
Tertiary Teaching Excellence Awards 2004

Nomination for:

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**Department of Electrical and Computer
Engineering**

The University of Auckland

Category One: Sustained Excellence



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1. INTRODUCTION

My application for a Sustained Excellence in Teaching Award is based on 20 years of teaching experience during which I have been awarded 14 teaching awards, including 2 University of Auckland Distinguished Teaching Awards and a University of Auckland Teaching Excellence Award in the Sustained Excellence in Teaching Category, and have consistently received excellent teaching evaluations in class surveys. While classroom teaching performance is the foundation upon which I base this application, I also claim a significant all-round contribution to University education. For instance, I have supervised 29 research theses or research projects, 102 final year projects and have also been involved in significant administrative tasks associated with curriculum design and with operational and quality control aspects of undergraduate teaching, culminating in appointment as Deputy HOD (Academic) with responsibility for undergraduate and taught postgraduate programmes within my Department.

In this teaching portfolio:

- I first outline my **teaching philosophy**.
- I then establish the breadth of my **teaching experience**.
- I next include a description of how I **design for learning** within my courses.
- I then discuss how I **evaluate teaching and learning**, including details of the 14 teaching awards received as well as some samples of teaching-evaluation class surveys and references from colleagues and students.

To illustrate my all-round contribution to the University teaching environment I conclude the teaching portfolio with details of:

- My **professional development and leadership** experience, including details of academic leadership and curriculum design for which I have been responsible.

2. TEACHING PHILOSOPHY

I am, by nature, introverted and have never been especially comfortable speaking in public. Some of my colleagues (who are aware of my reserved nature) have been quite surprised that I continue to win teaching awards. One (from another Department) was so bemused that he actually attended one of my lectures to see what I was doing. He later told me that I seemed like a completely different person in the lecture to the person he knew from the staff common room. This didn't surprise me as I have learnt to overcome my natural reserve and have developed a specific technique to "wind myself up" prior to a lecture. The approach I use is a visual-symbolic approach. I always design my lectures to have 3 or at most 4 key points. I integrate the lecture around these 3 or 4 points. I then assign a picture or symbol to each point. The more representative this symbol or picture is, the better. In the hour or so preceding a lecture I "play" these pictures through my head and visualise how I will make the transition from one topic to another. The whole lecture is thus integrated in 3 or 4 pictures which I can keep playing in my head, even when lecturing. Having this visual, integrated picture of how everything fits together gives me the confidence to deliver the lecture and ensures the topics flow naturally, one into the other.

If I were to summarise my teaching philosophy in one word, that word would be **integration**. Perhaps the major feature that distinguishes my approach from that of my colleagues is the extent to which I have gone to integrate all components of my courses. Beginning with a clear articulation of my educational aims and objectives, I then design the lectures, laboratories, problem sheets and assignments to achieve these aims and objectives. That alone, though, is insufficient. One must engage the students in this integrated process as well. To do this I share with students, via my lectures, my educational aims and objectives. Using the visualisation approach described above, I use every lecturing opportunity to reinforce how all the components of the course are integrated to achieve the desired educational aims and objectives.

Education Aims and Objectives

As an Engineering Academic my goals in teaching are guided by desired Graduate Profiles of both the University of Auckland and of the Institution of Professional Engineers of New Zealand (IPENZ). These goals include development of:

- A sound grasp of the scientific principles on which the subject is based and of the current engineering applications of the material.
- The ability to generalize from the specifics taught in the course to topics not previously encountered.
- An appreciation of the beauty of the underlying scientific basis (especially electromagnetics).
- The ability and desire to engage in lifelong learning.
- 'Character', i.e. that mixture of maturity, attitude and values which is necessary in professionals.
- Sensitivity to the non-technical issues involved, e.g. the biological effects of electromagnetic radiation.

These general aims and specific objectives are inculcated via a lecture programme supported by carefully integrated student activities. The success of the learning environment I create for my students relies on the learning outcome integration I develop within my teaching and learning methodology.

Teaching and Learning Methodology

In my view, teaching is principally concerned with making connections with individuals. Without these connections, deep learning is less likely to occur. I therefore try to interact with students as individuals, regardless of the class size, and make sure that they understand I do care. This can't be faked - students quickly spot someone who isn't genuine. An essential part of making these connections is to provide for reasonable contact time outside of lectures. I run an open-door policy in addition to posted office hours. I also provide additional support via email, and take some trouble to respond to emails promptly. I try to be a good listener. In my experience, the initial query that brings a student to my office is often not the real problem. One needs to probe patiently to find the real cause of the problem. I never ridicule or belittle students, and always encourage rather than criticize.

The key technique I use for integrating the student-centred activities with the lecture programme is to always be on the look-out for learning opportunities. Indeed, I feel one key characteristic that distinguishes competent lecturers from excellent lecturers is that the latter are usually able to spot and react to opportunities to reinforce student learning. Such opportunistic learning moments arise frequently both in formal environments such as lectures and in moments of informal contact in laboratories, tutorials and student office visits. I therefore try to respond to the dynamics in a class. I believe that one of the distinguishing features of my lecturing is that I can read the dynamics of a class reasonably well. While I always go into a class with a carefully prepared lecture structure, I am prepared to modify this spontaneously should the class dynamics make this advisable or should opportunistic learning moments present themselves. I encourage student questions in class and then always try to link these back to one of the associated student activities such as laboratories, problem sheets or assignments.

To develop a broadly based teaching experience, I have deliberately taught across a wide range of subjects, at all levels from Year 1 to postgraduate. I am always looking to make improvements and to try out new, and better, teaching and assessment methods. My approach to course design, teaching methodology and assessment strategy is integrative. I see a key part of my role as helping students see the big picture and showing them that the material is really an integrated whole.

3. TEACHING EXPERIENCE

3a. General

Since I was first appointed in May 1984 I have taught papers at all levels currently taught within the Department of Electrical and Computer Engineering: namely Years 1,2,3 and 4 of the BE degree and Post-Graduate papers at ME/PhD level. The subjects taught (detailed below with typical enrolment numbers in brackets) include not only papers for Electrical Engineering students but also service courses for other Engineering Departments.

50.003	(60)	Engineering and Society (<i>Guest Lecturer</i>)
50.201	(350)	General Studies II (<i>Guest Lecturer</i>)
53.111	(150)	Electrical Engineering 1G
53.141	(100)	Engineering Electromagnetics
53.204	(100)	Electrical Engineering Design
53.251	(120)	Transmission Lines and Fields
53.303	(50)	Advanced Electrical Engineering B
53.311	(30)	Applied Electricity
53.321	(70)	Applied Network Synthesis
53.363	(70)	Radio Systems
53.401	(10)	Studies in Electrical and Electronic Engineering A
53.452	(10)	VHF and UHF Radio Communication
ELECTENG 101	(550)	Electrical Engineering Systems (<i>Guest Lecturer</i>)
ELECTENG 204	(170)	Engineering Electromagnetics I
ELECTENG 302	(130)	Engineering Electromagnetics II
ELECTENG 306	(12)	Transmission Lines and Systems
ELECTENG 421	(85)	Radio Systems
ELECTENG 702	(20)	Applied Electromagnetics
ELECTENG 701	(30)	Wireless Communication

In addition almost all members of the Departmental academic staff supervise final year students enrolled in **ELECTENG 401 Project in Electrical Engineering**. Over the period 1984-2003 I have supervised 102 final year students.

The range of my teaching experience is large in comparison with most of my colleagues. In fact I am one of the very few Electrical and Computer Engineering staff who has taught at all levels within the Department. In addition to teaching students who are enrolled in one of the three degrees offered by my Department, I have also taught courses on electrical engineering for students majoring in other engineering disciplines. These courses, usually known as Service Courses, are particularly challenging to teach.

3b. Research Supervision

In addition to my undergraduate and postgraduate teaching, I also have significant experience of postgraduate research supervision. The details of the postgraduate students I have supervised are provided below.

PhD

Completed

M J Neve 'Mobile Radio Propagation Prediction in Built-Up Environments Using Ray-Methods', December 1992.

ME Thesis

Completed

K V S Reddy 'Investigation of MWM Technique for Hyperthermia Applicator Design', October 1994

R D Shackleton 'Development of a Wideband Channel Sounder', August 1996
(Jointly supervised with Mr L J Carter)

A C Watson 'Investigation of PEMF Treatment for Bone Non-Union', September 1996

D F Chew 'Mobile Radio Propagation Prediction using Regression Analysis', October 1997
(Jointly supervised with Dr K W Sowerby)

I L Mackenzie 'The Development of a Prototype Subsampling Receiver', December 1997
(Jointly supervised with Dr B J Guillemin and Professor A G Williamson)

J K L Wong 'Estimation of Mobile Transceiver Position', June 1998
(Jointly supervised with Professor A G Williamson)

S C M Perera 'Modelling of Wave Propagation in Microcellular Systems', January 1999'
(Jointly supervised with Professor A G Williamson)

D F Edgley 'Indoor Wireless Propagation', February 1999
(Jointly supervised with Professor A G Williamson)

Under Supervision

E T Y Au 'Diffraction Loss Prediction for Mobile Radio Systems'
(Jointly supervised with Dr M J Neve)

A Yeung 'RF Scale Modelling for Diffraction Loss Prediction' (Jointly supervised with Professor A G Williamson)

ME / MEngSt Project

Completed

G Nagendra 'Investigation of Improvement of the Methods of Calcium Ion Detection in Heart Tissue Using the Photoprotein Aequorin and a Fibre Optic Link', ME Project A, November 1992.

S T Kuik 'Review of Techniques for Calculating Diffraction Loss over Multiple Terrain Obstacles', ME Project A, November 1993.

S T Kuik 'An Investigation of Scale-Modelling and Theoretical Techniques for Calculating Diffraction Loss', ME Project D, May 1994.

G H Feng 'Measurement of Electric Field Strength at Mobile Radio Frequencies', ME Project D, May 1994.

B. Ng 'Implementation of a Multiple-Scatterer Based Model of a Wideband Mobile Radio Channel', ME Project A, November 1995.

W W-H Chan 'Urban Out-of-Sight Radio Propagation Modelling', ME Project A, November 1995.

G Y C Wong 'A Statistical Model for an Indoor Radio Propagation Channel', ME Project A, November 1995.

N Pillay 'Review of Studies of Biological Effects of Extremely Low Frequency Fields', ME Project A, December 1995

Y-W Chan 'Review of Biological Effects of Radio Frequencies', ME Project A, December 1995

Y-W Chan 'Review of Studies of CDMA Access Strategy for PCS Systems' ME Project B, December 1995

S N Wong 'Loss Prediction and Area Coverage for Land Mobile Systems', ME Project D, February 1996.

G Y C Wong 'Modelling of an Indoor Propagation Channel', ME Project D, February 1996.

B Ng 'Channel Modelling for Wideband Communications', ME Project D, February 1996.

W W-H Chan 'Propagation Modelling for Microcellular Environments', ME Project D, February 1996.

D Auger 'The Design of an Antenna Range', ME Project D, July 1996. (Jointly supervised with Professor A G Williamson)

K P Yu 'Interaction Mechanisms of Weak Electromagnetic Fields and Biological Systems', MEngSt Project Z, December 1997.

J L H Hung 'Stochastic Modelling of a Single Calcium Channel', MEngSt Project Y, March 2002.

J L H Hung 'A Study of Biological Effects of Electromagnetic Fields', MEngSt Project Z, March 2002.

