



**Innovation  
&  
Technology Commercialisation**

*'MASTER CLASS'*

**ENGG 4061  
6 Credit Points**

**Semester 1, 2009**

Friday  
1.00pm - 3.00pm  
CIVL Lecture Theatre 2

**Presented by:** Professor Ron Johnston, FTSE, Executive Director,  
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**Course material available on Engineering website –**

<http://www.eng.usyd.edu.au/current-students/InnoManage/ENGG4061/index.shtml>

## **Course Objectives**

1. To develop an understanding of the nature and importance of technological change and innovation, within the context of the global knowledge economy.
2. To examine the role of innovation in international competitiveness and economic development.
3. To understand the changing nature and effects of globalisation on Australia's economic performance, the competitiveness of Australian firms, and the generation of employment and wealth.
4. To understanding the characteristics of the emerging global knowledge economy, and the consequent issues of knowledge valuation and management, e-commerce, value chain, and alliance management.
5. To recognise the major elements in the management of technological innovation, including forecasting, R&D, technology acquisition, business strategy, financial control and marketing.
6. To develop an understanding of how companies formulate strategy and make decisions about innovation, through a series of case studies.
7. To gain an insight into the importance of innovation at all levels and functions of all organisations, and of the ways of developing people-skills and organisational styles to promote innovation.
8. To develop an understanding of the issues involved in commercialisation of research and technology, and in the start-up of a new technology-based venture.

## **Learning Approach**

Developing an understanding of the processes of management, and in particular of innovation, is very different from learning engineering. There are no formulae to learn and apply; there is not even a set of right answers, though there are plenty of wrong ones. Hence a different learning approach is required. The essence of management, and innovation, is that you are dealing with people. And different people behave differently in the same, and different situations. The biggest challenge is rarely to work out what to do, but rather to communicate effectively to and motivate a group of people to work out what to do, and how to do it.

Hence it is crucial for you, the student, to arrive at your own understanding so that you can apply it in the varied situations you face in the future. In these circumstances, effective learning occurs with the learner's dynamic involvement. You cannot learn passively by simply listening to lectures making notes - you must positively engage the material and experience of this course.

Through the conceptual material, your reading, a series of case studies, and exercises, you will learn to cope with the practical business difficulties of imperfect and incomplete information, conflicting information, divergent personal views and internal organisational politics. It will require you to actively engage in sorting, sifting, categorising, consolidating and transforming data.

The exercise, the case studies and the project all require the ability to work in teams with your fellow students, and to learn from one another's contributions. Hence it will be important for each student to develop the ability to effectively communicate their ideas, and listen to and respect the ideas of others.

Through exposure to a range of problems, you should start to be able to observe coherent patterns emerging. General principles will be drawn out to provide the basis for comparison and analysis in the real world. It will assist you in developing independent thought and responsible judgement.

## **Learning Outcomes**

This UoS is designed as a 'Master Class' for final year Engineering students to grapple with the challenges of engaging in, facilitating and managing innovation and technology commercialisation.

Key learning outcomes are:

- developing an understanding of the processes of management, and in particular of innovation
- understanding there are no formulae to learn and apply; there is not even a set of right answers, though there are plenty of wrong ones. Hence a different learning approach is required.
- insights into the essence of management, and innovation, as dealing with people; the biggest challenge is rarely to work out what to do, but rather to communicate effectively to and motivate a group of people to work out what to do, and how to do it.
- effective learning occurs with the learner's dynamic involvement; students cannot learn passively by simply listening to lectures making notes - you must positively engage the material and experience of this course
- learning to cope with the practical business difficulties of imperfect and incomplete information, conflicting information, divergent personal views and internal organisational politics, requiring students to actively engage in sorting, sifting, categorising, consolidating and transforming data
- through exposure to a range of problems, students should be able to observe coherent patterns emerging; general principles will be drawn out to provide the basis for comparison and analysis in the real world, which will assist in developing independent thought and responsible judgement.

## **Format**

The first four weeks will consist of intensive lectures providing a framework for analysing and managing innovation. Subsequently, specific issues will be explored through discussion and analysis of case studies. It is assumed that you have completed the assigned reading. Class time will be spent ensuring that you have understood this material and exploring new developments and extension to the basic concepts.

