A 30 / 25 YEAR CELEBRATION

The Engineering Science degree scores a quarter-century
and TAM goes over the hill

The end of 1992 will see the completion of 30 years in the life of a special department
within Engineering at the University of Auckland, known for most of its existence as
"THEORETICAL AND APPLIED MECHANICS" (TAM to its friends) and as
"ENGINEERING SCIENCE" (ES) since mid-1989. At the same time ES will harvest
its 25th crop of students "to be admitted to the Degree of Bachelor of Engineering" in
Engineering Science.

So it seems an appropriate time to report the following recently recorded fictitious but
entirely factual interview.

... credits and music fade — interviewer close-up ... 

Good evening. This is "BLUNTLINE" and tonight we investigate the mystique of
that most elusive of titles:
THEORETICAL AND APPLIED MECHANICS
a. k. a. ENGINEERING SCIENCE.

My guest this evening is a spokesperson for Engineering Science at the University of
Auckland. Our studio audience is a random selection from the street and you will be
pleased to know that special security measures are in force.
... applause and close-up on guest ... 

Good evening spokesperson. Can you tell me why TAM was formed in 1963?

Certainly, and good evening. It was created to overcome a problem experienced
world-wide by university engineering schools.

What was that?

The difficulty of getting mathematicians from another faculty to teach engineering
students the kind of mathematics that as engineers they will need.
... vague mumbles from mathematicians and engineers in audience ...

How did the formation of TAM solve this problem?

It was a new department within the Engineering School, and thus to some extent
controlled by it, charged with teaching analytical courses at all levels which would be
of specific value to engineering disciplines. Initially it had just two tenured staff and a
junior lecturer.

Was it a success?

No.
... reaction of shock! horror! ...

Please elaborate!

Well, it was only unsuccessful in the eyes of a professor or two, who expected the new
group to be a bunch of tame, non-threatening mathematical slaves.
... subdued 'hear! hear!' ...
Wouldn't the new group cooperate?

Oh, yes, it would and did. But the foundation head, Cecil Segedin, wisely realised that a department without a degree would not really be viable, and he quickly proposed a new BE in Engineering Science. This was to be broadly based on the applied mathematics of mechanics (solids and fluids) which gave the new department its name.

You said that TAM was set up with staffing of two and 'a half'. Did it grow?

Not straight away. Cecil Segedin and Mervyn Rosser were the founding staff members of TAM, 
\... muted cheers \...
and for nearly five years the only change was in the junior lectureship position, largely filled by active young graduates preparing to study overseas. Then in 1967 with the Engineering Science degree underway John List accepted an offer, and soon afterwards, Ian Medland as well. At the end of the decade Mike O'Sullivan joined the group and John left for Caltech (where he has remained, rising to senior professorial status.)

What about the next period?

Student numbers increased dramatically across the University during the early seventies. This had a big effect on our department, and over the next couple of years we appointed our first two non-New Zealanders, Mike Forster and Jerry Griffin, both from the USA, as well as Glen Sinclair, one of our own returning graduates. When Glen left to take a post at Carnegie-Mellon in Pittsburgh (where he too has made a name for himself) we obtained the services of Auckland science/mechanical engineering graduate, Chris Patterson, and soon afterwards (but only briefly, since the lure of California became too great) a further TAM person, Roland Horne.
\... activist shouts 'more aid to under-developed countries' and is arrested \...

You seem to have appointed a preponderance of 'local boys who've made good'!

Yes, and this feature was reinforced when both Jerry and Mike (Forster) returned to jobs back home. 1978 saw Otago (and ANU) graduate David Ryan transferring from Mathematics to TAM, and a further TAM-graduate appointment in the person of Peter Hunter. In 1980 Cecil Segedin retired, and his replacement as HOD was Englishman Ian Collins.
\... distinctly English voice cries: 'buy British' before being silenced \...

Ah, new foreign blood! I hope this was the start of a good trend?

Well, not really. The next appointee was Australian Geoff Mohr, but his term lasted only three and a half years, and Ian remains our only long-serving overseas appointment. Robert McKibbin joined in 1981, and in mid-decade Sue Byrne (the first woman on the full-time Engineering staff), Andy Philpott and Roger Nokes. All four of these, while still Kiwis, at least had begun their academic training in institutions further south.

So when the South Island secedes two more can be claimed as foreigners!
\... unidentified: 'hurrah for the mainland' \...
And since then?
At about the same time Don Nield repeated the Mathematics to TAM transfer, but sadly Ian Medland was forced to retire through ill-health. Throughout the '80s there had been the continued valuable support of part-time people, and an increasing pattern of both short- and long-term visits by overseas researchers.

By my count you had 10 tenured people in 1990. Is this the present staffing?

Nothing stays constant! At that stage Mervyn Rosser retired, Robert McKibbin moved south and Andrew Pullan joined full-time, which means that in early 1992 we are almost 4 below our entitlement of 13 equivalent full-timers, so that several new appointments are urgently needed.

Should I apply?

... tolerant amusement ...

What about ancillary staff?

We have one and a half secretarial staff positions, currently shared between three people. Our extensive work with computers, both in teaching and research, requires expert oversight and we have several analyst/programmers working in the department. As well as this there are three or more people employed on contract research. And we should not forget the many hours provided by graduate (and final-year) students in tutorial, laboratory and assignment assistance.

Sure. Now the preamble mentioned the 1989 name-change to Engineering Science. Why ditch 'TAM' after it had survived (and prospered) for more than 25 years?

The name of the degree itself had always been Engineering Science, and it was long felt that the phrase 'theoretical and applied mechanics' did not represent the full coverage of the department. Even during its first decade TAM had moved to encompass a range of mathematical applications wider than just mechanics.