Post-Doctoral Fellowship Supervision

Completed

Dr M J Neve 'Deterministic Radiowave Propagation Modelling', NZ Science and Technology Post-Doctoral Fellowship, 1 June 1994 to 31 May 1996. (Jointly supervised with Professor A G Williamson and Dr K W Sowerby.)

4. DESIGN FOR LEARNING

In my specialist subjects the students are taught the fundamentals of the design of radio systems and of the electromagnetic theory on which these systems are based. On completion of their undergraduate studies they are well prepared to function as junior members of design teams for telecommunication projects and radio hardware design. Former students are currently employed in New Zealand, Australia, Singapore and Hong Kong. The higher-performing students are well equipped for postgraduate study. Some of my former students are currently studying in New Zealand, Australia, USA and UK.

4a. Course Design

In a Faculty such as Engineering the course curricula must meet the requirements of both the University and the local Professional Engineering Institution (IPENZ). Nevertheless considerable flexibility does exist with regard to presentation styles, and some flexibility exists with regard to interpretation, to selection of problems and case-studies and to the inclusion of optional material.

I will use as an example my specialist subject area of electromagnetism and radio systems. In such courses I design the lectures and supporting material to meet 6 criteria.

1. My primary aim is to **provide a sound grasp of the scientific principles on which the subject is based and of the current engineering applications of the material.** I do this via a carefully crafted set of lectures where I go to some trouble to integrate the material in recommended or prescribed texts with supporting problem sets I have developed and with laboratory sessions or in-lecture demonstrations. I try to clearly separate basic skills material from material which requires considerable application of such skills. The supporting problem sets are designed to first develop the necessary basic skills first, before exposing students to more challenging problems which require application of these skills.
2. A secondary aim is to **develop the students' ability to generalize from the specifics taught in the course to deal with topics not previously encountered.** In my introduction to every course and at appropriate times throughout the course I remind students that this ability to generalise is one of the most important skills they will take from their university studies, and indeed is one of the distinguishing characteristics of university education. I approach the development of the ability to generalise in three ways.

At suitable points in my lecture material, I introduce an unfamiliar topic. Sometimes this is done part-way through a lecture. I then allow a small break for the students to discuss the matter amongst themselves before resuming to discuss the topic with the whole class. At other times I finish a lecture with such a topic, requesting students to think about it in advance of the next lecture at which this topic is to be discussed. The

third approach is to sprinkle problem sets and parts of assignments with such unfamiliar topics to create an opportunity for the students to apply previously learnt skills to such unfamiliar topics.

3. I try to leave the students with **an appreciation of the beauty of the underlying scientific basis (especially electromagnetics)**. To do this, I illustrate the generality of application of this material to elements of nature that most students never suspected were electromagnetic in origin. I share with the students the consequences that even small changes in electromagnetic parameters (such as the quantum of electronic charge) would have had on cosmology, galaxy development and evolution. I deliberately choose non-engineering examples to broaden the appeal. I also use the unity of the underlying mathematical description of electromagnetics to underline the beauty of the subject.
4. The profession of engineering requires its practitioners to engage in continuing professional development throughout their careers. An important attribute of the graduate profile of most universities is the ability to engage in lifelong learning. Not surprisingly then, another key objective I include in my course planning is the development and encouragement of the **ability to engage in lifelong learning**. There is no magic bullet to do this, nor can any one course in isolation achieve such a lofty aim.

As noted above, in my introduction to any course and at appropriate times throughout every course I remind students that they must engage in lifelong learning or risk becoming technologically out-of-date. The problem for most students and graduates is one of confidence. This lack of confidence is exacerbated by an increasing tendency amongst students to a passive learning approach. To counter this I strive to include in the problem sets for all my courses a small number truly challenging and unfamiliar problems. I then challenge the students to attempt these problems. They then discover that by using existing skills supplemented by additional reading, they can learn how to answer such questions. They don't always thank me while they are grappling with such problems, but I don't "give-in" to the grumbling and they are usually grateful by the end of the course.

The best vehicle I have to encourage students into lifelong learning is the supervision of Final Year Projects. All students in my Department undertake such a project, working with one other student under the supervision of a member of staff. The topic of the project is usually related to the staff member's research or consulting activities and always contains a significant research element. Most staff typically supervise 6 such students per year. By working closely with students over a full academic year, innumerable opportunities occur to help develop the abilities and confidence required for lifelong learning.

5. All members of professions must develop a suitable character in addition to technical skills. No one course or lecturer can do this, but a poorly prepared lecturer can certainly hinder its development. I strive, by my own personal example, to help the students **develop their characters**. I am careful to always show to students a mature

approach and a caring and inclusive attitude, and I strive to demonstrate values based on the greater good rather than selfish motives. This is not a topic that can be taught. Instead one can only deal with it on an individual basis. I encourage students where I see good examples and counsel students individually where their behaviour is inappropriate.

6. Engineering is not an isolated technical profession. Engineers design and build systems that members of the public interact with directly and which have an enormous influence on society. It is essential, then, that engineering students **develop sensitivity to the non-technical issues involved in the implementation of engineering systems.** Within my courses I tend to illustrate this dilemma with examples taken from the area of the biological effects of electromagnetic radiation. I work examples into my courses at years 2, 3 and 4 to illustrate the Resource Management Act processes surrounding siting of cell-phone towers, in order to show the students an example of the non-technical issues which they must be aware of. The treatments are of increasing levels of sophistication, so that by Year 4 the students can attempt assignment work where they have to take these sorts of considerations into account.

*An example of an assignment set (by a colleague and myself) for Year 4 students is included in **Appendix 3**. This assignment has three components. First, there are some typical engineering design calculations. Secondly, a forum is held where we simulate a meeting between the students (acting as junior design engineers) and the lecturing staff (posing as clients who have commissioned the design in question). Finally, in a second forum, we simulate a public consultation meeting, as required under the Resource Management Act. The lecturing staff assume the role of concerned local residents, while the students participate as the design engineers. Our aim is to show the students that skill at design calculations alone is insufficient. In addition, they will need to develop good communication skills, sensitivity to non-technical issues and some measure of political awareness.*

4b. Teaching Methods and Materials

The student body within my Department is diverse ethnically, has a significant gender imbalance and has quite varied technical and English language abilities. I therefore strive to cater for all learning styles. In lectures I try to present material using written, visual/graphical, oral and contextual methods. The latter is often delivered via (in-lecture) demonstrations. I am also conscious that some students are uncomfortable approaching a lecturer on their own, and learn better in an environment in which they can interact with their peers. I therefore try to facilitate group work. My coursework is generally set so that it can be worked either individually or via informal peer groups. Some assignments are deliberately set as group activities. I also encourage students to work in groups and to approach me outside of lecture times in groups. A small number of our students suffer from disabilities. Their particular difficulties need to be dealt with on an individual basis, usually in collaboration with the University's Disabilities Co-ordinator.

I have experimented with a variety of teaching styles. The teaching methods I use include: 'chalk-and-talk' via blackboard or whiteboard, material presented via OHP, slides, document camera or PowerPoint presentation, demonstrations in lectures, case study treatments with students working in groups, student-delivered lecture components, tutorials, problem clinics, laboratories, homework exercises, projects and assignments. In 2004 I will be experimenting with an on-line assessment and information tool (OASIS) developed by colleagues within my Department.

I strongly favour 'chalk-and-talk' for delivering engineering lectures. While the student evaluations of my courses receive similarly high ratings irrespective of teaching style, my assessment of the students' deep learning outcomes has convinced me (over the 20 years I have been teaching) that abstract subjects such as electromagnetics are best taught via chalk-and-talk. I think that if students see such a topic developed sequentially, and take notes as this is done, then the topic becomes less remote. I also feel that this chalk-and-talk style is better for developing the experience of early career lecturers, as its immediacy encourages engagement with the students. Mastery of chalk-and-talk leads, I believe, to better use of electronic media in lectures later in ones teaching career. Wherever possible, I encourage early-career lecturers to adopt this style initially.

Within the lecture room I strive for an enthusiastic and clear presentation. I take particular care with my writing and with my audio projection, and try to move around the lecture theatre and establish eye-contact with as many students as possible. I include a mid-lecture break to allow students to regain their concentration and use a variety of demonstrations, examples and amusing anecdotes to break up the lecture material, should class dynamics indicate this is necessary.

The course components I use and my goals with each are as follows:

- **Lectures** are used to establish structure, to emphasise key points and to identify the order in which the topics should be treated. In an early lecture (usually the first) I explain the course structure and learning objectives, and how the various components of coursework contribute to the learning objectives. Lectures are also the place where I link the particular course to others within the programme being studied by the students. I repeatedly make these linkages throughout the course as I have found it helps the students to see the 'bigger picture'. To do this I show the students overheads I have prepared of our degree structure, illustrating the various paths through to the final year electives and indicating the vocational opportunities available from the different paths.
- **Problem sets** are provided for individual study by students in their own time. They are designed to give practical experience in problem solving. They have graduated levels of difficulty, ranging from simple skills-based exercises, through unfamiliar applications of lecture material to truly challenging problems. I have refined the problem sets over time, following reflection on test and exam performance and student feedback in formal evaluations.

- **Knowledge base problem sets** have been used. These are quick answer skills-type problems which follow in sequence the lecture material and are repeatedly referred to in the lectures. By revising the lecture material and then attempting the associated knowledge base problems, students can quickly determine whether they have grasped the key (skills-related) points of the lecture.
- **OASIS problems** are being used for the first time in 2004. OASIS (On-Line Assessment and Information System) is a computer-based tool developed over several years by colleagues within my Department. It is designed primarily as a tool for self-directed active learning. I have not personally been involved in its development, but have been sufficiently impressed by the learning outcomes reported that I am evaluating it myself in 2004. In the mode in which I am using OASIS, it provides skills-type problems (which I wrote) that the students can practice on-line (from anywhere). In past years these skills would have been acquired by working textbook drill problems. We have noted an unwillingness on the part of students to do this work. However, if the same questions are provided on-line, they seem quite happy to work the very same problems.

Each time the students try a problem, the problem parameter values are changed. The students are provided with immediate feedback on whether the answer they entered was correct. They then have the option to try the same problem again or move on to the next in sequence. The database associated with OASIS allows staff to monitor access to the question database, including time of access, number of attempts, success rate etc. Within hours of my announcing the availability of this practice tool, two class members had tried all the problems and a significant number had tried the first few. It does seem to be very effective at engaging students.

- **Laboratories** are a very important part of all my courses. The laboratory material is carefully integrated into the lecture material so that the students understand the importance of the experimental work. I base at least part of the final examination on the laboratory material and in one final year course include a laboratory examination as part of the on-course assessment.

*A copy of the laboratory instruction sheet for this course is included in **Appendix 3**. This laboratory (developed by a colleague and myself) places real workplace restrictions on the students. They have to complete a task to a satisfactory standard, working on their own, and within a tight timeframe. We allow significant practice time and these practice sessions are heavily used by the students. We believe this unusual laboratory has significantly increased the students' engagement, in comparison with past years in which we ran a conventional laboratory on the same topic.*

- **Assignments** are used sparingly because of problems ensuring students work independently. However a good open-ended assignment is a very powerful teaching tool. I use assignments at final year level and in postgraduate classes. An example of a final

year assignment (with multiple learning objectives) was discussed above in section 4a, point 6.

- **Tests and Exams** are used to quantify whether learning outcomes have been achieved. My questions are always of graduated difficulty, beginning with skills type problems, then moving to unfamiliar applications of course material and finishing with challenging examples to stretch the upper end of the class.

