Course Description

7033 - Principles of RF Engineering

Course Code:	ELEC ENG 7033
Course Title	Principles of RF Engineering
Academic Year:	2008
Semester:	1
Units:	3
Lecturer:	Dr. C.J. Coleman
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Aim
The primary objectives of the course are to provide an understanding in the following areas:

RF System Basics:
Radio waves, antennas, analogue modulation, noise, sensitivity, selectivity, non-linearity, digital modulation, spread spectrum and radar.

Tuned Circuits:
Resonance, Q, bandwidth, transformers and matching networks.

Amplifiers: BJT amplifiers, Miller effect, differential amplifiers, feedback, FET amplifiers, amplifier noise.

Scattering Parameters:
Transmission lines, impedance transformation, Smith charts, S parameters and S parameter amplifier design. Multi-port networks.

Power Amplifiers:
Class A, B, C and E amplification. Broadband matching.

Filters: Basic lumped component designs. Filter realisation in microstrip form.

Oscillators:
Basic oscillator design and negative resistance approach. Phase noise and stability issues.

Mixers, Modulation and Demodulation:
Diode, BJT and FET mixers. The generation and demodulation of AM, SSB, FM and PM signals.

Introduction to Phase Locked Loops:
Basic principles and some applications. Frequency synthesisers.

Mode of delivery
Short course mode – 'O Week'.

Assumed Knowledge
A foundation Course in electronics and some familiarity with electromagnetic ideas.

Assessment
A quiz on fundamentals, a major assignment and two practical sessions.

Textbooks
Coleman, C.J. "An introduction to radio frequency engineering" (Cambridge, 2004)

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.

GA9 An ability to plan, manage and implement solutions that balance considerations of economy, quality, timeliness and reliability as well as social, legal and environmental issues.

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.

GA14 Understanding of the principles of sustainable design and development.

These programs also foster 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, GA7, GA8, GA10, GA11, GA12 and GA13 will be assessed through the tests, laboratories and the examination. The laboratory sessions will test, to some degree, attributes GA5, GA6 and GA9. Issues concerning GA2 and GA4 will be raised during lectures, but not assessed.

cjc:clg:14 February 2006