



# CBMS833

## Functional Proteomics

S2 Day 2019

*Dept of Molecular Sciences*

### Contents

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<a href="#"><u>General Information</u></a>	2
<a href="#"><u>Learning Outcomes</u></a>	3
<a href="#"><u>Assessment Tasks</u></a>	4
<a href="#"><u>Delivery and Resources</u></a>	8
<a href="#"><u>Unit Schedule</u></a>	9
<a href="#"><u>Learning and Teaching Activities</u></a>	12
<a href="#"><u>Policies and Procedures</u></a>	12
<a href="#"><u>Graduate Capabilities</u></a>	20
<a href="#"><u>Changes from Previous Offering</u></a>	24
<a href="#"><u>New Lecture content</u></a>	24

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#### **Disclaimer**

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## General Information

Unit convenor and teaching staff

Unit Convenor

Paul Haynes

[paul.haynes@mq.edu.au](mailto:paul.haynes@mq.edu.au)

Contact via [paul.haynes@mq.edu.au](mailto:paul.haynes@mq.edu.au)

Credit points

4

Prerequisites

Admission to MBiotech or MBiotechMCom or MLabQAMgt or MRadiopharmSc or MMarScMgt or MBioBus or MSc or GradCertLabQAMgt or GradDipLabQAMgt or MScInnovation

Corequisites

Co-badged status

The 4 credit point unit CBMS833 outlines chemical principles underlying the most recent developments in protein science. CBMS833 is 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. 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:

Process scientific data and prepare 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.

Describe the basis of 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.

Demonstrate proficiency in a range of practical proteomics techniques.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<a href="#"><u>Mini-Review Essay</u></a>	15%	No	Friday September 6th
<a href="#"><u>Oral Tutorial Presentation</u></a>	15%	No	from week 2 onwards
<a href="#"><u>Continuing assessment</u></a>	5%	No	weekly
<a href="#"><u>Mid-semester test</u></a>	5%	No	week 8
<a href="#"><u>Practical Report</u></a>	20%	No	Monday October 21st
<a href="#"><u>Final Exam</u></a>	40%	No	examination period

### Mini-Review Essay

Due: **Friday September 6th**

Weighting: **15%**

**Mini-Review Essay (Due 9am Friday September 6<sup>th</sup>) - 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, all of which are encouraged)
- Must conform to the Instructions for Authors for a review article submitted to “Journal of Proteomics”. Look up the Journal of Proteomics instructions and follow them. Make sure you read some review articles in the journal before you start writing, because that will give you a good template to work from.

On successful completion you will be able to:

- Process scientific data and prepare 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.

- Describe the basis of technologies used in proteomics.
- Exhibit a sound knowledge of how to apply proteomics technologies to answer biological questions.

## Oral Tutorial Presentation

Due: **from week 2 onwards**

Weighting: **15%**

### Oral Tutorial Presentation – Various Dates 15%

- Choose one publication from the Tutorial Papers List (on a first-come first-served basis), which is found on a wiki on the iLearn site.
- The papers are to be presented on the date indicated, because they are sorted by subject material. There is a small number of general interest papers at the end of the list which can be presented on any date you wish to choose.
- A maximum of four presentations will be scheduled for each week. If you put your name down as the fifth person, you will miss out on presenting, so you will have wasted your time preparing a presentation.
- Present your critique of the topic as a short Powerpoint seminar. Aim for 10-12 min talking (15 minutes max), and there will be time for questions. We may adjust that schedule depending on class numbers.

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**Note** that for 2019, due to class numbers, the task definition has been modified so that the presentations **can now be done in groups of up to a maximum of two people**. If you want to work with a partner you can, or if you prefer to do it as an individual task you can do that too. Note that both students in a group need to take part in the presentation, so you can not use this as a way to avoid standing up in front of the class

\*\*\*\*\*

- Participation in all other group's topics contributes to your final mark
- Perform your own peer-review of your chosen paper - tell us whether you think this paper should have been published and why.
- Look up other relevant literature so you can discuss your chosen paper in context rather than in isolation.
- 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.