4c. Teaching Development

The four inputs I use to improve my teaching methods comprise feedback from students via course and teaching evaluation forms, attendance at University of Auckland Continuing Professional Development (CPD) staff development courses, attendance at School of Engineering Education Seminars, and regular monitoring of Engineering Education Journals.

The CPD Staff Development courses I have attended are:

- How Students Learn
- Course Design and Assessment
- Managing Student Behaviour in Lectures
- CPR (in case of an accident in a laboratory)
- How To Get Promoted
- Helping Lecturers to Incorporate Effective Learning Strategies into University Courses
- CPD Health and Safety Workshop "Staying Out of Jail"

The Engineering Education Seminars I have attended include the following:

- The Perfect Graduate
- Computers in Engineering Education and the Profession
- Management Education in Engineering
- Total Quality Management
- Health and Safety in Employment Act
- Funding of Higher Education
- Technology in Schools
- A new BE degree
- Postgraduate Workshop
- Engineering Light & Magic (AV Facilities in the School of Engineering)
- Teaching in the new BE course
- Introduction to Semesterization
- What do First Year students know?
- What is Project-Based teaching?
- Alternative assessment strategies for engineering
- Comments on teaching the new Engineering Part 1
- Sequel to SECAT

My attendance at these courses was motivated by five factors. Firstly, I sought information on what was an appropriate **graduate profile**. I was already familiar with the graduate profiles of my university and of IPENZ. Attendance at the Engineering School education seminar on 'The Perfect Graduate' gave me the opportunity to engage in dialogue with other engineering faculty members on features of an appropriate graduate profile and provided a foundation for developing the profile that I use as a basis for my course design.

A second motivation was to acquire information on the **entry-level capabilities** of engineering students. A group of secondary school physics and mathematics teachers presented a seminar on 'What do First Year students know', within the regular School of Engineering education seminar series. The approach I take to Year 1 and 2 course design was heavily influenced by this seminar.

My **course design** strategies were informed by attendance at a CPD seminar on 'Course Design and Assessment'. For some years I used the 'ACME PIES' approach to course design taught in this seminar. Similarly, my approach to designing **active learning strategies** within my courses was informed by attendance at seminars on 'How Students Learn', 'Helping Lecturers Incorporate Effective Learning Strategies into University Courses' and 'What is Project Based Teaching?'. Finally, my **assessment strategy** was influenced by attendance at seminars on 'Course Design and Assessment' and 'Alternative Assessment Strategies for Engineering'.

Despite paying careful attention to professional development, not all initiatives that I have tried have been successful. However, careful reflection on such unsuccessful initiatives provides significant learning opportunities for the diligent lecturer. As an example, one less successful initiative which springs to mind involved a final year elective (53.363 Radio Systems). A few years ago, a colleague and I set out to increase student engagement in the course. We took approximately 30% of the course outline and turned it over to the students to present. We divided the class into groups of 4. Each group was allowed to pick one of the topics in the course outline (on a first come, first served basis). The group had to prepare a 2 page class handout on the topic and present a 20 minute lecture in class on the subject. In the final exam, students were required to write an essay-style answer to any two of the topics on the list. Most chose the topic they had studied and presented as one of their two essays. However, they were also required to also provide an essay-style answer on a topic presented by another group. The exam results generally showed a good understanding of the topic the student had presented in class, but a fairly poor understanding of the topic presented by their peers. The class survey results fell somewhere between neutral and negative. Predictably, some students were uncomfortable presenting in public. However, many students had little confidence in their peers' ability to present information correctly. These students indicated they wanted the lecturers to present all the course material.

This was unfortunate as one of the learning outcomes we sought was to reduce the students' reliance on the lecturers and to increase their reliance on peer-to-peer learning. On reflection, we felt that what was missing was a process to induct students into a new concept such as peer-learning. We eliminated the section requiring students to rely on notes delivered solely by their peers. However, the engagement exhibited in the preparations for their own presentations was something we wished to retain. We also wanted to retain an element of peer-to-peer learning, supported by suitable induction into the concept. The mode we subsequently shifted to was to have all the students prepare similar material and participate in a forum, as outlined at the end of section 4a. We thus retained elements of engagement arising from individual preparation as well as encouraging in students the

ability to learn from their peers. The lecturing staff functioned as facilitators at the forum, and concentrated on involving all students and getting them to share their ideas and develop confidence in the concept of peer-to-peer learning. Evaluations for courses taught this way are very positive.

In the appendices I have included both a copy of just such an assignment for the 1996 Radio Systems class and a copy of the corresponding class survey. The feedback was very satisfactory.

4d. Engaging Learners

My approach to engaging students comprises 5 key aspects, namely:

- Rapport is developed between student and teacher
- Lecturer's enthusiasm motivates students to learn
- Ethnic diversity is addressed by selection of teaching methods
- The lower and upper ability ranges are supported with appropriate course design and teaching approaches.
- A support system is available to students outside of lectures.

To establish a **rapport** I try to interact with students as individuals, and make sure that they understand I do care. As part of this process I try to memorize as many of the students names as possible so that I can address them by their first names in lectures and greet them should we meet casually around the campus. I also make contact with the class representatives and ask them to keep me informed of any niggles, before they become big problems. Through most of my teaching career I have kept in periodic contact with the class representatives throughout the semester to ensure I have a feel for the 'pulse' of the class. Now that I am Deputy HOD (Academic) I am ex officio a member of the Department's Staff Student Consultative Committee. Through the activities of this committee, I have regular contact with all class representatives, including those for the courses I teach.

Enthusiasm can't be faked. I have a deep love of the conceptual foundations of electromagnetism and a fascination with the interaction between electromagnetic fields and biological tissue. I sprinkle my lectures with snippets from these fields to enthuse the students and to allow my passion to show through my normally reserved character. I am also fortunate in that several of the early pioneers of electromagnetism had very unusual personalities. I sprinkle my lectures with anecdotes of the strange behaviour of these 'superstars'. For instance Tesla (who developed amongst other things the three phase induction motor) had a germ phobia which was so severe that he went to extraordinary lengths to avoid shaking hands with visitors to his laboratory. When he visited a restaurant, he always ordered a very large supply of table napkins so that he could wipe each implement he was to eat off - one napkin for each implement. The students love such stories. It allows my enthusiasm to show through and has the advantage of providing a nice break in the lecture material. It also enables me to show that some of the pioneers in this field developed extraordinary ability in technical matters at the expense of a more balanced development of their own characters - an important point I want all my students to be aware of.

A significant **ethnic diversity and gender imbalance** exists within classes I teach. Roughly 20% of the class are female, while approximately 80% of the class are Asian - generally Chinese, Korean, Indian and Sri Lankan. I acknowledge early in the course and repeat throughout the course that the students' different backgrounds mean that they will use different approaches to learning. I explain that in my lectures I will use a mixture of presentation techniques to suit different learning styles, including oral, visual and contextual presentations. I also explain the rationale behind the detailed problem sets, the knowledge base (and this year OASIS) problems, and the reading list, so that students with different learning needs can pick those parts of the support material most suitable to them. Some students' learning approaches benefit from peer support structures. Therefore (as discussed earlier) I encourage group work.

Throughout most of my teaching career the engineering faculty has permitted multiple entry routes into its undergraduate programme. As well as the usual year 1 entry point, it has been possible for students to enter at both year 2 and year 3. These multiple entry routes, coupled with the natural spread of abilities amongst students and the different school backgrounds to which they have been exposed, mean that it is essential that the **lower and upper ability ranges are supported with appropriate course design and teaching approaches**. My approach to this problem is to spring (unannounced) short tests on the class to check their entry-level ability and identify holes in their background. I then take different paths for the different groups of problems identified. One year my entry-level test found almost all the class to be deficient in an area of mathematics which had formerly presented no problems. On making further enquiries I found that a change in the secondary school mathematics syllabus had occurred of which I was unaware. Armed with the entry-level test results I was able to adjust my lectures and develop additional handout material to fill the gap.

Over the years I have identified common holes and have prepared extra handout and tutorial material which I provide to affected students. I have routinely run extra tutorials (in my office) for the small number of students admitted directly to year 3. These students are usually mature, have generally several years of work experience and normally have an entry qualification of an NZCE. In general, mathematics is their nemesis. Unfortunately for them, mathematics is the natural language of electromagnetism. I have found individual coaching sessions work well. These students are very motivated. They simply lack confidence in their mathematical ability. It isn't particularly difficult for an experienced lecturer to build this confidence up. I have also provided individual coaching sessions for students from traditional backgrounds who are motivated, but found to be struggling.

The most problematic are the **unmotivated learners**. Our Departmental "top and tail" test screening (where we identify the top and bottom 20% performers across all courses in a particular semester) identifies them and they are automatically requested to attend an interview (conducted by one of our Programme Leaders) to discuss their performance. There is, however, no easy solution to this problem. The unmotivated learners generally fall into one of four categories. There are some students who have been pressured into studying engineering by their parents, when they would rather study some other subject. In other cases, some students find the degree simply

doesn't match their expectations. Some students find they can't adapt to the independence required at university, while others have serious family or personal problems. Their problems have to be handled individually. In some cases I recommend completing the degree and then following their dreams. In other cases I recommend talking it through with their parents. Occasionally we facilitate a joint meeting of staff, student and parents. A few cases are referred to the university's central counselling service. Others are referred to our Student Learning Centre, should the problem be identified as a learning difficulty or a language problem.

It is also very important to identify the **top achievers**, who might need extra stimulation. One route I use to do this is to drop "seeds" in my lectures and see who responds. My usual approach is to introduce a brief discussion of a recent research result or a controversy within the field and wait to see who approaches me outside of lectures to discuss it. Most recently I have used research material dealing with the conceptual foundations of electromagnetism and the interface between classical electromagnetics and quantum mechanics, and with the controversy surrounding weak electromagnetic field interaction with biological tissue. I then "feed" enhanced reading lists to those students who respond, and make myself available for discussion of the most recent or controversial results.

4e. Research-based Teaching

The research work I am doing:

- Is fed either directly or by way of example or case-study into my postgraduate and undergraduate teaching
- Forms the basis of my final year undergraduate projects which are both popular and successful
- Is proving attractive to post-graduate students
- Forms the basis of advice offered to members of the public who are concerned about electromagnetic radiation bio-effects issues.
- Has been used as a basis for invited lectures within the Professional Development Programme (taken compulsorily by all engineering students) and for the Electrotechnology group of IPENZ and Engineers for Social Responsibility.

My research involves 3 major components, all of which I link with my undergraduate teaching.

- 1. The development of a deterministic model for path loss prediction in mobile radio systems.** This work has produced 1 PhD, 5 ME and 12 ME Project Reports so far, with 2 ME Thesis students currently under supervision.

The research results are fed directly into my teaching at postgraduate level and at final year level, while the application is used as a case study example in Year 2 and Year 3 core teaching. I also base final year student projects around this material - for instance over the last 5 years I have had 8 final year project students working on undergraduate research projects investigating improvements to the techniques used to calculate diffraction loss over multiply obstructed mobile radio paths.