A significant proportion of class time each week will be spent on exercises, guest lectures, case studies, and project presentations.

The 'laboratory work' for this course involves detailed field research on innovations and innovative companies.

## **Reading**

Textbook

J. Tidd, J Bessant and K. Pavitt, *Managing Innovation*, John Wiley, 2005 (3rd edition)

Other books which are valuable for sections of the course are:

J Bessant and J.Tidd, *Innovation and Entrepreneurship Change*, John Wiley, 2007.

B.R. Barringer and R.D. Ireland, *Entrepreneurship: Successfully Launching New Ventures*, Pearson Education, 2<sup>nd</sup> edition, 2008.

M.Dodgson, D, Gann and A. Salter, *The Management of Technological Innovation*, Oxford University Press, 2000.

Relevant Websites:

<http://www.aciic.org.au/>

[http://www.bus.ed.ac.uk/ESRC\\_Innovation.html](http://www.bus.ed.ac.uk/ESRC_Innovation.html) (and hotlinks listed there)

[www.phm.gov.au/australia\\_innova](http://www.phm.gov.au/australia_innova)

## **Assessment**

Formal assessment for this course is designed to recognise both individual and team effort. This is an intentional effort to reflect the business environment where effective teamwork is essential to the achievement of individual success. Active participatory learning will be hallmark of success throughout the course.

1. Profile of an innovation (individual) - due Week 3	10%
2. Case Studies of an innovation (group), Weeks 5-8	15%
3. Mid-term quiz, Week 9	15%
4. Analysis of an innovative start-up company (group) - due Week 11	25%
5. Final 'exam' project - due Week 13	35%

On the basis the breakdown is:

Individual assessment:	60%
Group assessment:	40%

All assignments must be handed to the lecturer or delivered to Room 246, Link Building (there is a secure mail-slot), in hard copy, by 3pm on the Friday that it is due. The only exception is the final 'exam' project which should be delivered electronically to [rj@aciic.eng.usyd.edu.au](mailto:rj@aciic.eng.usyd.edu.au) at the time indicated on the question.

### ***1. Profile of an Innovation***

Select an innovation from the Powerhouse Innovation Website and describe it against the nine components of the Powerhouse Industrial Innovation Cycle.

[http://www.powerhousemuseum.com/australia\\_innovates/cycle.htm](http://www.powerhousemuseum.com/australia_innovates/cycle.htm)

### ***2. Case Study of an Innovation***

First, you must form a group (no more than 5 members) and present the group name and members by Week 2. Select an innovation from the many sources available (preferably Australian). You must present your selection for approval by Week 3 (no duplicates).

The group presentation should be a maximum of 15 minutes. Describe the innovation. Analyse it so that you can answer the following questions:

- i) In what way did the innovation significantly differ from what else was available in the market-place?
- ii) How would you rate the commercial success? Provide some data.
- iii) What were the 3 greatest challenges in developing the innovation?
- iv) What were the 3 greatest weaknesses of the innovation?
- v) How did the innovation make life different?
- vi) How could it have been managed better?

### ***3. Quiz***

A 50-minute, current challenge about innovation.

### ***4. Group Project***

Select an innovative start-up company (preferably Australian) which has been trading no more than five years. You must present your selection for approval by Week 7 (no duplicates).

- i) Provide a historical narrative on the performance of the company.
- ii) Analyse the innovative product or service that the company was based on.  
What advantages did it offer to the market-place?
- iii) Describe the business development approach used, and the key decisions made along the way.

- iv) From your analysis, how could it have been managed more effectively?
- v) Analyse the prospects for the company in five years time.
- vi) What general lessons can you draw from this case study.

### ***5. Final 'Exam' Project***

An innovation management 'challenge' will be posted on the course website at an agreed time in Week 13. It will contain a brief detailing a problem you are assigned to address. You will provide your data, analysis, reasoning and recommendations by an agreed time within about 72 hours. Your answer must be emailed.

## **Course Outline**

### ***Week 1***

**Introduction:** objectives and organisation of the course, learning styles, assessment. the innovation imperative

**Key issues in innovation management:** the innovation imperative and competitive advantage, definitions and types of innovation – 4Ps – product, process, position, paradigm, what are the 'rules' of innovation?

