PHTN310

Industrial Project

S2 Day 2014

Physics and Astronomy

Contents

General Information	2
Learning Outcomes	2
Assessment Tasks	3
Delivery and Resources	4
Unit Schedule	6
Policies and Procedures	6
Graduate Capabilities	7
Background Information	10
General Reminders	11

General Information

Unit convenor and teaching staff
Unit Convenor
Michael Withford
michael.withford@mq.edu.au
Contact via michael.withford@mq.edu.au

Credit points
3

Prerequisites
PHTN321(P) or OPTO300(P) or OPTO321(P)

Corequisites
PHTN322

Co-badged status

Unit description
Photonics is the science and technology surrounding the generation, manipulation and detection of photons, the fundamental building block for light. Photonics is recognised as being a key enabling technology for next generation astronomy, biotechnology, medicine, communications and nanotechnology. Recent reports reveal that optics and photonics is responsible for 10% of the total revenue of the US and European economies. In this unit students have the opportunity to apply their knowledge, training, reasoning and analytical skills in a workplace environment. In particular, students are placed in industrial, government or semi-government laboratories to undertake projects within the broad scope of photonics and its application to real world problems. The projects are defined and supervised by University academic staff, and staff of the external laboratories concerned.

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:

Project planning and management, including a capacity to meet agreed deadlines set by the industry partner.

Insight into industry orientated research programs

Critical thinking and analysis both interpreting the outcomes of the industry project and identifying future research directions relevant to the project

Report writing skills.

Ability to effectively communicate the project outcomes to the industry partner.

(In some cases) Insight into practises used to validate and protect Intellectual Property

Assessment Tasks

Name	Weighting	Due
Project Report	50%	Week 13
Laboratory Book	25%	Week 5 and Week 13
Individual work diary	25%	Week 13

Project Report

Due: **Week 13**
Weighting: **50%**

The students are required to submit a 5000 word Project Report for the host organisation and formal presentation of Project outcomes to the Industry Supervisor. Typically, students will wotk in pairs with the industry partner. In those cases each student is expected to contribute equally to the project report. and the report must include a statement describing the contributions of each student to the joint project.

Students are assessed on both the joint Project Report and their individual work diaries / lab-books. Note that in some cases Project progress and timely conclusion can be influenced by circumstances that are outside of the Student's control. In recognition of this risk the assessment of this unit is given in grades of Pass or Fail only. However, this mark does not influence the GPA of the student.

On successful completion you will be able to:

- Project planning and management, including a capacity to meet agreed deadlines set by the industry partner.
- Insight into industry orientated research programs
- Critical thinking and analysis both interpreting the outcomes of the industry project and identifying future research directions relevant to the project
- Report writing skills.
- Ability to effectively communicate the project outcomes to the industry partner.
- (In some cases) Insight into practises used to validate and protect Intellectual Property

Laboratory Book

Due: **Week 5 and Week 13**
Weighting: **25%**

Each student must maintain an individual lab book. The lab book needs to be completed for each day of work on the project. Students are expected to regularly graph and analyse their results, and keep comprehensive and up-to-date records in their lab-books. The Partner and University supervisor will review the research plan and lab-books to ensure good practise in this respect. Satisfactory progress and the pursuit of good lab practise will be assessed by the Supervisors in Week 5. In week 13 students are also required to hand in their lab books to the Partner supervisor as part of the assessment process.

On successful completion you will be able to:

- Project planning and management, including a capacity to meet agreed deadlines set by the industry partner.
- Insight into industry orientated research programs
- Critical thinking and analysis both interpreting the outcomes of the industry project and identifying future research directions relevant to the project
- (In some cases) Insight into practises used to validate and protect Intellectual Property

Individual work diary

Due: **Week 13**
Weighting: **25%**

Each student must maintain an individual work diary. The work diary is a record of the additional reading and reflective research undertaken by each student on areas relevant to working in an industry environment. This may include a review of the mechanisms for protecting Intellectual Property and the project related implications for the host partner; a review of project planning and resources (eg. Gantt charts etc); a review of the science and engineering principles underpinning the Project; guidelines to working in a team environment; conflict resolution etc.

Students will be required to hand in their diaries to the University supervisor as part of the assessment process.

On successful completion you will be able to:

- Insight into industry orientated research programs
- (In some cases) Insight into practises used to validate and protect Intellectual Property

Delivery and Resources

Supervisors

The project has a supervisor at the host organisation, who is able to devote some time to supervising the students on the days that they attend the host organisation. The Physics and Astronomy Department at Macquarie University also appoints a university staff supervisor to maintain liaison, monitor progress and assist in advising students.

Required Unit Materials

You will be working within the premises of the industry or government partner. Compliance with standard OHS practise is expected. This includes wearing appropriate clothing and footwear (covered shoes).

Required Text

Not applicable

Teaching Strategy

Students spend a total of 18 days within the host organisation. This time should be used effectively in the pursuit of the objectives identified by the industry supervisor. A clear understanding of the project objectives and appropriate research planning will facilitate progress towards the project objectives. Students are expected to regularly graph and analyse their results, and keep comprehensive and up-to-date records in their lab-books. The Industry and University supervisor will review the research plan and lab-books to ensure good practise in this respect. Students are also expected to maintain a work diary that captures other project related reading and reflective analysis undertaken by the student. This may include a review of the mechanisms for protecting Intellectual Property and the project related implications for the host partner; a review of project planning and resources (eg. Gantt charts etc); a review of the science and engineering principles underpinning the Project; guidelines to working in a team environment; conflict resolution etc.