2. **The application of numerical electromagnetics techniques in radio system design and electromagnetic radiation bio-effects issues.** Four students have completed ME Projects in related areas and I have run numerous final year projects in this field. The results support my teaching at final year elective level and, to some extent, within the core electromagnetics component. This research material, in particular the bioeffects issues and RF Safety Standards, allows me to reinforce to the engineering students the need to deal with uncertainty and with members of the public who have different values from design engineers. It is some of the most personally satisfying material I teach and I believe some of the most valuable that these engineering students will encounter. It helps to reiterate material these students meet in their Professional Development Programmes on social responsibilities of engineers. In addition, I provide advice for members of the public concerned about electromagnetic radiation issues.
3. **The application of electromagnetics to biomedical engineering problems.** This work has produced 2 ME Theses and 2 MEngSt Project Reports so far. In addition it has served as the basis for numerous (very successful) final year projects, some of which have won industry-sponsored awards. My primary concentration at present is on elucidating the mechanism by which weak electromagnetic fields enhance the union of broken bones and on dosimetry considerations for electromagnetically based hyperthermia treatment of solid malignant tumours. Both of these topics are used as application example material within my final year elective teaching and within the compulsory electromagnetics papers I teach in years 2 and 3. These particular applications are very satisfying to teach and are well received by the students. Most of our students chose to study electrical engineering because they were good at mathematics and sciences and because they wanted to use this ability to do something constructive. However, when they arrive at university they are all too often confronted with heavily mathematical courses in which the application is never explained. Because the electromagnetics courses I teach are also heavily mathematical, I take particular care to include examples in lectures (and in the associated problem sheets) that stress the application. I have found biomedical examples particularly effective. I suspect this is because I am touching a heart-string - the students chose to study engineering because they wanted to design systems beneficial to humankind - exactly what biomedical systems are.

My primary aims in research supervision are to develop advanced intellectual independence coupled with appropriate training in the current research techniques and with suitable practice at oral and written presentations. To facilitate development of intellectual independence I always choose open-ended problems in which the student has to define (with my guidance) the scope of their research.

Within my Department, we work in research groups to maximise funding opportunities and to share resources and expertise. I **keep current knowledge** of my subject by regular reading of the literature from research journals, attendance at conferences and Departmental and research group seminars, and by collaboration with colleagues. I act as a referee for three major international research journals: Institution of Electrical and Electronics Engineers (IEEE) *Transactions on Vehicular Technology*,

Institute of Electrical Engineers (IEE) *Proceedings on Microwaves, Antennas and Propagation*, and *IEE Proceedings on Communications*. I am a member of the relevant professional societies - namely the Institution of Professional Engineers of New Zealand (IPENZ) and the US-based multi-national Institution of Electrical and Electronics Engineers (IEEE). The latter organizations both have local committees based in Auckland and run an active continuing education programme, in which I participate. The IEEE, in particular, runs a Distinguished Lecturer Programme, in which world experts in various research areas tour the world presenting research seminars to local chapters of the IEEE. I have found attendance at the latter seminars very beneficial. As I have moved into academic administration the other calls on my time mean I have to work smarter to achieve any research productivity. I now work in a mode where most of my research students are co-supervised by a colleague with similar administrative commitments. We collaborate on research, including meeting weekly to discuss our personal research.

In total, I have supervised 29 research theses and research projects, details of which were provided earlier in this portfolio. One of the students I supervised, Dr Michael Neve, won two major awards, an IEE Premium and an NZEI Prize, for his research. (*Copies of the Certificates are provided in Appendix 1.*) Following a Post-Doctoral Fellowship in the UK, Michael joined our staff and Michael and I collaborate on research, co-supervise research students and jointly teach one undergraduate course. Another of my students, Andrew Yeung, has recently won the University of Auckland Postgraduate Poster Competition.

4f. Assessment

In order to get feedback on my teaching effectiveness I do all my own marking. I try to mark and return the material quickly, and to provide fast and detailed feedback to the students. I always provide model solutions and ensure marked scripts are returned early enough in the course to allow students to discuss their marks with me, if they have any concerns. I usually devote part of a lecture to going over those aspects of the coursework that were poorly done. I do this not only to clear up misunderstandings surrounding technical aspects of the coursework, but also to better integrate it into the learning process. For a similar reason I try to run as many of my own laboratories as possible.

The assessment methods used are a mix of final examinations plus coursework based on class tests, assignments, projects, laboratories and occasionally seminars.

Since I teach at all levels of the undergraduate course currently taught by Electrical Engineering staff I can monitor the performance of the students as they move through Years 1,2, 3, 4 and in some cases post-graduate studies.

In determining the effectiveness of my assessment methods I look particularly at

- Performance in coursework and final exam
- Results of class surveys

- How well the students are able to deal with subsequent courses that rely (informally) on my courses as prerequisites.
- How well the students perform in final year projects and (occasionally) as postgraduate students.
- Informal feedback from employers of graduates and from the graduates themselves.

After every lecture I make notes on aspects that worked well or didn't appear to work as well as desired. Similarly, after all tests and exams have been marked, I make notes for future reference on features that may need to be changed, or learning outcomes that don't seem to have been met. After all class surveys, I note the favourable and unfavourable comments. Within my Department we have a Course Audit requirement, which I helped to design and implement. This means the examiners for a course have to meet after the results have been finalised to fill in a Course Audit form. (*A sample Course Audit form is supplied in **Appendix 3**. I was one of the developers of this form.*) The meeting is chaired by the course coordinator, who has the responsibility for filing the course audit document in the Department's records system. At this meeting the examiners reflect on all aspects of the course - lectures, laboratories, problem sets, tests, assignments, exam results and survey results. They are required to note the most favourable and unfavourable comments in the course surveys, and indicate what action they intend to take. Similarly, they are required to note any other changes they recommend on the basis of class performance in the course.

Tests and Exams are used to quantify whether learning outcomes have been achieved. My questions are always of graduated difficulty, beginning with skills type problems, then moving to unfamiliar applications of course material and finishing with challenging examples to stretch the upper end of the class. The exam (or test) results statistics are compared with past classes to determine departures from the norm. (Significant departures automatically trigger discussion at the Course Audit stage.) A certain percentage of questions are recycled over the years to measure changes in class performance. When I joined the Engineering School staff 20 years ago, my mentor advised me that for a Year 1 or 2 exam, the lecturer should be able to complete the question in one third the time set for the students. Similarly, in a Year 4 paper, the lecturer should be able to complete the question in about half the time available for the student. Year 3 questions were assumed to lie midway between these two extremes. I have consistently applied this practice and feel comfortable with the results. I in turn have passed this folklore on to staff I have mentored.

4g. Summary of Design for Learning

I believe the key factor underpinning good learning is **integration**. I have gone to considerable trouble to design my course content in a way in which the topics flow naturally, one to the other. I take care to show students how the various course components (lectures, problem sheets, laboratories, coursework and exams) are integrated. Similarly, I take time in my lectures to show students how the course I am lecturing to them in is integrated into the larger structure of their degree and how it fits into possible vocational pathways. My lecturing style (in which I use visual symbols to represent to myself the key topics) is integrative in nature. I take care to mark

coursework quickly and usually devote part of a lecture to going over those aspects of the coursework that were poorly done. Similarly, I try to discuss class evaluation of the course with the class to show that their feedback is taken seriously and is used to improve the courses. By and large, students are not particularly good at seeing the 'big picture' or at spotting the inter-connections between courses. They tend to compartmentalize. I see one of my key roles as a lecturer being to break down these compartments and show the students how the material is really an integrated whole, rather than a set of facts to be memorized, regurgitated in exams and then forgotten.

5. EVALUATING TEACHING AND LEARNING

5a. Student Feedback and Evaluation

Two potential sources of evidence exist

1. Surveys of courses/ teaching evaluation
2. Engineering School Teaching Awards

Surveys of courses / teaching evaluation

I monitor courses and teaching performance by surveying all classes I teach using the standard Engineering School and Centre for Professional Development forms for course evaluation and for teaching evaluation. The outcome of these evaluations has been excellent, with high ratings for overall effectiveness. This is particularly significant as the area within which I teach and research (Electromagnetics) is universally regarded by students as abstract, hard and boring. Teachers of Electromagnetics courses worldwide have struggled to maintain student engagement.

*The quantitative results obtained from sample teaching evaluations are provided in **Appendix 1**. I have also included (in **Appendix 4**) scanned copies of student comments taken from my class surveys.*

The Engineering School compulsorily surveys all classes using what is known as the 'Dean's Fast Feedback' survey. This survey is performed fairly early in the semester (usually week 7 or 8) so that corrective action can be taken if necessary and feedback given to the students. The survey returns a quantitative score for the course and each lecturer as well as providing space for students to include both favourable and unfavourable comments. The quantitative scores for all Engineering School courses are published on the School's website within the semester in which the course runs.

As course coordinator, it has been my practice to speak to the class after the surveys have been processed. I summarize the favourable and unfavourable comments and indicate what action is planned. If the survey results indicate a problem, my normal practice is to instigate action to correct the problem and then resurvey the class toward the end of the semester using a standard university Centre for Professional Development survey form. I also maintain contact with the class representatives to ensure I get early warning of any difficulties. The students respond warmly to receiving feedback on the survey results, as it confirms that the surveys are being taken seriously.

Teaching Awards

The Faculty of Engineering instituted Teaching Awards in 1990. The Engineering Faculty Teaching Awards Committee separately surveys all Engineering undergraduate students and asks them to rank teaching staff performance. Each year 6 awards are made - one for the top ranked teacher and 5 merit awards for the next 5 ranked staff. For several years the winner of the top award was automatically nominated for the University of Auckland Distinguished Teaching Award. With the demise of the Distinguished Teaching Awards, the winner now becomes the Faculty of Engineering nominee for the University Teaching Excellence awards. The winner of the Engineering School's top award is ineligible to receive this again for a period of 5 years, but is eligible to receive merit awards.

Since 1990, I have received either the top award or a merit award in each year for which I was eligible. (In 2002, I was on leave and didn't teach. Consequently I wasn't considered for an award.) I have provided copies of a selection of the certificates in **Appendix 1**.

1990	Engineering Faculty Merit Award for undergraduate teaching of high quality.
1991	Engineering Faculty Merit Award for undergraduate teaching of high quality.
1992	University of Auckland Distinguished Teaching Award / School of Engineering Teaching Award for excellence in undergraduate teaching.
1993	Engineering Faculty Merit Award for undergraduate teaching of high quality.
1994	Engineering Faculty Merit Award for undergraduate teaching of high quality.
1995	Engineering Faculty Merit Award for undergraduate teaching of high quality.
1996	Engineering Faculty Merit Award for undergraduate teaching of high quality.
1997	University of Auckland Distinguished Teaching Award / School of Engineering Teaching Award for excellence in undergraduate teaching.)
1998	Engineering Faculty Merit Award for undergraduate teaching of high quality.
1999	Engineering Faculty Merit Award for undergraduate teaching of high quality.
2000	Engineering Faculty Merit Award for undergraduate teaching of high quality.
2001	Engineering Faculty Merit Award for undergraduate teaching of high quality.
2003	School of Engineering Teaching Award for excellence in undergraduate teaching.

2003 **University of Auckland Teaching Excellence Award** (in the Sustained Excellence in Teaching Category). (Medallion to be presented at the May Graduation ceremony.)

In addition, I have received two informal awards from completing classes. In 1992, the final year class voted me the best lecturer and presented me with a plaque at an end of year social function.

The final year Electrical and Electronic Engineering class of 2003 voted me the best lecturer of 2003 and presented me with a small plaque commemorating this at the Auckland University Engineering Society Dinner in October 2003.

*Pictures of these two plaques are included in **Appendix 4**, along with scanned student comments taken off my class surveys.*

5b. Improving Teaching Through Evaluation

Reading student teaching evaluations can be a salutary experience, especially for the novice lecturer. In the early stages of my teaching career, I tried a variety of teaching styles. I eagerly awaited the return of the class surveys and while mostly pleased, I was occasionally disappointed. The disappointments, however, provided me with my best learning experiences.