**Industry databases:** sources of information about company innovations.

*Reading:* Tidd, Ch. 1

### ***Week 2***

**Innovation as a core business process to be managed:** evolving models of the innovation process, successful innovation and successful innovators, roadmaps for success, innovation management archetypes.

**Developing the Framework for an Innovation Strategy:** rationalist versus incrementalist strategies, technology and competitive analysis, Porter's framework, the dynamic capabilities of firms, innovation strategy in small firms.

*Reading:* Tidd, Ch. 2&3

*Groups to be established*

### ***Week 3***

**Positions: the national and competitive environment:** national systems of innovation, coping with competitors, appropriating the benefits from innovation, positioning of small firms.

**Paths: exploiting technological trajectories,** major technological trajectories, revolutionary technologies, developing firm-specific competencies.

**Processes: integration for strategic learning:** locating R&D activities - corporate versus divisional, global versus local, allocating resources for innovation, technology and corporate strategy, organizational processes in small firms.

*Reading:* Tidd, Ch. 4-6

*Profile of an Innovation due*

*Selection of Innovative Case Study*

#### **Week 4**

**Learning from markets:** how do technology and markets affect marketing?, differentiating products, creating architectural products, marketing technological products, marketing complex products, forecasting the diffusion of innovations.

**Learning through alliances:** why collaborate, forms of collaboration, patterns of collaboration, effect of technology and organisation, managing alliances for learning.

**Managing the internal processes:** enabling scanning, strategy-making, knowledge acquisition, effective resourcing, product and process innovation.

*Reading:* Tidd, Ch. 7,8,9

#### **Week 5**

**Innovative manufacturing:** the changing face and demands on manufacturing, is manufacturing dying? Key challenges – agility, innovation, knowledge-intensive, design-make-serve, globalised network model, global supply chains, computer-integrated model

*Reading:* Bessant, Ch. 4

*Group Presentations of Innovation Case Studies*

#### **Week 6 – Good Friday**

#### **Week 7**

**New product and service innovation:** the growing importance of service innovation over product innovation, service innovation strategies, tools and technology to assist service innovation.

*Reading:* Bessant, Ch. 5

*Group Presentations of Innovation Case Studies*

#### **Week 8**

**Knowledge and Intellectual Property (IP) management:** the components of knowledge management, knowledge generation, acquisition, codification, storage and distribution, translation into socio-economic benefit, creating, protecting and exploiting intellectual property.

*Reading:* Bessant, Ch. 6

*Group Presentations of Innovation Case Studies*

#### **Week 9**

**Exploiting discontinuous innovation:** the difference between steady-state innovation and discontinuous innovation, associated threats and opportunities, the role of new entrant companies, intra- and entre-preneurship.

**Entrepreneurship and new ventures:** making of an entrepreneur, the purpose of a new venture, reasons for corporate venturing, managing corporate ventures, structures for corporate ventures, learning through internal ventures.

*Reading:* Bessant, Ch. 7, 8

### **Week 10**

**Creating and launching the business venture:** shared vision and leadership, appropriate organisation structure, key individuals, stretching training and development, effective teamwork, a creative climate, external focus, the learning organisation.

**Entrepreneurship and new ventures:** making of an entrepreneur, the purpose of a new venture, reasons for corporate venturing, managing corporate ventures, structures for corporate ventures, learning through internal ventures.

**Financing the new venture:** venture capital, a financial fitness checklist, the business plan, cash flow.

*Reading:* Tidd, Chs, 10,11,

### **Week 11**

**Social entrepreneurship and innovation:** growth and nature of the concept of social entrepreneurship

**Innovation for sustainability:** open systems of innovation, diffusion and adoption of innovation, tools for considering future innovation.

**Innovation and globalisation:** globalisation of innovation, national innovation systems, positing in international value chains,

*Reading:* Bessant, Ch 9,10,11

*Group project on analysis of an innovative start-up company due*

### **Week 12**

**Systematic organisation and management of innovation:** learning to manage innovation, measuring success, auditing innovation management.

*Reading:* Bessant, Ch. 12, Tidd Ch 13

### **Week 13**

*Final 'exam' project*