

# Course Description

## 7052 - Electromagnetic Theory and RFID Applications

<b>Course Code:</b>	ELEC ENG 7052
<b>Course Title</b>	Electromagnetic Theory and RFID Applications
<b>Academic Year:</b>	2008
<b>Semester:</b>	2
<b>Units:</b>	3
<b>Lecturer:</b>	Prof. P.H. Cole
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### **Aim**

This course aims to develop in students an understanding of and an ability to apply the principles and techniques employed in modern electromagnetic communication systems.

The principles will be illustrated in the context of the design and operation of Radio Frequency Identification Systems, and the establishment of their electromagnetic compatibility.

### **Content**

Revision of basic electromagnetic theory. Lumped and distributed circuit theory. Practical circuit elements for HF and microwave communications. Reciprocity theory and its applications. Microwave networks and junctions.

Propagation in space and in buildings. Signals and noise in receivers.

Modulation systems. High frequency communication signals and calculations. Fourier and Hilbert transforms. Construction of signalling waveforms and interpretation of their spectra.

High frequency measurements.

Electromagnetic compatibility regulations and measurements. Radio frequency identification concepts, applications, hardware, and protocols. Classification and management of reader collisions.

### **Mode of delivery**

This course will be presented as a series of approximately 24 lectures, with 12 tutorials.

### **Assumed knowledge**

This course assumes familiarity with principles of circuit theory, signals and systems and electromagnetic theory.

### **Assessment**

Assessment will be based on an end of semester 2-hour examination (65%) and in-semester quizzes and assignments (35%).

### **Course notes**

A comprehensive set of course notes and references will be placed on the web and may be accessed via MyUni.

### **Graduate attributes**

- GA1** An advanced level of knowledge and understanding of the theory and practice of Electrical and Electronic, Computer Systems or IT&T Engineering and the fundamentals of science and mathematics that underpin these disciplines.
- GA2** A commitment to maintain an advanced level of knowledge throughout a lifetime of engineering practice and the skills to do so.
- GA3** The ability to apply knowledge in a systematic and creative fashion to the solution of practical problems.
- GA4** A commitment to the ethical practice of engineering and the ability to practice in a responsible manner that is sensitive to social, cultural, global, legal, professional and environmental issues.
- GA5** Interpersonal and communication skills for effective interaction with colleagues and the wider community.
- GA6** An ability to work effectively both independently and cooperatively as a leader, manager or team member with multi-disciplinary or multi-cultural teams.
- GA7** An ability to identify, formalise, model and analyse problems.
- GA8** The capacity to design, optimise, implement, test and evaluate solutions.
- GA10** Personal attributes including: perseverance in the face of difficulties; initiative in identifying problems or opportunities; resourcefulness in seeking solutions; and a capacity for critical thought.
- GA11** Skills in the use of advanced technology, including an ability to build software to study and solve a range of problems.
- GA12** A commitment to the highest standards of professional endeavour and the ability to take a leadership role in the community.
- GA13** An ability to utilise a systems approach to design and operational performance.

This course also fosters the graduate attributes of the University of Adelaide and the Institution of Engineers Australia. These should be read in conjunction with the list above.

### **Assessment of graduate attributes**

Attributes GA1, GA3, GA4, GA7, GA10 and GA12 will be assessed through the quizzes, assignments and the main examination.

Attributes GA5 and GA13 will be assessed through both the assignments and the main examination.

The quizzes are designed particularly to assess attribute GA2, but they will also assess attributes GA6 and GA8.

Attribute GA11 will also be assessed through the assignments.