



# MOLS8212

## Functional Proteomics

Session 2, Weekday attendance, North Ryde 2020

*Department of Molecular Sciences*

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### Disclaimer

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### Notice

As part of [Phase 3 of our return to campus plan](#), most units will now run tutorials, seminars and other small group learning activities on campus for the second half-year, while keeping an online version available for those students unable to return or those who choose to continue their studies online.

To check the availability of face-to-face and online activities for your unit, please go to [timetable viewer](#). To check detailed information on unit assessments visit your unit's iLearn space or consult your unit convenor.

## General Information

Unit convenor and teaching staff

Paul Haynes

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

Credit points

10

Prerequisites

Admission to GradDipBiotech or GradCertLabAQMgt or GradDipLabAQMgt or MBiotech or MBioBus or MLabAQMgt or MRadiopharmSc or MSc or MScInnovationChemBiomolecularSc and (BMOL6201 or CBMS621 or BMOL6432)

Corequisites

Co-badged status

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:

**ULO1:** Process scientific data and prepare written work in formats suitable for publication in peer-reviewed scientific journals.

**ULO2:** 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.

**ULO3:** Develop skills in critical thinking and analysis, and written and oral presentation of scientific information

**ULO4:** Extract and summarise from the scientific literature information required to develop a research plan within a relevant area of proteomics.

**ULO5:** Describe the basis of technologies used in proteomics, and exhibit sound knowledge of how to apply proteomics techniques to answer biological questions.

**ULO6:** Explain the chemical, biochemical and biophysical processes involved in proteomics, and demonstrate proficiency in a range of practical proteomics techniques.

## General Assessment Information

### MOLS8212 Functional Proteomics ASSESSMENT PROCESS 2020

#### Mini-Review Essay (Due 9am Friday September 4<sup>th</sup>) - 15%

Topic for 2020: 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.

#### 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 to the class 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.

- 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.

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

- You will be required to submit a written question after each lecture, which must be relevant to the topic that has been presented. Discussion of these will form our weekly revision session prior to the new content lecture.

#### **Mid-semester test – Friday October 2nd - 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 practical class.

#### **Practical Report (Due Monday October 19<sup>th</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.

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

- 2.5hr exam covering all practical and theoretical components of MOLS8212
- Questions are a mix of long and short answer questions

## Assessment Tasks

Name	Weighting	Hurdle	Due
<u>Continuing assessment</u>	5%	No	weekly
<u>Practical Report</u>	20%	No	Monday 19th October
<u>Oral Tutorial Presentation</u>	15%	No	Timeslots available each week.
<u>Final Exam</u>	40%	No	During examination period
<u>Mini-Review Essay</u>	15%	No	Friday September 4th
<u>Mid-semester test</u>	5%	No	week 8

### Continuing assessment

Assessment Type <sup>1</sup>: Reflective Writing

Indicative Time on Task <sup>2</sup>: 3 hours

Due: **weekly**

Weighting: **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 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

### Practical Report

Assessment Type <sup>1</sup>: Lab report

Indicative Time on Task <sup>2</sup>: 16 hours

Due: **Monday 19th October**

Weighting: **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, and exhibit sound knowledge of how to apply proteomics techniques to answer biological questions.
- Explain the chemical, biochemical and biophysical processes involved in proteomics, and demonstrate proficiency in a range of practical proteomics techniques.

## Oral Tutorial Presentation

Assessment Type <sup>1</sup>: Presentation

Indicative Time on Task <sup>2</sup>: 14 hours

Due: **Timeslots available each week.**

Weighting: **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. 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. 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.

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, and exhibit sound knowledge of how to apply proteomics techniques to answer biological questions.

## Final Exam

Assessment Type <sup>1</sup>: Examination

Indicative Time on Task <sup>2</sup>: 22 hours

Due: **During examination period**

Weighting: **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, and exhibit sound knowledge of how to apply proteomics techniques to answer biological questions.
- Explain the chemical, biochemical and biophysical processes involved in proteomics, and demonstrate proficiency in a range of practical proteomics techniques.

## Mini-Review Essay

Assessment Type <sup>1</sup>: Essay

Indicative Time on Task <sup>2</sup>: 14 hours

Due: **Friday September 4th**

Weighting: **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, and exhibit sound knowledge of how to apply proteomics techniques to answer biological questions.
- Explain the chemical, biochemical and biophysical processes involved in proteomics, and demonstrate proficiency in a range of practical proteomics techniques.