One factor always at the back of the mind of anyone who teaches large classes is the matter of keeping good class control. Novice lecturers are always especially sensitive to this. In the true engineering tradition, I was thrown in the deep end when I commenced my teaching career. Fairly early on in my career, I found myself teaching a service course for non-electrical engineering students. This was a course even hardened veterans tried to avoid. The students resented learning about electrical engineering, usually as a result of bad experiences in secondary school Physics classes. Class control was always an issue in such a class. Bearing this in mind, I prepared a lecture course based entirely on overheads (so that I could always face the class) and steeled myself to 'take no prisoners'. This class was not to get out of control. It didn't, but I did cop it in the class evaluations. I believe that I learnt more from this evaluation than any other I have received. It certainly shaped my approach to large class teaching. I subsequently lightened up considerably, worried less about maintaining absolute control, and had more fun in lectures.

In recent years I have used evaluation in a slightly different way. I often try course innovations such as new ways of presenting material and new types of questions in problem sets. This year, I am trialling an e-learning tool called OASIS. I am careful never to make too many changes to any one class. Usually, I would change only one component from the previous year. I then use the course evaluation as one element in my assessment of how successful the innovation was. (An example of the use of evaluation in this manner was treated at the end of section 4b.)

Over the last 18 months, I have helped introduce a formal course audit process within my Department. This process requires the course lecturers to collectively decide what response, if any, is to be made to matters raised in course surveys. The process is overseen by our Programme Leaders and by me (in my capacity as Deputy HOD (Academic)). I believe this process provides a very good way of ensuring that appropriate improvements are made to teaching as a result of course evaluation.

6. PROFESSIONAL DEVELOPMENT AND LEADERSHIP

6a. Teaching

I am currently the Deputy HOD (Academic) with responsibility for the delivery and quality of the undergraduate and taught postgraduate programmes. I chair the Department's Curriculum and Programme Committee, assign teaching duties, serve on the Department's Staffing Committee and serve on the Faculty Academic Programmes Committee and on the Faculty (Degree) Restructuring Committee.

I have served in most administrative posts in the Department (detailed below), but concentrate mainly on those related to teaching.

- (1) Joint Coordinator of Final Year Projects.
- (2) Organizer of ME Lecture Timetable.
- (3) Departmental Representative on Faculty Timetable Committee.
- (4) Convener, Faculty Timetable Committee.
- (5) Departmental Representative on Faculty Committee on Student Report Writing.
- (6) Departmental Representative on Faculty Audio Visual Committee.
- (7) Departmental Representative on Faculty Library Committee.
- (8) Convener, Faculty Library Committee - from July 1992 to February 1998.
- (9) Convener, Departmental Committee on Word Processing/Desk Top Publishing.
- (10) Member, Departmental Publications Committee
- (11) Organiser, Departmental Research Seminar Programme.
- (12) Convener, Departmental Curriculum Committee.
- (13) Departmental Representative on the Mathematics Education Subcommittee of the Board of Studies for Mathematical and Information Sciences.
- (14) Convener, Departmental Appointments Committee.
- (15) Academic Liaison Person for Radio Systems Laboratory.
- (16) Member, Departmental Development Committee.

Those duties with particularly significant responsibilities are:

- Final Year Project Coordinator (1)
- Convener, Faculty Timetable Committee (4)
- Convener, Faculty Library Committee (8)
- Convener, Departmental Curriculum Committee (12)
- Convener, Departmental Appointments Committee (14)

6b. Contributions to the Engineering Profession

I am a member of the following professional societies.

IEEE - grade of membership - Member (**MemIEEE**)
IPENZ - grade of membership - Member (**MIPENZ**)

I have served in the following capacity for the professional societies to which I belong:

- (1) Secretary/Treasurer of IEEE New Zealand North Section. (IEEE: Institute of Electrical and Electronics Engineers - a multi-national Engineering Institution based in the USA.).
- (2) IEEE representative on Auckland Section Management Committee of IPENZ Electro-Technical Group. (IPENZ: Institute of Professional Engineers New Zealand Inc.).

I have served as a member of the Electrotechnology Advisory Group for the National Diploma in Engineering. (Initially I served as an alternate for the NZVCC representative on this committee, but ultimately was co-opted to the committee itself.) The Advisory Group consists of representatives from Industry, NZQA and the Tertiary Sector.

I have served as a consultant to industry (via UniServices)

In 2002 I took one year's unpaid leave to work in industry and broaden my experience. This experience is fed back into my teaching and the company I worked for sponsored one of my final year projects in 2003.

Reviewer for Refereed Journals

I act as a Referee for the following journals:

- IEEE Transactions on Vehicular Technology
- IEE Proceedings on Microwaves, Antennas and Propagation
- IEE Proceedings on Communications

6c. Academic Leadership and Curriculum Design

A number of the administrative roles I have performed have involved considerable academic leadership on my part. In particular, I have had a considerable leadership role as Convener of the Curriculum Committee. In 1995 we completely revamped the Electrical and Electronic Engineering degree to:

- Improve the effectiveness of our teaching
- Alter course sizes (and consequently redistribute material) to fit in with proposed semesterization of all of the University of Auckland degrees
- Facilitate inter-Departmental, inter-faculty and conjoint degrees
- Produce a degree structure which is more amenable to the frequent modification necessary to incorporate technological advances
- Increase the Computer Systems Engineering content of the degree, including a Computer Systems Engineering stream
- Add a conjoint BCom/BE degree

Such proposals involve significant change and of course staff opinion is far from uniform. I had to make these changes work and select appropriate staff (in my role as Convener of the Appointments Committee) to teach the new degree.

To make progress in these matters I spent short periods at both the University of Canterbury (Department of Electrical and Electronic

Engineering) and Massey University (Department of Production Technology) viewing their curriculum and discussing key issues with their staff. I examined, in particular, syllabi, teaching and assessment methods, and course philosophy. My conclusions (in 1995) were that as a Department we needed to urgently re-evaluate and define the attributes we wish to develop in our graduates. It was essential that we defined curriculum and devised learning environments around these attributes rather than around the individual course syllabi. **However**, this approach ran contrary to the then current practice in our Department. The successful integration of the approach I initiated required (and continues to require) considerable leadership skill on my part.

The Electrical and Electronic Engineering degree I principally designed in 1995 has worked well over the intervening 8 years. It was externally moderated by IPENZ in 2000 and accepted by IPENZ as meeting their accreditation requirements. The rapid technological changes that are part of our discipline mean it is time, once again, to revisit curriculum issues. I once again find myself in a similar role. As Deputy HOD (Academic) and Chair of our Curriculum and Programmes Committee it is my responsibility to guide the Degree Restructuring Project within our Department and to ensure the quality control processes are in place in preparation for the Academic Audit in 2004.

7. CONCLUSION

My application for a Tertiary Teaching Excellence Award (in the Sustained Excellence category) is based on:

- The fourteen teaching awards I have received (including 2 University of Auckland Distinguished Teaching Awards and a University of Auckland Teaching Excellence Award in the Sustained Excellence in Teaching Category).
- The excellent teaching evaluation class surveys I have received
- References from colleagues and students
- A significant all-round contribution to University education, including post-graduate supervision and curriculum design and academic leadership.

There is an inevitable conflict between the demands of research and teaching. In the first half of my academic career, in addition to a very significant teaching contribution, I have been active in academic administration in support of teaching. My role has gradually developed into one of high quality teaching, academic administration, leadership and mentorship. This is the path down which I expect the second half of my academic career to further develop. I see my contribution as being to uphold teaching standards and to provide a role model.

APPENDICES

- **Appendix One: Recognition of Excellence**
- **Appendix Two: Publications**
- **Appendix Three: Teaching Materials**
- **Appendix Four: Student Comments and Informal Awards**

APPENDIX ONE: RECOGNITION OF EXCELLENCE

- 1) **University Teaching Awards.** Specifically, copies of 2 University of Auckland Distinguished Teaching award medallions and a copy of the advice of award of a 2003 University of Auckland Teaching Excellence Award.

- 2) **Engineering Teaching Awards.** Copies of School of Engineering Distinguished Teaching Awards for 2003, 1997 and 1992. An example of one of the School of Engineering Merit Awards for excellence in undergraduate teaching that I have received is also included.

- 3) Examples of **teaching evaluations.**

- 4) Examples of **prestigious awards** (IEE Premium and NZEI Prize) made to postgraduate students for research I have supervised.

University Teaching Awards



THE UNIVERSITY OF AUCKLAND
NEW ZEALAND

OFFICE OF THE VICE-CHANCELLOR

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The University of Auckland
Private Bag 92019
Auckland, New Zealand

5 February 2004

Dr Gerard Rowe
ELECTRICAL & ELECTRONIC ENGINEERING

Dear Dr Rowe

Each year the University recognises the importance of its teaching activities by making awards to a group of its excellent teachers. The Teaching Excellence Awards sub-committee of Teaching and Learning Quality Committee has considered the nominations for the University of Auckland Teaching Excellence Awards. I am delighted to advise you that the sub-committee recommended that you receive an award for 2003 in the Sustained Excellence in Teaching category.

The Tertiary Teaching Excellence Awards will be presented at the May Graduation Ceremony for your Faculty. Each Award carries with it a medallion and a prize of \$5,000. When joint awards are made the prize money is shared. The medallion is inscribed with your name and, as the space for the name is limited, we would like to take advice on the form of inscription you would prefer.

Title (if desired)	Preferred first name (or initials)	Family Name
<hr/>		
Examples: Dr Lesley Chancellor, 2003	or Dr L.J. Chancellor, 2003	or Lesley Chancellor 2003

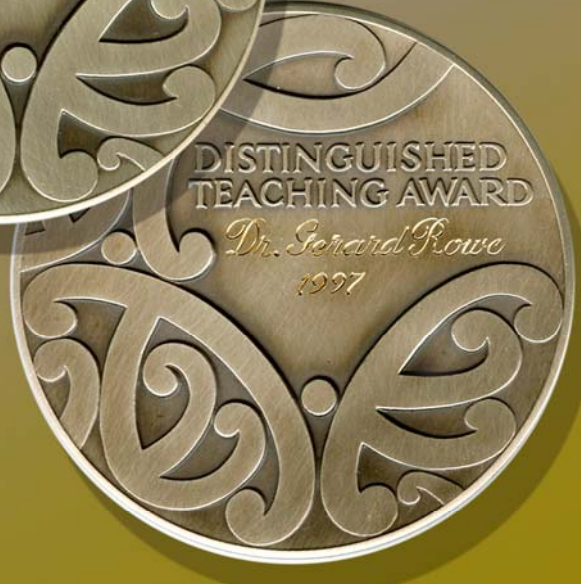
The University hopes that you are able to attend the graduation and you may wish to apply for tickets for your family. The enclosed form indicating your preferred inscription should be returned to Val Pettit, email: v.pettit@uakland.ac.nz, by end of March.

Once again, congratulations on your teaching successes and I look forward to seeing you at the graduation presentation.