Record-keeping

Each student must maintain both an individual lab book and work diary. The lab book needs to be completed for each day of work on the project. Entries in the lab book must be viewed and approved as correct records by the Industry supervisor on a regular basis (at least fortnightly). Students will be required to hand in their lab books to the Industry supervisor as part of the assessment process. The work diary is a record of the additional reading and reflective research undertaken by each student on areas relevant to working in an industry environment. Students will be required to hand in their diaries to the University supervisor as part of the assessment process.

Laboratory Requirements

Appropriate clothing and footwear

Lab-book

Calculator and / or lap-top

Workload

Students will meet with the Unit convenor / University Supervisor at least twice to review lab-books, work diaries and progress against project objectives. One of these meetings will take place at the host organisation.

Unit Schedule

Attendance

Students are required to attend at the site of the host organisation to undertake the project on the days stated in the covering letter (every Friday during semester 2, starting 8th August and finishing Friday 14th November 2014, and five full days during the semester break, 22nd September to 3rd October 2014). This is a total of 18 days. On some of these days some time may be spent at the University or elsewhere pursuing the objectives of the project with the agreement of the industrial supervisor.

Progress Meetings

Students are required to attend progress meetings at the external site as arranged by the University supervisor. At least one such meeting will take place during the project.

Policies and Procedures

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

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

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

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

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

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

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

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

Student Code of Conduct

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

Student Support

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

Learning Skills

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

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

Student Services and Support

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

Student Enquiries

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

IT Help

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

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

Graduate Capabilities

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.

This graduate capability is supported by:

Learning outcomes

- Project planning and management, including a capacity to meet agreed deadlines set by the industry partner.
- Critical thinking and analysis both interpreting the outcomes of the industry project and identifying future research directions relevant to the project

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.

This graduate capability is supported by:

Learning outcomes

- Project planning and management, including a capacity to meet agreed deadlines set by the industry partner.
- Insight into industry orientated research programs
- Critical thinking and analysis both interpreting the outcomes of the industry project and identifying future research directions relevant to the project
- Report writing skills.
- Ability to effectively communicate the project outcomes to the industry partner.
- (In some cases) Insight into practises used to validate and protect Intellectual Property

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.

This graduate capability is supported by:

Learning outcomes

- Project planning and management, including a capacity to meet agreed deadlines set by the industry partner.
- Critical thinking and analysis both interpreting the outcomes of the industry project and identifying future research directions relevant to the project
- Report writing skills.

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.

This graduate capability is supported by:

Learning outcomes

- Project planning and management, including a capacity to meet agreed deadlines set by the industry partner.
- Critical thinking and analysis both interpreting the outcomes of the industry project and identifying future research directions relevant to the project
- Report writing skills.

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:

Learning outcomes

- Project planning and management, including a capacity to meet agreed deadlines set by the industry partner.
- Critical thinking and analysis both interpreting the outcomes of the industry project and identifying future research directions relevant to the project

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.

This graduate capability is supported by:

Learning outcomes

- Project planning and management, including a capacity to meet agreed deadlines set by the industry partner.
- Report writing skills.
- Ability to effectively communicate the project outcomes to the industry partner.

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.

This graduate capability is supported by:

Learning outcome

- Insight into industry orientated research programs

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.

This graduate capability is supported by:

Learning outcome

- Insight into industry orientated research programs

Background Information

Optoelectronic technologies are those devices and systems that use both light and electric signals in their functioning. Photonics devices and systems, which use only light, are covered as a subset of optoelectronics within this degree. Examples of optoelectronic/photonic technologies include laser systems, fibre-optic communications systems, remote sensing systems, medical diagnosis systems and optical information systems. The degree covers the design and function of such systems at system and device level as well as the relevant physics, electronics and mathematics that allow understanding of the operating mechanisms of the devices and systems.

The B Tech (Optoelectronics) has been running at Macquarie University since 1990, and, after a review, has recently been replaced by the BSc with a Major in Photonics. In this new degree, we have retained the key elements that made the BTech (Optoelect.) degree attractive to students and employers alike, including the international standard optoelectronics teaching laboratories, the industry project and the inclusion of technology management in the curriculum. The BTech program is accredited by the Australian Institute of Physics as a physics degree, and we anticipate that this will continue for the BSc – Photonics Major degree. PHTN310 is a Capstone unit for the Photonics major for the BSc.

The graduates of the B Tech (Optoelectronics) degree have been employed in three main areas: sales/ service engineers of high tech equipment; research/professional officers in university, government, hospital and industry research laboratories; and Research and Development Engineers / Officers involved in photonics component development and manufacturing. About 20% of the graduates have also completed the Honours component of this degree, in a 4th year.

About 10% of graduates go on to higher research degrees. Macquarie's major research centres with recognised strengths in laser and optical physics and engineering, materials physics and electronics provide many attractive projects and opportunities for research. The academic staff who lead these research programs are the same staff who lecture and supervise laboratories in the B Tech (Optoelect.) and the BSc – Photonics Major degrees.

General Reminders

Intellectual Property

Since the projects are undertaken under supervision of the host organisation, the University has no claim to any intellectual property arising from the student's work. Students would have the same rights as employees of the host organisation.

Safety

Students must be advised of and observe such safety procedures as required by the host institution including attendance at safety courses or medical examinations.

Confidentiality

Students must observe such confidentiality concerning the project and its results as required by the host organisation of its employees. Signing Confidentiality Agreements may be required in some cases, and it is desirable if this is discussed in advance with the course convener. If students are uncomfortable about the provisions of these agreements they should discuss the issue with their University supervisor and course convener.

Accident Insurance

Students are covered for personal injury by the University's insurance policy when they are undertaking part of a formal unit of study off campus. Breakages or damage are part of the normal research and development process and are not covered by university insurance.

Payment

Students are working on the unit for credit towards their degree programs and are not paid by the host organisation.