CBMS330

Chemical and Biomolecular Sciences Capstone

S2 Day 2019

Dept of Molecular Sciences

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General Information

Unit convenor and teaching staff

Unit Convenor
Koushik Venkatesan
koushik.venkatesan@mq.edu.au
Contact via Contact via Email
Building 4WW Room 123
Monday to Friday (9am to 4pm) by appointment

Tutor - Biomolecular Science
Francesca Short
francesca.short@mq.edu.au
Contact via Contact via Email
6WW 260
Monday to Friday (9am to 4pm) by appointment

Tutor - Chemistry
Sinead Keaveney
sinead.keaveney@mq.edu.au
Contact via Contact via Email
6WW 308
Monday to Friday (9am to 4pm) by appointment

Credit points
3

Prerequisites

Corequisites
9cp from CBMS units at 300 level

Co-badged status

Unit description
Having mastered some fundamental and practical aspects of chemical and biomolecular sciences, you have started to understand how to integrate your knowledge from these subjects into broader areas. The aim of this unit is to help you further with 'putting it all together' as we aim to provide you with additional skills, tools and preparation for future employment. An important part of the unit will be a laboratory investigation in which you will plan and carry out the investigation, and report on the outcomes. You will have the opportunity to use sophisticated research instruments and to refine your laboratory skills. You will also develop skills to aid you in the transition into the workforce or further study.

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:

Integrate the knowledge, abilities, and values that you have obtained from your undergraduate experience to define a problem, formulate a hypothesis, and design and plan a research study/investigation.

Demonstrate the need for theoretical calculations/ experiments, experimental design and conducting of experiments/ calculations when investigating a research problem in Chemistry/Biomolecular Sciences.

Design and conduct appropriate experiments/ calculations to investigate a research problem in Chemistry/Biomolecular Sciences

Successfully utilise a variety of generic techniques/ calculation programs used in research laboratories within the Chemistry/Biomolecular Sciences.

Effectively communicate key Chemistry/Biomolecular Science concepts and scientific results in written and oral form to a variety of audiences. This includes presenting your research in the format of a seminar.

Work effectively, responsibly and safely, as a member of a research team

Develop career networking skills and capabilities that will aid you with either moving into the workforce or further study.

Assessment Tasks

Name	Weighting	Hurdle	Due
Execution of Research Project	25%	No	Fortnightly (x5)
Portfolio Task	25%	No	week 9
Seminar Presentation	25%	No	week 12 & 13
Final Research Report	25%	No	week 13

Execution of Research Project

Due: **Fortnightly (x5)**
Weighting: **25%**

At the conclusion of each of the 5 lab sessions, you will post a short summary (blog) of your contribution to the project for the week. Include details such as your contribution to the project, project outcomes and future project plans.

Due date is 10pm on the friday following the completed lab session. Submission is via iLearn.

This Assessment Task relates to the following Learning Outcomes:

- Integrate the knowledge, abilities, and values that you have obtained from your undergraduate experience to define a problem, formulate a hypothesis, and design and plan a research study/investigation.
- Demonstrate the need for experiments, experimental design and conducting of experiments when investigating a research problem in Chemistry/Biomolecular Sciences.
- Design and conduct appropriate experiments to investigate a research problem in Chemistry/Biomolecular Sciences.
- Successfully utilise a variety of generic techniques used in research laboratories within the Chemistry/Biomolecular Sciences.
- Writing and keeping a well maintained lab journal
- Work effectively, responsibly and safely, as a member of a research team.

On successful completion you will be able to:

- Integrate the knowledge, abilities, and values that you have obtained from your undergraduate experience to define a problem, formulate a hypothesis, and design and plan a research study/investigation.
- Demonstrate the need for theoretical calculations/ experiments, experimental design and conducting of experiments/ calculations when investigating a research problem in Chemistry/Biomolecular Sciences.
- Design and conduct appropriate experiments/ calculations to investigate a research problem in Chemistry/Biomolecular Sciences
- Successfully utilise a variety of generic techniques/ calculation programs used in research laboratories within the Chemistry/Biomolecular Sciences.
- Work effectively, responsibly and safely, as a member of a research team
- Develop career networking skills and capabilities that will aid you with either moving into the workforce or further study.

