are due in by 9am on the due date.

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TUTORIAL TIMETABLE

Tutorials: Fridays 11-1pm from August 7th

Room E6A 133

Week Date

2 August 7th (note: July 31st is used for the first lecture)

3 August 14th

4 August 21st

5 August 28th

6 September 4th

7 September 11th

Semester Break - September 14th to September 27th

8 October 2th

9 October 9th

10 October 16th

11	**October 23rd**
12	**October 30th**
13	**November 6th** *(Only if required)*

Learning and Teaching Activities

Lectures

Lecture material delivered in 2 hour blocks weekly.

Weekly follow-up

The first 15 minutes from each lecture are spent following up on questions raised from the previous weeks continuing assessment submissions.

Tutorials

Students present a 10-15 minute presentation on a scientific paper they have selected from a list.

Practical Class

Students spend five whole days in practical class during one week of semester break.

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy.html

Grading Policy http://mq.edu.au/policy/docs/grading/policy.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Grievance Management Policy http://mq.edu.au/policy/docs/grievance_management/policy.html

Disruption to Studies Policy http://www.mq.edu.au/policy/docs/disruption_studies/policy.html *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the Learning and Teaching Category of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they

are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.mq.edu.au.

Guidelines for preparation of written work

ALL WRITTEN WORK MUST BE ORIGINAL. Students are sometimes tempted to use material which is not their own without due acknowledgment. This constitutes cheating, the penalty for which is failure of the course. It is considered equivalent to cheating in an examination. Direct copying and/or submitting material from your own work done in previous years is also considered cheating.

WHAT CONSTITUTES CHEATING?

Collusion

Collusion is the secret and fraudulent production of identical or superficially altered work submitted for assessment by two or more students. It is easily detected by the examiner from the similarity in styles. This constitutes cheating and will be dealt with accordingly.

Plagiarism

Plagiarism is the verbatim use of someone else's work, as if it were your own. This also constitutes cheating and will be dealt with accordingly. The "someone else" concerned may be an author, critic, lecturer, or even a fellow student. Plagiarism includes copying of material from practical books obtained from other students in the same or previous years. It also includes the direct copying of material from texts, references and other sources. It is important to realize that it does *not* make it acceptable to reproduce a sentence or paragraph from a published source when you add the name or number of the reference at the end.

If you need to quote another piece of work, do it correctly. You must provide quotation marks around the quotation and this must be referenced. In other words, the only proper way to indicate that the words are not yours is to show clearly that they are a quotation.

It is often desirable and may even be necessary to use other people's ideas but you must not pretend that they are your own. In such cases, your text should include a reference to the source of the idea. You may need to use a figure or table from another source. If so, the legend must indicate the source, with the appropriate reference. The list of referees should include acknowledgment of ideas, data and direct quotations from all sources.

More information regarding the University policy on academic honesty can also be found at http://www.mq.edu.au/policy/docs/academic_honesty/policy.html.

Collaboration

Students are often required to work cooperatively in groups when performing experiments. This may be necessitated by limitations on the amount of equipment or experimental material available, or simply by the fact that more than one pair of hands is required to do the experiments. Such collaboration is common and is an essential part of scientific endeavour. However, collaboration must always be acknowledged.

When you perform experimental work as part of a group, you must always acknowledge the

collaboration by writing the names of the other members of the group at the start of your practical report.

Collaboration in performing an experiment does not extend to writing a report on the experiment where that report is assessed for marks. Students must prepare their own report individually.

Guidelines for preparation of written work

WHAT IS REQUIRED?

References

Essay and practical reports need scientific references to support facts and ideas that you are referring to. These should be primarily journal articles from recent scientific literature. You should only rarely need to cite textbooks; everything in a textbook was most likely published elsewhere in the literature long before the book was published. You should not refer to websites such as Expasy or NCBI for general information; gel images in Expasy for example, have also been published elsewhere in the scientific literature. You should NEVER refer to Wikipedia or to tutorial information posted on the web at another university. The reason for these rules is that textbooks, websites and Wikipedia are not primary sources, they are compilations of previously published material. More importantly, they are not peer-reviewed (including textbooks) so the authors can say whatever they like on a topic whether it is right, or not.

Learn to use Endnote or a similar program to manage and cite your references. This will make your written work look more polished and will avoid simple mistakes which cost you marks. Endnote is available as a free download from the MQ library, along with simple online tutorials in how to use it. Format references in your work according to the guidelines of any of the following journals: Analytical Biochemistry, Journal of Biological Chemistry, Journal of Proteome Research, Molecular and Cellular Proteomics, or Proteomics. The most common error students make with references is that the references in a list are inconsistent in style – they all need to be *exactly* the same format.