- An essential part of this task is organising yourselves so that everyone in the class has a time scheduled to present their work. A wiki will be set up in iLearn, and you will be able to put your name down. The papers are grouped by subject so that they follow the weekly lecture content fairly closely, to help reinforce your learning. Hence, a paper on a specific topic will be listed on a given date and can only be presented on that date.
- The exception to this is the general interest papers which can be presented on any date you wish to choose. If you choose to present one of the general interest papers, it is your job to copy and paste that information into the correct date on the wiki so that everyone knows what is going on.
- It is important to be proactive about this scheduling task, because the unit convenor will not be involved. If there are five names down to present on one week, you need to talk among yourselves and fix the problem. Please be aware that we frequently have issues with students putting their name down and then withdrawing from the unit. That means timeslots go by unused and then there is not enough time for other students to present. Again, it is the student's responsibility to make sure that four presenters turn up each week.

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.
- Describe the basis of technologies used in proteomics.
- Exhibit a sound knowledge of how to apply proteomics technologies to answer biological questions.

## Continuing assessment

Due: **weekly**

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 be relevant to 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: **week 8**

Weighting: **5%**

### **Mid-semester test – Week 8 - 5%**

- This will typically be a multiple choice quiz aimed at helping students assess their areas of strength and weakness prior to the final exam. It will be held after the midsemester break.

On successful completion you will be able to:

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

## Practical Report

Due: **Monday October 21st**

Weighting: **20%**

### **Practical Report (Due Monday October 21<sup>st</sup>) - 20%**

- You must present your work in the format of a manuscript suitable for publication in Journal of Proteomics. This will be discussed in detail during the practical session.

On successful completion you will be able to:

- Process scientific data and prepare 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.
- Describe the basis of 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.
- Demonstrate proficiency in a range of practical proteomics techniques.

## Final Exam

Due: **examination period**

Weighting: **40%**

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

2.5hr exam covering all practical and theoretical components of CBMS733

Questions are a mix of long and short answer questions

On successful completion you will be able to:

- Develop skills in critical thinking and analysis, and written and oral presentation of scientific information.
- Describe the basis of 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

### CBMS833 Functional Proteomics

#### Other important items

- We do not work from a textbook, instead we focus on current scientific literature.
- Additional reading material is also included at the end of most lectures. It is your job to look it up.
- 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.
- This unit is designed to build upon CBMS832 Protein Discovery and Analysis. There is no prerequisite for entry into CBMS833 but passing CBMS832 is strongly recommended.
- 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.
- 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.
- What is changed? The unit is updated every year with revised lecture content and numerous new tutorial research papers.
- What is changed? the unit will also be offered at 700 level to Masters of Research students.
- What is changed? The research tutorial presentation will 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.
- For 2019, revised and refreshed lecture content based on feedback from previous year, and updated tutorial paper list. The revised lecture content and numerous new tutorial research papers reflect the rapidly changing state of the field.

## Unit Schedule

### LECTURE, TUTORIAL and PRACTICAL TIMETABLE

**Lectures: Mondays 12:00 pm - 2:00 pm July 29<sup>th</sup> - November 4<sup>th</sup>, 9WW 102**

**Tutorials: Thursdays 12:00 pm - 2:00 pm, August 1<sup>st</sup> - November 7<sup>th</sup>, 3IR G240**

**NOTE: the first scientific content lecture will be held in the first tutorial timeslot, Thursday August 1<sup>st</sup> 12:00 pm - 2:00 pm in 3IR G240.**

**Practicals: Are held in a one-week block during semester break. You must be available for all of September 23<sup>rd</sup>- 27<sup>th</sup>. 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, please 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](http://timetables.mq.edu.au)

All unit information is distributed using the unit website on ilearn, accessed via [ilearn.mq.edu.au](http://ilearn.mq.edu.au)

Lectures Mondays 12-2pm, starting July 29<sup>th</sup>, 9WW 102

Week	Date	Lecture Title
1	<b>MONDAY</b> July 29 <sup>th</sup>	Subject Outline, Introduction and Assessment Process, and General Introduction
1	<b>THURSDAY</b> August 1 <sup>st</sup>	Mass spectrometry fundamentals ( <i>in tutorial timeslot</i> ) (3IR G240)
2	August 5 <sup>th</sup>	Protein Identification from MS data
3	August 12 <sup>th</sup>	2D gels and 2D DIGE
4	August 19 <sup>th</sup>	Differential display and shotgun proteomics
5	August 26 <sup>th</sup>	Quantitative proteomics (I) label-free
6	Sept 2 <sup>nd</sup>	Quantitative proteomics (II) isotope labels
7	Sept 9 <sup>th</sup>	Data dependent acquisition (DDA) and Data independent acquisition (DIA)
<b>Practical: 5+ Days, 23<sup>rd</sup>- 27<sup>th</sup> September (<i>during semester break</i>)</b>		
8	Sept 30 <sup>th</sup>	[Post practical data analysis]
9	October 7 <sup>th</sup>	Multiple reaction monitoring and proteomics validation
10	October 14 <sup>th</sup>	Protein-Protein Interactions
<b>Practical report due 9am Monday October 21<sup>st</sup></b>		
11	October 21 <sup>st</sup>	Post-translational modifications (I) - Glycoproteomics
12	October 28 <sup>th</sup>	Post-translational modifications (II) - Phosphoproteomics
13	November 4 <sup>th</sup>	Revision