Portfolio Task

Due: **week 9**
Weighting: **25%**

Choose from a list of supplied job ads/job descriptions of work that you may be interested in

applying. Or supply a job ad of your choosing. Prepare a cover letter and a short (~2 to 3 page) cv tailored for the job application/work description. Guidance on portfolio development and preparing job applications will be given.

Due date is 10pm on the friday of the above listed week. Submission is via iLearn.

This Assessment Task relates to the following Learning Outcomes:

- Develop career networking skills and capabilities that will aid you with either moving into the workforce or further study.

On successful completion you will be able to:

- Develop career networking skills and capabilities that will aid you with either moving into the workforce or further study.

Seminar Presentation

Due: **week 12 & 13**
Weighting: **25%**

In your research lab groups, you will present a short research talk on your research project conducted over the semester (15 minute + 5 min question time).

Presentations will be held during morning lab sessions during weeks 12 & 13. This Assessment Task relates to the following Learning Outcomes:

- Design and conduct appropriate experiments to investigate a research problem in chemistry/bimolecular science.
- Effectively communicate key chemistry/Biomolecular Science concepts and scientific results in written and oral form to a variety of audiences. This includes presenting your research in the format of a seminar.

On successful completion you will be able to:

- Integrate the knowledge, abilities, and values that you have obtained from your undergraduate experience to define a problem, formulate a hypothesis, and design and plan a research study/investigation.
- Effectively communicate key Chemistry/Biomolecular Science concepts and scientific results in written and oral form to a variety of audiences. This includes presenting your research in the format of a seminar.
- Work effectively, responsibly and safely, as a member of a research team
- Develop career networking skills and capabilities that will aid you with either moving into the workforce or further study.

Final Research Report

Due: **week 13**
Weighting: **25%**

A 2,000-2,500 word report on your research project is to be completed at the end of the semester (week 13). The format is formal and in the style of a scientific paper. It will include the following sections: Abstract, Introduction, Materials and Methods, Results and Discussion, References. Report writing skills will be given during the tutorials and via ilearn.

This Assessment Task relates to the following Learning Outcomes:

- Design and conduct appropriate experiments to investigate a research problem in Chemistry/Biomolecular science.
- Successfully utilise a variety of generic techniques used in research laboratories within Chemistry/Biomolecular Sciences.
- Effectively communicate key Chemistry/Biomolecular Science concepts and scientific results in written and oral form to a variety of audiences. This includes presenting your research in the format of a seminar.

On successful completion you will be able to:

- Integrate the knowledge, abilities, and values that you have obtained from your undergraduate experience to define a problem, formulate a hypothesis, and design and plan a research study/investigation.
- Effectively communicate key Chemistry/Biomolecular Science concepts and scientific results in written and oral form to a variety of audiences. This includes presenting your research in the format of a seminar.
- Work effectively, responsibly and safely, as a member of a research team
- Develop career networking skills and capabilities that will aid you with either moving into the workforce or further study.

Delivery and Resources

General: Depending on the projects, the lab sessions will either take place in research labs or in teaching labs. The research lab sessions will take place either in the morning (9-1pm) or afternoon (2-6 pm) every week or every second week (9am-1pm and then 2-6pm). The lab sessions in teaching labs will take place every second week (9-1pm and then 2-6pm). The lab sessions are compulsory. Lab sessions will commence in Week 2 (biomolecular) or Week 3 (Chemistry). Tutorial/lecture sessions will be held from 1-2pm. There is no final exam for this unit.

Tutorials/Seminars: Tutorials/Seminars will be held on Thursdays from 1-2pm; commencing week 2 (see below for week 1 tutorial information). The location is 9 Wallys Walk 102 Theatre.