Sincerely

Julie Poch

Julie Poch
Deputy Vice-Chancellor (Academic)



Engineering Distinguished Teaching Awards

This is to certify that

Dr Gerard Rowe

has gained the

**DISTINGUISHED TEACHING AWARD
1997**

This is to certify that

Dr G B Rowe

has gained the
MERIT AWARD

1998

for excellence in undergraduate

at the
School of Engineering
The University of Auckland



Peter Brothers

Peter Brothers
Dean of Engineering
11 March 1999

This is to certify that



Gerard B. Rowe

has gained the

School of Engineering Teaching Award 1992

for excellence in undergraduate teaching

at the

School of Engineering
University of Auckland

25th November 1992

R. M. Sharp

R. M. Sharp
Dean of Engineering

This is to certify that

Dr. Gerard Rowe

has gained the
**DISTINGUISHED TEACHING
AWARD 2003**

for excellence in undergraduate teaching

at the

School of Engineering
The University of Auckland



**THE UNIVERSITY OF AUCKLAND
NEW ZEALAND**

Peter Brothers

Peter W. Brothers

Teaching Evaluations

Year 2
Paper

University Lecturing Questionnaire

No. enrolled: 156 Gerard Rowe Survey#: 7582
 * No. respondents: 71 ELECTENG 204 Large class Stage 2 Print date:2003-11-27

Item	Bar Chart	Summary	Survey	Dept	Faculty
L001 The lecturer was well prepared for the lectures		A+SA = 96% D+SD = 0% count=14	Mean 9.49 Std.Dev 1.09	7.75 2.31 .75	7.83 2.09 .79
L002 The lecturer stimulated my interest in the subject		A+SA = 86% D+SD = 1% count=14	Mean 7.81 Std.Dev 1.67	5.75 2.69 .77	5.49 2.73 .85
L003 The lecturer was enthusiastic about the subject		A+SA = 99% D+SD = 0% count=14	Mean 9.50 Std.Dev 1.00	7.81 2.27 .74	7.29 2.37 .93
L004 The objectives of the lectures were clearly explained		A+SA = 94% D+SD = 0% count=14	Mean 9.11 Std.Dev 1.45	6.39 2.68 1.01	6.48 2.52 1.04
L005 I was clearly informed about how my learning would be assessed		A+SA = 89% D+SD = 0% count=14	Mean 8.41 Std.Dev 1.69	6.77 2.27 .72	6.56 2.28 .81
L006 I received helpful feedback on my learning progress		A+SA = 49% D+SD = 5% count=14	Mean 6.60 Std.Dev 2.18	5.53 2.44 .44	5.23 2.42 .57
L007 The lecturer was easy to approach for help outside the class		A+SA = 63% D+SD = 1% count=14	Mean 7.50 Std.Dev 1.92	6.80 2.44 .29	6.48 2.37 .43
L008 The lecturer responded to students questions in a constructive way		A+SA = 93% D+SD = 1% count=14	Mean 8.26 Std.Dev 1.49	6.88 2.34 .59	6.96 2.23 .58
L009 The lecturer provided effective resources for learning		A+SA = 93% D+SD = 0% count=14	Mean 8.76 Std.Dev 1.56	6.96 2.57 .70	6.77 2.67 .75
L010 Overall, the lecturer was an effective teacher		A+SA = 97% D+SD = 1% count=14	Mean 9.19 Std.Dev 1.43	6.80 2.72 .88	6.74 2.64 .93

Teaching Evaluations

Year 3

STUDENT EVALUATION OF LECTURING S.E.C.A.T												
Survey number: 8010 Reports to: Gerard Rowe												
Lecturer: Dr Gerard Rowe						Date: 11 November 1996						
Course: 53.251 SC Transmission Lines and Fields												
1=Very Poor / 2=Poor / 3=Mediocre / 4=Acceptable / 5=Good / 6=Very Good / 7=Outstandingly Good												
Total Responses	43	1's	2's	3's	4's	5's	6's	7's	Mean	%<4	%=4	%>4
Instructor's attitude towards students		0	0	0	0	5	18	20	6.3	0%	0%	100%
Instructor's use of white / black board		0	0	1	2	2	16	22	6.3	2%	5%	93%
Instructor's ability to communicate clearly		0	0	0	1	1	16	25	6.5	0%	2%	98%
Instructor's ability to explain the material clearly		0	0	0	0	4	18	21	6.4	0%	0%	100%
How well does the instructor demonstrate their knowledge of the subject		0	0	0	0	4	12	27	6.5	0%	0%	100%
Ability to present the material in an interesting manner		0	0	0	5	17	13	8	5.6	0%	12%	88%
Ability to structure lectures in a clear manner		0	0	0	1	2	24	16	6.3	0%	2%	98%
Degree of preparedness by staff		0	0	0	1	1	12	29	6.6	0%	2%	98%
Overall organisation by instructor		0	0	0	0	2	15	26	6.6	0%	0%	100%
Overall effectiveness of teaching		0	0	0	1	3	20	19	6.3	0%	2%	98%

Year 4

STUDENT EVALUATION OF LECTURING S.E.C.A.T												
Survey number: 5402 Reports to: Gerard Rowe												
Lecturer: Dr Gerard Rowe						Date: 25 June 1996						
Course: 53.363 FC Radio Systems												
1=Very Poor / 2=Poor / 3=Mediocre / 4=Acceptable / 5=Good / 6=Very Good / 7=Outstandingly Good												
Total Responses	74	1's	2's	3's	4's	5's	6's	7's	Mean	%<4	%=4	%>4
Instructor's attitude towards students		0	0	0	2	11	33	28	6.2	0%	3%	97%
Use of white / black board		0	0	0	1	15	21	37	6.3	0%	1%	99%
Ability to communicate clearly		0	0	0	0	9	36	29	6.3	0%	0%	100%
Instructor's ability to explain the material clearly		0	0	1	4	7	35	27	6.1	1%	5%	93%
How well does the lecturer demonstrate their knowledge of the subject		0	0	0	2	10	31	31	6.2	0%	3%	97%
Ability to present the material in an interesting manner		0	0	2	6	25	29	12	5.6	3%	8%	89%
Ability to structure lectures in a clear manner		0	0	1	4	8	27	34	6.2	1%	5%	93%
Degree of preparedness by staff		0	0	0	2	11	26	35	6.3	0%	3%	97%
Overall organisation by instructor		0	0	1	0	8	27	38	6.4	1%	0%	99%
Overall effectiveness of teaching		0	0	0	0	11	35	28	6.2	0%	0%	100%

Teaching Evaluations

Service Paper

Dr G B Rowe, 53.111, 1993

PRIVATE &
CONFIDENTIAL



University of Auckland

TEACHING EVALUATION REPORT

Lecturer: Dr G B Rowe

Paper: 53.111 Electrical Engineering IG

According to advice received, the survey on which this report is based was carried out by a staff member other than the teacher concerned, and met the requirements laid down by HERO for its endorsement as being suitable for performance assessment purposes.

Number of responses processed : 94

Initiated by: HOD

Ratings:- 1 Very poor / 2 Poor / 3 Mediocre / 4 Acceptable / 5 Good / 6 Very good / 7 Outstandingly good

Ability to structure sessions in a clear and logical manner.

RATING	1	2	3	4	5	6	7	MEAN	
FREQUENCY	0	0	1	3	4	40	45	6.3	(1)

Knowledge of the subject matter.

RATING	1	2	3	4	5	6	7	MEAN	
FREQUENCY	0	0	2	0	11	44	36	6.2	(5)

Ability to clearly communicate and explain the course content.

RATING	1	2	3	4	5	6	7	MEAN	
FREQUENCY	0	0	2	4	6	44	37	6.2	(9)

Enthusiasm for the subject.

RATING	1	2	3	4	5	6	7	MEAN	
FREQUENCY	0	0	1	6	16	43	27	6.0	(13)

Ability to present the material in an interesting manner.

RATING	1	2	3	4	5	6	7	MEAN	
FREQUENCY	0	0	3	5	25	39	21	5.8	(17)

Attitude towards students.

RATING	1	2	3	4	5	6	7	MEAN	
FREQUENCY	0	0	1	6	11	38	37	6.1	(21)

Overall effectiveness in teaching this course.

RATING	1	2	3	4	5	6	7	MEAN	
FREQUENCY	0	0	2	2	7	49	33	6.2	(25)

The equivalent question to the item on "overall effectiveness in teaching this course" for all stage 1-3 courses at the University of Auckland during the period 1990-1992 rated a mean response of 5.0. The outcome of this evaluation is therefore well above the level of the University mean for this item. In general terms the students describe the instructor's teaching as "very good".

Prestigious Awards

The Institution of Electrical Engineers
 Founded 1871 Incorporated by Royal Charter 1921



This is to certify that
 for the session 1992/93
 the Council have awarded

AN ELECTRONICS LETTERS PREMIUM

to

G B Rowe
 M J Neve

for their papers entitled

"Assessment of GTD for mobile radio propagation prediction"
 and

"Estimation of cellular mobile radio planning parameters using
 a GTD-based model"

Witness our hands and seal at Westminster
 this 30th day of September 1994



President

Member of Council

Secretary

The New Zealand Electronics Institute
 Incorporated 1949

This is to Certify that

G. B. ROWE

was awarded the

N.Z.E.I. Prize

for the Best Technical Paper

at

Nelcon 93

The New Zealand Electronics Institute Incorporated

*An organisation which seeks, through the association of its members in meetings and discussions,
 to spread knowledge of, and to extend the applications of Electronics in all its aspects.*

Witness our Hand and Seal at Auckland

This 13th day of May 1993



President

Secretary

APPENDIX TWO: PUBLICATIONS

1) Details of **research publications and grants**

Refereed Journals

- (1) Rowe, G.B., Williamson, A.G. and Egan, B. 'Mobile Radio Propagation in Auckland at 465MHz', *Electronics Letters*, 19, 1983, pp 207-208.
- (2) Rowe, G.B., Williamson, A.G. and Egan, B. 'Variability of Mobile Radio Path Loss in Auckland at 465MHz', *Electronics Letters*, 19, 1983, pp 588-589.
- (3) Rowe, G.B., Williamson, A.G. and Egan, B. 'Mobile Radio Propagation in Auckland at 76MHz', *Electronics Letters*, 19, 1983, pp 1064-1065.
- (4) Rowe, G.B. and Williamson, A.G. 'Mobile Radio Propagation in Auckland at 851MHz', *Electronics Letters*, 22, 1986, pp 1154-1155.
- (5) * Neve, M.J. and Rowe, G.B. 'Assessment of GTD for Mobile Radio Propagation Prediction', *Electronics Letters*, Vol. 29, pp 618-620, April 1993.
- (6) * Neve, M.J. and Rowe, G.B. 'Estimation of Cellular Mobile Radio Planning Parameters Using a GTD-Based Model', *Electronics Letters*, Vol. 29, pp 1372-1374, 1993.
- (7) Neve, M.J. and Rowe, G.B. 'Contributions Towards the Development of a UTD-Based Model for Cellular Radio Propagation Prediction', *IEE Proceedings on Microwaves, Antennas and Propagation*, Vol. 141, 1994, pp 407-414.
- (8) Neve, M.J. and Rowe, G.B. 'Mobile Radio Propagation Prediction in Irregular Cellular Topographies Using Ray Methods', *IEE Proceedings on Microwaves, Antennas and Propagation*, Vol. 142, 1995, pp 447-451.
- (9) Neve, M. J., Rowe, G. B., Shafi, M., Sowerby, K. W. and Williamson, A. G. 'Wireless Personal Communications Services: A New Zealand Perspective', *IEEE Personal Communications Magazine (Special Issue on Personal Communications Services in the Far East.)*, Vol. 4, No. 2, April 1997, pp 22-29.
- (10) Perera, S. C. M., Williamson, A. G. and Rowe, G. B. 'Prediction of Breakpoint Distance in Microcellular Environments', *Electronics Letters*, 35, 1999, pp 1135-1136.