What is an essay?

An essay is a written discourse on a topic. It has a defined introduction, middle and conclusion, and contains logical arguments that follow a clear sequence. An essay does not contain dot point lists, and does not need to contain subheadings. It can contain table and figures to illustrate a point. If these are copied from a reference it needs to state that explicitly in the Figure legend or table footnote. Tables and figures should be numbered sequentially in order of their appearance in the text, and can either be inserted into the text or collated at the end. Every figure needs an explanatory legend, most tables need a footnote or two to explain the meaning of column headings. An essay has relevant references formatted as described earlier and collected at the end of the text.

What is a practical report?

A practical report has a title, aim, introduction, materials and methods, results, discussion, and

references. It is divided into sections under these headings. It usually contains figures, and may contain tables as well. If these are copied from a reference it needs to state that explicitly in the Figure legend or table footnote. Tables and figures should be numbered sequentially in order of their appearance in the text, and can either be inserted into the text or collated at the end. Every figure needs an explanatory legend, most tables need a footnote or two to explain the meaning of column headings.

The aim of the experiment should be clearly stated. The methods should not just be copied directly from the course manual or notes. The results should describe what you observed, irrespective of whether you think it “worked” or not. Discussion should compare your observed results with literature or other experiments in class, especially if you have positive controls to work with. A practical report has relevant references formatted as described earlier and collected at the end of the text.

HINTS ON HOW TO USE SCIENTIFIC JOURNALS

During CBMS833 we will use current research (as distinct from partially digested textbook examples) to illustrate principles. The most up-to-date information is published in scientific journals.

CBMS833 students need to read journal articles to supplement the information given in lectures and practical notes. Your own reports should be modeled on the style of scientific papers (so take careful note of their presentation). It is important that you become efficient at using the large amount of information available. A huge number of journals and papers are available. The following paragraphs give you some guidance in doing this efficiently.

If everyone read scientific papers with care, effort and attention to detail, we would have to read a lot less. Develop an economical reading style and avoid too much rereading. In addition:-

1. Do not read through the paper from start to finish. A journal article is NOT a novel (though the results and ideas may be!). The various sections are there for good reasons.

2. Read and think about the Title. "Is the paper really about the subject matter I thought it was? Do I need to read it at all?"

3. Read the Abstract (or Summary) to confirm the suspicions formed in 2. This section should give you an idea of the main results and why they are important. Ask yourself: "Do I need to read further? Is this paper appropriate?" This is especially important if you have uncovered the reference in another paper or from Science Citation Index or Current Contents. Titles often suggest that the paper is more relevant than it really is.

4. If you continue, now read the Results. Examine the figures and tables. They should be self-explanatory. (This is something that you must bear in mind when you prepare your own report. Good captions and labels are vital). What do the results mean? How convincing are they? Now look at the Discussion. Do your interpretations of the data and conclusions agree with those of the author(s)?

5. How do these experiments fit in with the general research field and with current theories? In other words, why was the research conducted? This should be established in the Introduction.

Despite the efforts of editors and reviewers there are bad papers as well as good papers in the

published literature. Some are badly presented, but contain basically good work. You have to plough through those to extract the gems of wisdom. Others look great on the surface but say nothing of importance. You should train yourself to recognize these quickly without wasting time on them. To help you here, look carefully at the following:-

(a) What are the hypotheses (or questions) posed in the paper? (Be careful that you are not simply forming your own idea of what the paper is testing.)

(b) What approach is used to collect the data (see Methods section).

(c) Do the data, and the manner of collection allow a DIRECT TEST of the hypothesis? If not, what sort of experiment would?

(d) Are there interpretations of the Results which you would make but which have been ignored by the author(s)?

You should try to bear these points in mind when you are reading any papers, but it will be especially important when reading the key papers for your reports, major essay and tutorial presentation. We expect that you will show evidence of having evaluated the strengths of published work.

TIMELY SUBMISSION

ALL CBMS833 assessment deadlines must be met

Late submissions **will** be penalised with 10% loss of the maximum mark for each day past the deadline.

If there is any medical reason why you cannot submit work on time or if you cannot give your tutorial topic for any reason, you should contact the course convenor as early as possible, *before* the due date.

Copies of medical certificates **MUST** be forwarded to the course convenor as soon as possible. Failure to do so will incur a zero mark for non-submission.