The list of tutorial topics will be available on iLearn. This course is NOT taught from standard texts and attendance at tutorials is strongly encouraged.

Week 1 Tutorial/workshop: A 2 hour workshop will be held in week 1 (Thursday, 1st August, 2019) from 12 – 2pm. The location for this workshop is 4WW (F7B) 322 seminar room (level 3). Lab group's and projects will be assigned during this workshop. Attendance is compulsory.

Laboratory Session (Wet-lab): he research lab sessions will take place either in the morning (9-1pm) or afternoon (2-6 pm) every week or every second week (9am-1pm and then 2-6pm). The lab sessions in teaching labs will take place every second week (9-1pm and then 2-6pm). There will be a break for the tutorial between 1-2pm. The labs will stay open during semester until 6pm. Labs will be held in 14 Sir Christopher Ondaatje Ave (E7B) 349 Science Lab and in other research labs at the molecular sciences. The weeks when your group is not scheduled for lab are for you to work with your group outside of the scheduled laboratory sessions. There will be groups made up of 2-5 student members. There will be two lab groups in the 4-5 student category: Chemistry and Biomolecular Science. Biomolecular student projects will commence in week 2 and Chemistry student projects will commence in week 3. There are **FIVE** laboratory sessions in total that you **MUST** attend. Outside these compulsory scheduled hours, you may also find you will need to attend the lab to complete tasks/experiments. This could include removing/incubating samples. You must notify the laboratory teaching staff or the responsible supervisor if you require access outside of scheduled lab time. Further information regarding the laboratory session and the nature of the laboratory component will be given during the tutorial session to be held in week 1. Laboratory sessions are **COMPULSORY**. If you cannot attend, you must submit a Special Consideration request if you wish your absence to be considered.

Other (Dry-lab): Due to the nature of the research activities in this unit, there are other tasks/ activities that you will need to schedule time for both during and beyond the thursday scheduled contact hours (e.g. analysing data, preparing seminars, etc). The 'write-up' room (E7B 354) and notebook computers will be available for you to use during the Thursday lab session to help with these tasks (open until 6pm, by request). The laboratory may also be open during the mid-semester break to help you complete these tasks (by request).

Each student is expected to attend all tutorials and laboratory sessions which commence at 9am. Excessive absence from tutorials and laboratory sessions will be treated as grounds for incomplete work in CBMS330.

The university timetable can be found at http://www.timetables.mq.edu.au/

Required and Recommended Texts and/or Materials

This course is NOT taught from standard texts but will depend on the nature of the weekly activities and thus reading material may be advised by your CBMS academic supervisor. Lists of other suggested reading material will be issued separately. Additional printed notes and other material will be issued as required or made available via the CBMS330 website: learn.mq.edu.au.

Technology Used and Required

You will be using and receive training in modern, state of the art research equipment for conducting your research project. This will be located in the laboratories located in 14 Sir Christo

pher Ondaatje Ave (E7B) 349 Science Lab and include other research laboratories in the Dept Molecular Sciences. You will use database search tools including webofscience, Scifinder, PubMed to acquire relevant literature. You will complete assessment tasks and deliver presentations including an oral talk that will require access to software such as word processing software, graphics software and powerpoint. General use computers will be provided during the laboratory session with internet access.

Unit Web Page

- The URL of the CBMS330 is: ilearn.mq.edu.au
- You will be asked for your username (student MQID) and password.
- For log-in or contact difficulties, contact the University Library Information Technology Help Desk. http://www.lib.mq.edu.au/help/ithelp/

Unit Schedule

The CBMS330 ilearn site contains important information including the details of the weekly tutorial schedule. **Weekly tutorials** are compulsory and are structured around the five following themes. **Tutorials commence in Week 1 (1-2pm)**.