## Mid-semester test

Assessment Type <sup>1</sup>: Quiz/Test

Indicative Time on Task <sup>2</sup>: 3 hours

Due: **week 8**

Weighting: **5%**

This will typically be a short 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, and exhibit sound knowledge of how to apply proteomics techniques to answer biological questions.
- Explain the chemical, biochemical and biophysical processes involved in proteomics, and demonstrate proficiency in a range of practical proteomics techniques.

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<sup>1</sup> If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

<sup>2</sup> Indicative time-on-task is an estimate of the time required for completion of the assessment



task and is subject to individual variation

## Delivery and Resources

- 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 MOLS8211 Protein Discovery and Analysis. There is no prerequisite for entry into MOLS8212 but passing MOLS8211 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 2020, revised and refreshed lecture content based on feedback from the 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

**Lectures Mondays 2-4pm, starting July 27<sup>th</sup>, *online***

Week	Date	Lecture Title
1	<b>MONDAY</b> July 27 <sup>th</sup>	Subject Outline, Introduction and Assessment Process, and General Introduction (1)
1	<b>FRIDAY</b> July 31 <sup>st</sup>	Mass spectrometry fundamentals (2) ( <i>in tutorial timeslot</i> )
2	August 4 <sup>th</sup>	Protein Identification from MS data (3)
3	August 10 <sup>th</sup>	2D gels and 2D DIGE (4)
4	August 17 <sup>th</sup>	Differential display and shotgun proteomics (5)
5	August 24 <sup>th</sup>	Quantitative proteomics (I) label-free (6)
6	Sept 1 <sup>st</sup>	Quantitative proteomics (II) isotope labels (7)
7	Sept 7 <sup>th</sup>	Data dependent acquisition (DDA) and Data independent acquisition (DIA) (8)
<b>Practical: 5 Days, 21<sup>st</sup>- 25<sup>th</sup> September (during semester break)</b>		
8	Sept 28 <sup>th</sup>	Multiple reaction monitoring and proteomics validation (9)
9	October 5 <sup>th</sup>	[Public Holiday]
10	October 12 <sup>th</sup>	Protein-Protein Interactions (10)
<b>Practical report due 9am Monday October 19<sup>th</sup></b>		
11	October 19 <sup>th</sup>	Post-translational modifications (I) Glycoproteomics (11)
12	October 26 <sup>th</sup>	Post-translational modifications (II) Phosphoproteomics (12)
13	November 2 <sup>nd</sup>	Revision

All written work must be submitted through iLearn Turnitin. In addition, hardcopies may be required, to be confirmed.

**Tutorials: Fridays 12-2pm from August 7<sup>th</sup>**

**Location 9WW 102**

Week	Date
1	[note: July 31 <sup>st</sup> is used for a lecture]
2	August 7 <sup>th</sup> - MS Fundamentals
3	August 14 <sup>th</sup> - Protein ID
4	August 21 <sup>st</sup> - 2D Gels and 2D DIGE
5	August 28 <sup>th</sup> - Shotgun proteomics
6	September 4 <sup>th</sup> - Label Free quantitation
7	September 11 <sup>th</sup> - Quantitation with labels
	<i>Semester Break - September 14<sup>th</sup> to September 27<sup>th</sup></i>
8	October 2 <sup>nd</sup> – Data Independent Acquisition
9	October 9 <sup>th</sup> - Multiplexed reaction monitoring
10	October 16 <sup>th</sup> - Protein interactions
11	October 23 <sup>rd</sup> - Glycoproteomics
12	October 30 <sup>th</sup> - Phosphoproteomics
13	November 6 <sup>th</sup> - spare

Q. Why is July 31 used for a lecture?

A. If we had a tutorial session on that day, the students presenting their research papers would have less than a week to prepare. If we start tutorials in week two, then the first students will have two weeks to prepare, which is sufficient time to allow them to do a good job.

## 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.*)

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://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<http://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](http://ask.mq.edu.au) or if you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@mq.edu.au)

## 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 help you improve your marks and take control of your study.

- [Getting help with your assignment](#)
- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

## 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.