Such as?

The degree has two major components, Mechanics and Operations Research. Both of these rely strongly on techniques from pure and applied mathematics and so the degree course includes papers in analysis, computation, statistics, and so on, as well as general continuum mechanics and operations research topics.

... cries of 'boring, boring' from student, who is frog-marched out ...

That seems to cover the 'Science' part of the title, but what about the 'Engineering' content?

Yes, a very pertinent question. The department has always worked hard to maintain its validity as an engineering department. Its degree includes many compulsory papers in areas such as design, electrical engineering, vibrations, control, industrial administration, fluids, solids and so on. In addition students may choose from a wide range of applied electives in their final year, and along with these studies they make full use of advanced computer techniques.

I know about computers (I've played Pacman)

... derisive laughter ...

but how on earth does all that other stuff help anybody?

Research in the department touches a wide range of everyday affairs.
Do you turn on a light switch?

Don't tell me you're into plastics!

... conservationist cries of 'shame!' treated with contempt ...

No, but the power you use comes from a mix of sources including Maui gas and geothermal energy. For many years we have had research assistants working on problems in these fields. Do you fly regularly?

Yes.

O.K. – and I won't ask which line!

... two advertising banners wave and are pulled down by security guards ...

Well, another group in the department works on difficult but rewarding airline scheduling problems. This helps to keep your costs down.

Someone else mostly pays that!

... cries of 'yes, we do' instantly silenced ...

But what about me personally?

Chances are that you may need major surgery in the future and it's comforting to know that people in this department work closely with medical researchers to improve their knowledge about both solid and fluid parts of the body. Your next replacement heart-valve may owe a lot to Engineering Science's modelling! And there's much more: for example work on ground stability, irrigation and drainage, lung modelling, effluent mixing in rivers, yacht sails (a mug's game?), telecommunications, container packing, forecasting methods (future Treasury employees?), production planning and so on.

These sound interesting topics. But doesn't your department, by its very nature, run the risk of becoming very theoretical; you know, dull lectures, boring papers, uncommunicative researchers and so on?

Heavens, no! (i) Dull teaching? Two of our staff have received the School's prestigious student-assessed 'teaching excellence' award, which has only been in existence for a few years.

... loud cheers ...

(ii) Theory only? The recent establishment of a laboratory will complement theoretical studies, particularly for fluid flow problems, and of course the extensive computer network within the department (come and be shown around some time) provides a very impressive experimental facility in itself. (iii) No communication? The department has hosted several highly successful workshop days for highschool teachers involved with applied mathematics projects, and staff have contributed to many courses and seminars under the Continuing Education umbrella.

OK, OK! I'm impressed.

Don't stop me! Several of our people are internationally recognised in areas such as geothermal flow, biomedical modelling and airline crew scheduling. As recently as this year we have seen a staff member as the senior author of a definitive book about flow through porous media. And the environment has not gone unnoticed, with authoritative work on the spread of nuclear contamination round Mururoa atoll.
Well, I certainly asked for that, and it sounds very extensive! But you haven't said much about the students themselves.

... calls of 'yes, what about the workers?', quickly suppressed ...

Do you have any?

Sure, and they have already been mentioned implicitly because of their considerable contribution to research projects. Ours is not a large department. Undergraduate classes have averaged between 12 and 15 per year over its first quarter-century, with a considerably higher proportion of women (about 20% in recent years) than Engineering has as a whole.

I suppose you get all the good scholarship and bursary winners?

... mixed shouts of 'great!' and 'never' defy easy location ... 

It is tempting to think that a specialised department like ours would cream off the brightest entrants, but this has never been the case. Our students cover the whole range from A+ to "scrape-through", but our output can hold its own with that of any university course. For example in 1991 seven students out of the fourteen who completed graduated with first-class honours, against a School average of about 20%.

... polite cheering ... 

Across the University graduates are finding increasing difficulty in getting jobs. How do your people fare?

Even in the present climate of gloom nearly all our BE graduates can find jobs which suit them. Many go into industry, but about a third on average enrol here or overseas for an ME or a PhD degree, often continuing an interest arising from their BE studies.

Have there been any recent significant developments in your department?

One is very recent indeed. We share a brand-new joint professorship in Operations Research with the Department of Management Science and Information Systems (MSIS).

... piercing whistle ... 

As an inter-faculty appointment this is an exciting first for the University, crossing the boundary between Commerce and Engineering.

Isn't such cooperation long overdue?

Well, no, because this is only the culmination of a trend within the department which has been there for a long time. Common papers across the faculties of Science (Maths & Stats), Commerce (MSIS) and Engineering (ES) have been successfully taught for some years in both Mechanics and Operations Research. This new top-level appointment will confirm and strengthen important ties in teaching and research linking engineering with management and mathematics.

Would you like to wrap up

... heckler yells 'yes, wrap up' and is bundled out ... 

the achievements of the department over its time so far?

Thank you. From its humble beginnings (as TAM) ES has developed to its present highly respected position in Engineering at Auckland. As well as providing the teaching and research upon which its own degree is based, ES has maintained its service courses in engineering mathematics and has expanded into basic teaching and support in computing for the whole School.
And what of the future?

. . . . call of 'beware forecasting! remember Treasury!' is applauded loudly . . . .

We expect to continue to enrol good students; to attract excellent staff; to cooperate with industry in pursuing useful research topics; and to fulfil the basic university functions of preservation, propagation and promotion of knowledge.

Thank you, and our best wishes.

. . . . prolonged applause, credits and music to fade-out . . . .

MERVYN ROSSER

University of Auckland

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