- Review of the Scaffold of the Chemistry/ Biomolecular Science Major: reflecting on the development of your graduate capabilities and how these have been achieved within the degree.
- The Student Portfolio / Graduate Capabilities: Seminars from the career service and other professional bodies will allow you to take on an active role to reflect and then document on your abilities to demonstrate your capabilities in the area of Chemistry/ Biomolecular Sciences. You will be provided with advice to prepare a portfolio.
- Research Project Skills: a practical introduction to research methods, effective writing, effective oral communication and presentations, group work, planning and organization will be given. This will be linked to your research project and the assessment tasks associated with your research project.
- Introduction to Academic and Industry Cultures: Professional preparation of knowledge, skills and values of the profession, occupational health and safety requirements, computer literacy, library competency, software package analysis, analysis of Internet tools/software.
- Ethical and Substantive Issues and Themes: that affect the world community and broad cross-sections of humanity.

Below are brief guidelines regarding the chemistry/biomolecular science research-project you will do in this unit. Further details and updates of project results will be continuously made available on the CBMS330 ilearn.mq website during the semester.

"Which techniques/skills that I have encountered during my undergraduate experience do I wish

to further develop in a given practical situation?"

Designing and Building Biological Systems: Your research-project for the capstone unit will be mentored by A/Prof K Venkatesan, Dr. F. Short, Dr. S. Keaveney and other academics in the department. As a researcher, you will work as part of a small team and be the drivers of your research project. Your research project will encompass a **'Design, Build and Test'** format.

For your research project, the initial idea framework and the necessary facilities will be provided by the respective supervisor of the project.

- The CBMS330 research project is a **group effort**. You may be given or wish to embrace specific tasks in your group project and, as part of the team effort, are expected to communicate/share your findings/results back to your group. You will be assessed individually as per assessment guidelines.
- Suggestions and training on how best to perform your research-project will be part of the tutorial content. Skills to help you prepare for your presentation and written report will be included. Additionally training on specialized instrumentation *etc* can be organised, if required for your group project.
- Thursdays during semester are the official timetabled 'CBMS330' laboratory days. You will spend at least 20 hours of lab time on your project within the laboratory during weeks.

Learning and Teaching Activities

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships

with others and the environment, learning from them, and growing - personally, professionally and socially.

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific

knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

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). 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). 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 (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 or if you are a Global MBA student contact 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) 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

If you are a Global MBA student contact 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/.

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

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Assessment tasks

- Execution of Research Project
- Seminar Presentation
- Final Research Report

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

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Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Learning outcome

- Develop career networking skills and capabilities that will aid you with either moving into the workforce or further study.

Assessment tasks

- Execution of Research Project
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Discipline Specific Knowledge and Skills

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This graduate capability is supported by:

Learning outcomes

- Integrate the knowledge, abilities, and values that you have obtained from your undergraduate experience to define a problem, formulate a hypothesis, and design and plan a research study/investigation.
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- Design and conduct appropriate experiments/ calculations to investigate a research problem in Chemistry/Biomolecular Sciences
- Successfully utilise a variety of generic techniques/ calculation programs used in research laboratories within the Chemistry/Biomolecular Sciences.

Assessment tasks

- Execution of Research Project
- Seminar Presentation
- Final Research Report

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Assessment tasks

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This graduate capability is supported by:

Assessment tasks

- Execution of Research Project
- Portfolio Task
- Seminar Presentation
- Final Research Report

Socially and Environmentally Active and Responsible

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This graduate capability is supported by:

Learning outcomes

- Effectively communicate key Chemistry/Biomolecular Science concepts and scientific results in written and oral form to a variety of audiences. This includes presenting your research in the format of a seminar.
- Work effectively, responsibly and safely, as a member of a research team

Assessment tasks

- Execution of Research Project

- Portfolio Task
- Seminar Presentation
- Final Research Report

Changes from Previous Offering

The Chemistry and bimolecular capstone is combined. The lab sessions will take place both in the research labs and the teaching labs. The teaching labs will be open from 9am to 6pm from week 2 to week 11 on Thursdays.

Changes since First Published

Date	Description
23/07/2019	Bi-weekly has been amended to fortnightly. A reference to blackboard has been removed.