* *For these two papers we were awarded the IEE Electronics Letters Premium. (Copy of Certificate provided in **Appendix 1.**)*

Conference Publications

- (1) Blomfield, D.A.E. and Rowe, G.B. 'Research in UHF Techniques in the Department of Electrical Engineering at the University of Auckland', UHF Radio Techniques Symposium, Auckland, Dec. 1980.
- (2) Rowe, G.B. 'Principles of Radio Propagation at UHF', UHF Radio System Design Seminar, University of Auckland, August 1981.
- (3) Rowe, G.B. 'Point-to-Point System Design', UHF Radio System Design Seminar, University of Auckland, August 1981.
- (4) Rowe, G.B. 'Mobile Radio Propagation Studies in Auckland', VHF and UHF Radio Systems Symposium, Auckland, 27-28 Nov., 1986.
- (5) Rowe, G.B. 'Prediction of Mobile Radio Path Loss', Proc. 24th National Elect. Conference, NELCON 87, Auckland, Sept. 1987.
- (6) Rowe, G.B. 'Prediction of Signal Strength in Mobile Radio Systems', IREECON'87 Conference Digest, Sydney, Sept. 1987.
- (7) Rowe, G.B. 'Digital Transmission Over Mobile Radio Paths', Proc. 25th National Electronics Conference, NELCON 88, Christchurch, Sept. 1988.
- (8) Rowe, G.B. 'An Electromagnetic Model Of The Mobile Radio Channel', Proc. 26th National Electronics Conference, NELCON 89, Wellington, Sept. 1989.
- (9) Neve, M.J. and Rowe, G.B. 'Wideband UHF Mobile Radio Propagation Studies', Proc. 26th National Electronics Conference, NELCON 89, Wellington, Sept. 1989.
- (10) Neve, M.J. and Rowe, G.B. 'Wideband Radiowave Propagation Applicable to Future Cellular Telephone Systems', Proc. Communications '90, Melbourne, October 1990.
- (11) Neve, M.J. and Rowe, G.B. 'An Investigation into Wideband Radiowave Propagation Applicable to Second and Third Generation Cellular Telephone Systems', Proc. ICCS'90, Singapore, November 1990.
- (12) * Neve, M.J. and Rowe, G.B. 'Assessment of Ray-Methods for Mobile Radio Propagation Prediction', Proc. 30th National Electronics Conference, NELCON 93, Auckland, May 1993.
- (13) Rowe, G.B., Redgrove, M.R. and Reddy, K.V.S. 'Review of Bioelectromagnetics Studies at the University of Auckland School of Engineering', Proc. Annual Conference (New Zealand Branch) Australasian College of Physical Scientists and Engineers in Medicine, Auckland, November 1993.
- (14) Neve, M.J. and Rowe, G.B. 'Personal Wireless Communications: A Challenge in Radiowave Propagation Modelling', Proc. ICCS'94, Singapore, November 1994, pp 10-14.

- (15) Neve, M J, Rowe, G B, Sowerby, K W and Williamson, A G, 'Mobile radio systems research at the University of Auckland', *Proc. ENZCon '95, Auckland, August 1995*, pp 89-94.
 - (16) Neve, M J, Rowe, G B, Sowerby, K W and Williamson, A G, 'Radiowave propagation prediction for personal communications services: what do we need to know?', *Proc. ENZCon '95, Auckland, August 1995*, pp 95-100.
 - (17) Reddy, K V S and Rowe, G B, 'Investigation of MWM Technique for microstrip antenna design', *Proc. ENZCon '95, Auckland, August 1995*, pp 115-120.
 - (18) Redgrove, M R and Rowe, G B, 'The use of the finite-difference time-domain method to predict power deposition patterns in the human body', *Proc. ENZCon '95, Auckland, August 1995*, pp 121-126.
 - (19) Reddy, K V S and Rowe, G B, 'Investigation of MWM technique for Hyperthermia applicator design', *Proc. Eng. & Physics in Medicine 95, Queenstown, November 1995*, pg 85.
 - (20) Neve, M. J., Rowe, G.B., Sowerby, K. W. and Williamson, A. G. 'The Investigation of Radiowave Propagation Mechanisms for Future Wireless Communications Services Planning', *Proc. IEEE VTC'96 Conference, Atlanta, April 1996*, pp 615-619.
 - (21) Perera, S.C.M., Rowe, G.B. and Williamson, A.G. 'Break Point Analysis in Microcellular LOS Environments', *Proc. NZ Communications Workshop, Wellington, May 1997*.
 - (22) Chew, D. F., Rowe, G. B. and Sowerby, K. W. 'Mobile Radio Propagation Modelling Using Regression Analysis', *Proc. IPENZ National Conference, Auckland, February 1998, Volume 2*, pp 155-160.
- * *This paper was awarded the New Zealand Electronics Institute (NZEI) prize for the best technical paper presented at NELCON 93. (Copy of certificate provided in **Appendix 1.**)*

Technical Reports

- (1) Rowe, G.B. 'Evaluation of a Solar Panel as a Remote Power Source', School of Eng Report No 253, April 1981.
- (2) Rowe, G.B., Williamson, A.G. and Egan, B. 'Mobile Radio Propagation in Auckland at 465MHz', School of Eng Report No 302, Feb. 1983.
- (3) Rowe, G.B., Williamson, A.G. and Egan, B. 'The Variability of Mobile Radio Path Loss in Auckland at 465MHz', School of Eng Report No 319, Feb. 1983.

- (4) Rowe, G.B., Williamson, A.G. and Egan, B. 'Mobile Radio Propagation in Auckland at 76MHz', School of Eng Report No 325, Oct. 1983.
- (5) Rowe, G.B. 'A Land Mobile Radio Coverage Area Prediction Model for New Zealand', School of Eng Report No 354, June 1984.
- (6) Perera, S.C.M., Rowe, G.B. and Williamson, A.G. 'Modelling of Radio Wave Propagation In Microcellular Environments', UniServices Report No. 6938, Prepared for Telecom New Zealand Ltd, June 1997.
- (7) Williamson, A.G., Sowerby, K.W. and Rowe, G.B. 'Indoor Wireless Propagation Modelling and System Capacity Estimation', UniServices Report No 6939, Prepared for Telecom New Zealand Ltd., December 1997.

Research Grants

- (1) 141 Engineering 146, April 1985, 'Cellular Radio Systems Study', Auckland University Research Committee, \$2,063. (Jointly with Professor A.G. Williamson.)
- (2) 417.151, October 1985 'Mobile Radio Data Transmission Study', Auckland University Research Committee, \$5,000. (Jointly with Professor A.G. Williamson.)
- (3) 391.691, August 1987, 'Mobile Radio Systems Engineering', University Grants Committee, \$35,000. (Jointly with Professor A.G. Williamson.)
- (4) 391.698, September 1988, 'Mobile Radio Systems Engineering, Phase II', University Grants Committee, \$30,000. (Jointly with Professor A.G. Williamson.)
- (5) 3417241, October 1990, 'Wideband Channel Characterisation', Auckland University Research Committee, \$4,000.
- (6) 3417311, April 1993, 'Experimental Electromagnetic Dosimetry Studies', Auckland University Research Committee, \$7259.
- (7) 3417363, November 1994, 'Experimental Electromagnetic Dosimetry Studies', Auckland University Research Committee, \$6,500
- (8) 3417387, April 1995, 'Linear Antenna Design and Measurement', Auckland University Research Committee, \$4,500. (Jointly with Dr M J Neve.)
- (9) 3417449, October 1996, 'Monitoring of ELF-VLF magnetic fields professionally and environmentally encountered in NZ', Auckland University Research Committee, \$3,000. (Jointly with Dr A W Green.)
- (10) 3603024 April 2003, 'Characterisation of the Powerline Communications Channel', Auckland University Research Committee, \$10,000. (Jointly with Dr S. Berber).

In addition, I have supported several research programmes via UniServices Contracts with Telecom New Zealand Ltd. The details of these contracts are:

- (10) UniServices Job No: 3726 - Outdoor Mobile Radio Communication
Customer: Telecom Corporation of New Zealand Ltd
\$27,000 plus GST, May 1990
- (11) UniServices - Microcellular Propagation Modelling for Personal Communications Systems (PCS) Planning
Customer: Telecom Corporation of New Zealand Ltd
\$25,000 plus GST, September 1996
(Jointly with Professor A G Williamson)
- (12) UniServices - Indoor Wireless Propagation Modelling and System Capacity Estimation
Customer: Telecom Corporation of New Zealand Ltd
\$25,000 plus GST, September 1996
(Jointly with Dr K W Sowerby and Professor A G Williamson)
- (13) UniServices - Antennas for Indoor Wireless Systems
Customer: Telecom Corporation of New Zealand Ltd
\$25,000 plus GST, 1999
(Jointly with Professor A G Williamson)

APPENDIX THREE: TEACHING MATERIALS

- 1) Copy of assignment for 53.363 Radio Systems
- 2) Copy of laboratory sheet for laboratory examination in ELECTENG 421.
- 3) Copy of Course Audit for a course I coordinate (ELECTENG 302)

The University of Auckland

Department of Electrical & Electronic Engineering

53.363 RADIO SYSTEMS

ASSIGNMENT 1996

Report to be submitted, 3 pm, 15 May 1996 at Radio Systems Lecture.

Scenario

You are a junior engineer employed by a firm of consulting engineers. Your firm has been engaged to assess aspects of the establishment of a television service to a remote area. Your involvement centres round the radio transmission aspects: the microwave link from Auckland and the UHF transmission of the television signal.

Specifically, your involvement is to be:

1. To consider the technical feasibility of the proposals for the microwave link and UHF distribution as in Attachment A. You are required to report your assessment in a concise report (not exceeding 6 pages) to your supervisor who is an experienced radio systems engineer. Your report should also draw attention, briefly, to any issues (technical, environmental etc) which the clients may need to consider, and which may need to be addressed in (2) or (3) below.

The fee your firm is to receive is such that a maximum of 8 hours can be devoted to this aspect, including the preparation of the report.

2. Following the submission of your report you will be a member of a team from your firm to attend a meeting with representatives of the client company. You will be expected to answer technical questions.
3. It will be necessary to obtain Planning Approval for this development and a public meeting is to be held. Few of the residents of the area have detailed technical knowledge of radio engineering, but they are well informed on environmental and conservation issues. You are to attend this meeting, and may be required to answer questions.

This Assignment and Requirements

You are required to undertake the assessment outlined in (1) above of the proposal at Attachment A. You may use the data in Attachment B if you wish, or any other data you can obtain, which you should reference. Remember, this is an assessment of feasibility,

not of a final design. Your report will be graded and returned to you at (or before) the forum session(s) referred to below.

Aspects (2) and (3) above will be covered at a forum session to be held in the lecture time on Monday May 27. The forum may continue in subsequent lecture periods of that week. You are expected to attend this forum (which will be facilitated by Professor Williamson and Dr Rowe jointly), and to be prepared to be an active participant.

A register of attendees will be kept. To gain **any** credit for this assignment you must attend the forum. Students submitting the written report but being unable to attend the forum sessions for reasons beyond their control, will be given the opportunity of a private session with the facilitators.

You are permitted to discuss details of your study with fellow students; however the written report must be your own assessment. As with any professional activity you must take responsibility for your own recommendations.

(Note: Attachment A follows.)

ATTACHMENT A

The proposal is to provide television service to the Kawakawa Bay and Orere Point areas from a repeater station at Papakauri. There is already an adequate route to the top of Papakauri for access etc, and a reliable power supply connection is possible. Whilst there is no residential housing in the close proximity of Papakauri, the area is very popular with trampers and there is a trampers hut near the summit, which is used regularly. The summit has trees of approximately 15m in height.