EXAMINATION POLICY

- As with all subjects in the Department of Chemistry and Biomolecular Sciences, your final mark has a large component of continual assessment.
- Since your final mark is the sum of all components of this subject, you should approach this subject in a consistent and diligent manner throughout the session; leaving your best effort to the final examination period would be most unwise.
- Remember, marks are deducted from the continuous assessment component if you are absent without cause or if your submissions are late.
- Despite the presence of a significant continuous assessment component in CBMS833, you will be required to reach a grade of 50% in the final exam in order to pass CBMS833. In the event you fail this unit, you can NOT request a supplementary examination or re-examination simply because you failed.

- The final examination is typically 2.5 hours long, but may be longer if required.

CBMS833 LABORATORY SAFETY POLICY

1. Laboratory coats and sensible **fully enclosed** footwear (no thongs or open-toed sandals) must be worn in the research lab at all times. Lab coats should be removed prior to entering common areas (eg: hallways, tea rooms).

2. Smoking, eating and drinking are not permitted at any time in any lab.

3. You are responsible for the smooth and efficient operation of your work area. Keep your assigned work areas as tidy as possible (e.g., clean and store any used items when no longer required; return any communal reagents to their assigned place in the laboratory). Do not leave a mess for someone else (eg: co-workers or Departmental technical staff) to clean up.

4. You might be handling bio-hazardous or radioactive materials during your practicals. Mouth pipetting is NOT allowed at any time. The Chemistry and Biomolecular Sciences Department has a complete Safety Manual which you may refer to at any time prior to undertaking a hazardous task. In order to provide a safe working environment, please take this request most seriously.

5. All instructions for the handling of:

(a) biohazardous and radioactive material;

(b) micro-organisms;

(c) recombinant materials; and

(d) research equipment

must be carefully adhered to.

6. Some practical exercises may involve the examination of human fluids, human cells or human cell lines. There should be no sharing of this material or any of the instruments used to collect them.

DISRUPTION TO STUDIES AND SUPPLEMENTARY EXAMINATIONS POLICY

The rules regarding special consideration and supplementary examinations are set out in full in the University Undergraduate Calendar. The following is a summary.

1. What is a request for Disruption to studies?

A request for the Department to take into account, when assessing your performance in any assignment or examination, circumstances beyond your control: typically medical problems or other compassionate circumstances. Forms regarding the Disruption to studies process are available at:

www.reg.mq.edu.au/Forms/APSCons.pdf

2. What are acceptable reasons for Disruption to studies?

(i) ***valid*** medical, compassionate and serious unforeseen personal events that prevent a student from meeting scheduled deadlines,

(ii) ***validated*** conflicts between scheduled assessments and sporting, cultural or other activities ***at a national or international level***: these **must be** raised well in advance with the Department.

3. How do you apply?

(i) Lodge ***a written application***, together with supporting documentation, with the Student Enquiries Office in Admin. Or do it online at ask.mq.edu.au.

(ii) Do this no later than 7 days following the serious illness or other situation. Admin. will pass it on to the Department.

(iii) It is ***your*** responsibility to check the outcome with the Department, ***not later than two weeks*** after lodging the application.

4. What is "supporting documentation"?

(i) ***A medical certificate***, which states the date or dates of any relevant consultations or attendances, the nature of the problem and the treatment; and a specific statement that the student was unfit to complete the required assessment or examination on the date specified. Medical certificates which do not have all this information will not be accepted.

(ii) ***A letter from the University Counselling Service***, or a professional counsellor, which sets out the general nature of the problem affecting the student, and the opinion of the counsellor that the student was unfit to complete the required assessment

(iii) ***A statutory declaration***, setting out the facts upon which Disruption to studies is requested, and attaching any supporting documents.

Note: A letter from an employer, friend, religious advisor etc. is not sufficient.

5. Supplementary exams?

(i) These are granted ***only under special conditions***: (a) if the student did not sit the standard examination for an acceptable reason; or (b) if the student, after reporting the illness to the Supervisor-in-Charge, left the examination room because of verified illness.

(ii) ***Early exam/assessment will not be permitted*** on the grounds of lengthening the period available for holidays or for departure overseas before the end of the exam period.

6. Timing of Supplementary Assessment

(i) Supplementary assessment is to be completed at a time convenient to the Department. It is the responsibility of the applicant to comply with the requirements of the Department.

(ii) It is ***your responsibility*** (a) to be available to sit for the exam at any time during the vacation period immediately following the application; AND (b) to leave a contact address and telephone number with the Department.

7. Form of Supplementary Assessment

Supplementary theory and practical exams may require different and additional assessment tasks to the normal examination. Supplementary examination may be in individual, oral format.

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

IT Help

For help with University computer systems and technology, visit http://informatics.mq.edu.au/help/.

When using the University's IT, you must adhere to the Acceptable Use Policy. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

PG - Capable of Professional and Personal Judgment and Initiative

Our postgraduates will demonstrate a high standard of discernment and common sense in their professional and personal judgment. They will have the ability to make informed choices and decisions that reflect both the nature of their professional work and their personal perspectives.