All written work must be submitted through iLearn Turnitin. In addition, hardcopies of assignments and practical reports are to be handed in at the Departmental office in 4WW and are due in by 9am on the due date.

## CBMS833 Functional Proteomics

### TUTORIAL TIMETABLE

**Tutorials: Thursdays 12-2pm from August 8<sup>th</sup>**

**Room 3IR G240**

Week	Date
1	[note: August 1 <sup>st</sup> is used for a lecture]
2	August 8 <sup>th</sup> - MS Fundamentals
3	August 15 <sup>th</sup> - Protein ID
4	August 22 <sup>nd</sup> - 2D Gels and 2D DIGE
5	August 29 <sup>th</sup> - Shotgun proteomics
6	September 5 <sup>th</sup> - Label Free quantitation
7	September 12 <sup>th</sup> - Quantitation with labels
	<i>Semester Break - September 16<sup>th</sup> to September 29<sup>th</sup></i>
8	October 3 <sup>rd</sup> - Data Independent Acquisition
9	October 10 <sup>th</sup> - Multiplexed reaction monitoring
10	October 17 <sup>th</sup> - Protein interactions
11	October 24 <sup>th</sup> - Glycoproteomics
12	October 31 <sup>st</sup> - Phosphoproteomics
13	November 7 <sup>th</sup> (spare)

## 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 week one of semester break, plus a lecture timeslot on the following Monday.

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central \(https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central\)](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

Undergraduate students seeking more policy resources can visit the [Student Policy Gateway \(https://students.mq.edu.au/support/study/student-policy-gateway\)](https://students.mq.edu.au/support/study/student-policy-gateway). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central \(http](#)

[s://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/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/study/getting-started/student-conduct>

## Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) 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](https://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@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](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 Expaty or NCBI for general information; gel images in Expaty 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 CBMS733 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.

CBMS733 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 CBMS733 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 CBMS733. 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.

### CBMS733 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](http://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](http://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](http://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](http://ask.mq.edu.au)

If you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

# IT Help

For help with University computer systems and technology, visit [http://www.mq.edu.au/about\\_us/offices\\_and\\_units/information\\_technology/help/](http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/).

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources 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

- Process scientific data and prepare 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.
- Demonstrate proficiency in a range of practical 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 week one of semester break, plus a lecture timeslot on the following Monday.

### 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

- Describe the basis of 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.
- Demonstrate proficiency in a range of practical 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 week one of semester break, plus a lecture timeslot on the following Monday.

## 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

- Process scientific data and prepare 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 week one of semester break, plus a lecture timeslot on the following Monday.

## 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

- Process scientific data and prepare 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.
- Demonstrate proficiency in a range of practical proteomics techniques.

## Assessment tasks

- Mid-semester test
- Practical Report
- Final Exam

## Learning and teaching activities

- Students spend five whole days in practical class during week one of semester break, plus a lecture timeslot on the following Monday.

## 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

- Process scientific data and prepare 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 week one of semester break, plus a lecture timeslot on the following Monday.

## 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

- Process scientific data and prepare 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 week one of semester break, plus a lecture timeslot on the following Monday.

## Changes from Previous Offering

Reduced 2D gels and 2D DIGE to one lecture. Added an additional lecture on Data Dependent Acquisition (DDA) and Data Independent Acquisition (DIA). Revised and refreshed lecture content based on feedback from previous year, and updated tutorial paper list.

## New Lecture content

The 2018 lecture syllabus different to previous offerings. The two lectures presented previously on two-dimensional gel electrophoresis and two-dimensional differential in gel electrophoresis have been combined into a single lecture. An additional lecture has been added on Data Independent Acquisition approaches in shotgun proteomics. These changes reflect the state-of-the-art in the proteomics field, where Data Independent Acquisition shotgun proteomics experiments have become increasingly prevalent in the scientific literature.