The proposal is to establish a single hop microwave link from the Waiatarua transmitter site in West Auckland and to establish a low power UHF repeater, both co-sited on Papakauri.

Details:

Microwave Link

- approximately 18GHz, 200mW transmitter.
- the equipment at ground level is approximately 20m from the base of each tower, and the minimum antenna height on the Waiatarua tower is 40m.

You need to choose appropriate waveguide and antennas. A received signal of at least –75dBm is sought.

TV Repeater

- a frequency of about 600MHz is to be used.
- a 150W UHF transmitter is proposed.
- coverage is sought principally for Kawakawa Bay and Orere Point.

You are requested to offer advice as to a suitable type of antenna and the tower height. Using typical data for transmission lines and antennas, and taking into account the path details you are further requested to estimate the likely received signal levels in Kawakawa Bay and Orere Point.

Note: A topographical map of the area is available in the Radio Lab, together with some catalogues. You may use this material, **but it is not to be removed from the laboratory for any reason.**



THE UNIVERSITY OF AUCKLAND
FACULTY OF ENGINEERING
DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

ELECTENG421 Radio Systems

Experiment RS2 – Double Stub Matching

Read these instructions carefully as this experiment is to be performed under special conditions!

The objective of this experiment is to double-stub match an unknown load to a 50Ω transmission line at a specified frequency. ***Students are required to undertake this experiment individually without assistance or supervision. Every student will have a different load/frequency combination.***

1. You will be assigned a two-hour period sometime in the last four weeks of the semester for you to attend the Radio Systems Laboratory to perform Experiment RS2. (Allocations of the available times will be undertaken randomly and you will only be permitted an alternative time to that assigned to you if you have, and can prove, that the assigned time clashes with some immovable commitment.)
2. When you arrive for your session the Radio Systems Laboratory technician (Mr M. Twiname) will issue you with the load to be matched and will assign the frequency at which you are to design the matching network. He will enter these details on the attached measurement test sheet.
3. Your task is to design a double-stub matching network for your load at the assigned frequency. You should seek a design which minimises the sum of the stub lengths, but which is realisable with the supplied hardware. Your objective is to achieve a VSWR of 1.1 or better. You are required to record the results of your calculations, graphical or otherwise, and to record the VSWR that your design achieved in practice. You are permitted to “tune” the network, but if you need to do so you must record the adjusted parameters and the final VSWR. ***Once you have completed the worksheet you should return the load to Mr Twiname who will record this on your sheet.***
4. After your laboratory session you will be required to meet at an assigned time with the Radio Systems laboratory work examiner (to be advised) to present your completed results sheet. You will be asked questions, and/or asked to explain some aspects of the experiment. When this interview is completed satisfactorily you will have completed the requirements of this experiment.

You must complete this experiment satisfactorily by Friday 24 October 2003.

You are not permitted to have assistance from anyone (staff, fellow students or others) in the laboratory when you undertake this experiment. You are permitted assistance and advice *before* doing so, or, if necessary, *after a failed attempt* and *before* a subsequent attempt. However, if you fail to complete the experiment satisfactorily during your two hour session you will have to close down the experiment and return the load to Mr Twiname. When you next return to do the experiment (after further thought, etc) you will be issued with a different load and frequency for your next attempt.

Anyone accepting assistance in the laboratory to do this experiment will automatically fail to satisfy the requirements of this experiment and will therefore be unable to complete the requirements for the Radio Systems paper!

On-Course Assessment

This experiment contributes to your on course assessment to a maximum of 10 marks (10%).

Most engineering activities are performed for a fee under a contract that specifies what is to be achieved, in what time frame and to what standard. The contract also specifies what penalties or fee reductions will apply if the contract conditions are not met. Notwithstanding any fee reductions the obligation to complete the work satisfactorily usually remains.

The “fee” available to you is 10 marks. The contract period begins when you uplift the unknown load from the laboratory technician and your allowable contract period in the laboratory is two hours. (You may undertake whatever prior preparation you like, as discussed below.) The required standard of the work is to achieve a VSWR of 1.1 or better. If you meet these targets the available fee is 10 marks; what fraction you get will depend on the completeness and quality of your worksheet and the accuracy and clarity of any further information sought from you by the laboratory work examiner.

Should you fail to achieve the required objective (VSWR of 1.1 or better) within the two hour period you will have to make another attempt to satisfy your contractual requirements. However the maximum “fee” now available to you is only 5 marks. If you again fail to achieve the required outcome you will score zero marks *but the contractual requirement to complete the laboratory experiment remains – that is, you still have to complete it satisfactorily. It is your responsibility to ensure that the requirements of this experiment are met by the completion date.*

Any student presenting falsified results will automatically score zero, and be required to repeat the experiment!

Prior Preparation

Like all engineering activities the key to a successful outcome is preparation. It is not uncommon for engineering companies to invest heavily in development, and to develop key skills before seeking to use them.

In this exercise you may do any prior preparation you like. If you wish you can use the equipment during the period RS1 is running to practice double stub matching, and you can do this in a group with other class members if you wish.

However, when your allocated time to perform Experiment RS2 arrives and you uplift your assigned load from the lab technician, you must undertake this experiment on your own and without assistance.

*If any aspect of the above instructions is not clear you should seek clarification from
Dr G. B. Rowe before proceeding!*



THE UNIVERSITY OF AUCKLAND
NEW ZEALAND
DEPARTMENT OF ELECTRICAL
AND ELECTRONIC ENGINEERING

COURSE AUDIT

Note: This form should be submitted to the HoD (via the appropriate Programme Leader) with the following attachments

- course outline issued to students including details of basis for assessment
- copies of tests, assignments and the final examination
- marks sheet showing on-course, examination and final marks, and grades

COURSE CODE: ELECTENG 302 **SEMESTER & YEAR:** Semester 1, 2003

COURSE TITLE: Engineering Electromagnetics 2

COURSE COORDINATOR: Gerard Rowe

NUMBER OF STUDENTS: 118

DEGREE PROGRAMME (EEE, CSE, SE, U/G or P/G): EEE (+ CSE Pt 4 Elective)

ACADEMIC STAFF INVOLVED (in lecturing, tutorials, labs, clinics):
Lectures: Gerard Rowe, Allan Williamson, Udaya Madawala & Patrick Hu
Labs: Chris Smaill

DETAILS OF TA HOURS REQUIRED (lab supervision/test supervision/marketing/tutorials etc)

Lab Supervision: TA – 76 hours (including ELECTENG 306). Chris Smaill – 30 hours total (24 hrs in labs, one lab preparation session, several hours dealing with signing lab journals and rescheduling missed labs.)
Test supervision: Rowe, Hu, Madawala and Smaill – 2 hours test supervision each. Suggest request TA support for test supervision in 2004.
No tutorials. All marking done by lecturers.

DETAILS OF ASSESSMENT OF STUDENTS (On-course, projects, labs, final exam):
70% final exam and 30% on-course. Two 45-minute tests – 15% each. Two compulsory labs.

WHAT PROCEDURES WERE USED TO ENSURE THAT ON-COURSE ASSESSMENT WAS THE STUDENTS OWN WORK?

On-course marks derived entirely from tests. Usual test conditions applied.

FAST FEEDBACK SURVEY OF COURSE

List the two most common favourable comments:

Well taught
Interesting material

List the two most common shortcomings:

Lecture interleaving unhelpful
Need tutorials

What action is to be taken resulting from this feedback?:

The lecturers met to consider the feedback. On academic grounds we recommend no action. If the course was taught as two 6-week modules, we feel the students wouldn't have enough time to absorb the (abstract) material. We have found tutorials to be poorly attended and a waste of resources.

DETAILS OF OTHER SURVEYS OR COURSE EVALUATIONS UNDERTAKEN (if any):

One lecturer (UM) arranged a CPD survey of his teaching as he was not surveyed using the Dean's Fast Feedback Survey forms.

ACADEMIC STAFF REFLECTIONS ON THE COURSE

On the lecture programme: Disadvantaged by poor room and timetable clash on Mondays. All staff had previously taught this course, but most felt it was difficult to "make a connection" with the students in this lecturing environment. Disappointed with test and exam results. Need to get students working more – perhaps use OASIS.

On the laboratory programme (if applicable): Lab 1 OK. Look at Lab2 to see if appropriate. (Run largely as a demo in 2003.)

On projects (if applicable): N/A

On the basis for assessment: Modify to engage students more. Add oasis questions as part of marked course-work. Possibilities are: 10% Oasis and 10% on each test, or 5% Oasis, 10% Test 1, 15% Test 2.

ARE ANY CHANGES PLANNED/RECOMMENDED FOR THE NEXT TIME THIS COURSE IS DELIVERED?

Revamp AGW/GBR problem sheets – especially sheet 2
Work more in-class problems
Add OASIS questions

ANY OTHER ISSUES THAT NEED TO BE PURSUED (eg timetable, links with other courses)

Timetable clash on Mondays involving Pt 4 elective – BJJ notified
Avoid 8am tests and lectures immediately following tests. Maybe tests in evenings.

APPENDIX FOUR: STUDENT COMMENTS AND INFORMAL AWARDS

- 1) Scanned copies of student comments from class surveys plus pictures of two informal awards presented by final year classes in 1992 and 2003.

Student Comments

"What was most helpful for your learning?"

What improvements would you like to see?

Nah, the lecturer is good.
The best I've ever seen in AU.



The enthusiasm of the lecturer.

We need Mr. Rowe like lectures for such a difficult and vast subject — Thank!

I am fully satisfied with whatever was taught by Mr. G. B. Rowe → He is enthusiastic about subject and his way of ~~be~~ lecturing motivated me to learn e-mag.

Student Comments

"What was most helpful for your learning?"

* Perhaps Dr. Rowe could teach other lecturers in this Dept. on how to LECTURE.

* I was very impressed with Dr. Rowe's teaching. Gave me a renewed sense of hope for this department.

The lecturer gives info clearly, it is really easy to follow
I am so great that Dr. Rowe is teaching the most difficult part of this paper.

Very well organised.
Lecturer was very clear as to what we should learn.

General comment:
I have never seen a lecturer who is as organised as Dr Rowe
- very impressive!

good examples
good lectures,
good notes

Clearly explanation, & a clear solution & reference for question given.

Student Comments

"What was most helpful for your learning?"

Georand was very enthusiastic when teaching & hence has stimulated my interest in this subject. wish can have him as a lecturer for all subjects!!

Explanation of all the details and points. lecturer went beyond the notes.

One of the best paper I have.

Get Dr Rowe to teach whole paper

Your lectures were really well presented, and I like your clear explanations - well spoken english. Thanks for responding to my email about mid-lecture breaks! They were really helpful.

Student Comments

"What was most helpful for your learning?"

- The lecture notes were comprehensive
- The lecturer was enthusiastic
- Created interest in electromagnetics

- very clearly structured lectures.
- reinforcement on important points

Dr. Rowe's clear, well structured lecturing voice in which its contents actually make sense without ~~the~~ later revision.



The notes were great!
Dr Rowe is very clear too.

- It's really nice when you teach taught us the mat we need to ~~use~~ know in the lecture note, you thought us to refer the page that can explain ~~part~~ particular sentence that we might not understand.

← Overall you are a really nice lecturer.

Dr Rowe explains concepts thoroughly and extremely clearly.

The lectures were clear, concise, informative, easy to follow & understand.

Lecturer (very high standard)