This graduate capability is supported by:

Learning outcomes

- Become familiar with the process of preparing written work in formats suitable for publication in peer-reviewed scientific journals
- Communicate to their peers a summary of a recent publication in a contemporary area of proteomics, and produce their own peer-review of that publication
- Develop skills in critical thinking and analysis, and written and oral presentation of scientific information
- Extract and summarise from the scientific literature information required to develop a research plan within a relevant area of proteomics
- Exhibit a sound knowledge of how to apply proteomics technologies to answer biological questions
- Gain hands-on practical experience in a range of proteomics techniques

Assessment tasks

- Mini-Review Essay
- Oral Tutorial Presentation
- Continuing assessment

Learning and teaching activities

- Students present a 10-15 minute presentation on a scientific paper they have selected from a list.
- Students spend five whole days in practical class during one week of semester break.

PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

Learning outcomes

- Understand technologies used in proteomics
- Comprehend the chemical, biochemical and biophysical processes involved in proteomics
- Exhibit a sound knowledge of how to apply proteomics technologies to answer biological questions
- Gain hands-on practical experience in a range of proteomics techniques

Assessment tasks

- Mid-semester test
- Practical Report
- Final Exam

Learning and teaching activities

- Lecture material delivered in 2 hour blocks weekly.
- The first 15 minutes from each lecture are spent following up on questions raised from the previous weeks continuing assessment submissions.
- Students spend five whole days in practical class during one week of semester break.

PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience, of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

Learning outcomes

- Become familiar with the process of preparing written work in formats suitable for publication in peer-reviewed scientific journals
- Communicate to their peers a summary of a recent publication in a contemporary area of proteomics, and produce their own peer-review of that publication
- Develop skills in critical thinking and analysis, and written and oral presentation of scientific information
- Extract and summarise from the scientific literature information required to develop a research plan within a relevant area of proteomics

Assessment tasks

- Mini-Review Essay
- Oral Tutorial Presentation
- Practical Report
- Final Exam

Learning and teaching activities

- The first 15 minutes from each lecture are spent following up on questions raised from the previous weeks continuing assessment submissions.

- Students present a 10-15 minute presentation on a scientific paper they have selected from a list.
- Students spend five whole days in practical class during one week of semester break.

PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

Learning outcomes

- Become familiar with the process of preparing written work in formats suitable for publication in peer-reviewed scientific journals
- Communicate to their peers a summary of a recent publication in a contemporary area of proteomics, and produce their own peer-review of that publication
- Develop skills in critical thinking and analysis, and written and oral presentation of scientific information
- Extract and summarise from the scientific literature information required to develop a research plan within a relevant area of proteomics
- Gain hands-on practical experience in a range of proteomics techniques

Assessment tasks

- Mid-semester test
- Practical Report
- Final Exam

Learning and teaching activities

- Students spend five whole days in practical class during one week of semester break.

PG - Effective Communication

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

Learning outcomes

- Become familiar with the process of preparing written work in formats suitable for

publication in peer-reviewed scientific journals
- Communicate to their peers a summary of a recent publication in a contemporary area of proteomics, and produce their own peer-review of that publication
- Extract and summarise from the scientific literature information required to develop a research plan within a relevant area of proteomics

Assessment task

- Oral Tutorial Presentation

Learning and teaching activity

- The first 15 minutes from each lecture are spent following up on questions raised from the previous weeks continuing assessment submissions.
- Students present a 10-15 minute presentation on a scientific paper they have selected from a list.
- Students spend five whole days in practical class during one week of semester break.

PG - Engaged and Responsible, Active and Ethical Citizens

Our postgraduates will be ethically aware and capable of confident transformative action in relation to their professional responsibilities and the wider community. They will have a sense of connectedness with others and country and have a sense of mutual obligation. They will be able to appreciate the impact of their professional roles for social justice and inclusion related to national and global issues

This graduate capability is supported by:

Learning outcomes

- Become familiar with the process of preparing written work in formats suitable for publication in peer-reviewed scientific journals
- Communicate to their peers a summary of a recent publication in a contemporary area of proteomics, and produce their own peer-review of that publication
- Develop skills in critical thinking and analysis, and written and oral presentation of scientific information
- Extract and summarise from the scientific literature information required to develop a research plan within a relevant area of proteomics

Assessment task

- Continuing assessment

Learning and teaching activity

- The first 15 minutes from each lecture are spent following up on questions raised from

the previous weeks continuing assessment submissions.

- Students spend five whole days in practical class during one week of semester break.