Associate Professor Margaret Hyland – PhD MRSNZ MTMS MAMS University of Auckland

Margaret Hyland has 15 years experience in aluminium smelting technology research and is a three-time recipient of the TMS Light Metals Award.

She has worked with numerous aluminium producers and suppliers on fluoride and sulfur emissions and capture; chemical and mechanical properties of cathode and anode materials; development of new materials.

Professor James Metson – BSc Hons PhD FNZIC MRSNZ MTMS University of Auckland

James Metson has gained an international reputation in aluminium reduction technology for his research on environmental aspects of smelting; materials performance; alumina structure; and impurity transport. He has a broad knowledge of the light metals industries and consults internationally.

A Word from Participants

I now have a better understanding of the fundamentals (thermodynamics, chemistry) of the reduction process, which is a good complement to my practical experience. I frequently refer to the course notes when explaining issues to colleagues.

Mark Cooksey, Senior Research Engineer, CSIRO, Australia

I learned a new approach to look into the data and presenting them in such a way that they are readable and easy to analyse. It also widened and corrected my understanding about alumina, its specifications and impact on pot operation.

Mohsin Ahmed Shukralla, Reduction Manager, Aluminium Bahrain B.S.C.

The cross-section and also "pedigree" of faculty was excellent and certainly brings the content to life and gives it crucial relevancy.

Stewart Hamilton, Manager, Technology and Sustainability, NZAS.

I am digging much deeper for the route cause and try always to avoid compensatory action. It also helped me a lot in terms of analysis and operation understanding

Nabeel Al Jallabi, Reduction Superintendent, Aluminium Bahrain B.S.C.

A great introduction to the Reduction process fundamentals. The knowledge and skills learnt on this course were highly applicable in the practical work environment and improved my technical effectiveness in Reduction.

Scott Westbury, Manager, Reduction North, NZAS.

During the last 10 years I attended quite some courses for the aluminium industry all over the world. Under all these courses the Certificate and Diploma courses organised by the Universities of Auckland and NSW offers the best in class training for supervisors, engineers and researchers.

Martin Iffert, Reduction Manager, Trimet, Essen.

Completing the assignments beforehand was challenging however it really consolidated what I already knew and clearly identified what I didn't know.

Gretta Theobald Stephens, Technical Manager

I learned more in the two weeks I spent in the course, than in the 3 years I have been in the industry. I think I have a better understanding of how the Aluminium industry operates.

Palesa Mokoena (BHA), Reduction Crew Leader, Hillside Smelter, Richards Bay, South Africa.

How to enrol ?

- **Key Dates 2008**

  Enrolment for Certificate – by 31st August.

  Residential 3 week block – 17th November to 5th December.

- **Contact**

  Margaret Hyland *m.hyland@auckland.ac.nz*

  Jenny Roper *j.roper@auckland.ac.nz*

  This year the Certificate will run at The University of Auckland (week 1) and Boyne Smelter, Queensland, Australia (week 2-3).

Cost

Standard applicable University enrolment fees apply. Depending on the conversion rate as below:

- International – NZ$13,400, approximately US$10.6K
- Domestic – NZ$12,000, approximately US$9.5K
- Social fee – NZ$1,500 approximately US$1,200
- Travel and accommodation. (General guides and information will be in Light Metals website www.lightmetals.co.nz under course & conference page)

For general information on admission and Engineering Postgraduate programmes see http://www.engineering.auckland.ac.nz/uoa/engineering/postgrad/postgraduate-degrees/pgcert-lmrtech.cfm

THE UNIVERSITY OF AUCKLAND
NEW ZEALAND

University Postgraduate Qualification in Aluminium Reduction Technology

University of Auckland

- *Enrolment for Certificate – By 31st August*
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2008

THE UNIVERSITY OF AUCKLAND
NEW ZEALAND

Post Graduate Certificate in Light Metals Reduction Technology

Goals of the programme

The aim of the programme is to teach advanced concepts in chemical and materials engineering specific to Light Metals reduction technology, especially aluminium. The course content draws on recent advances in technology and leading edge research and uses experts from academia and industry as lecturers and tutors.

What is the Qualification ?

- The Certificate is a series of University Courses integrating all key aspects of smelting technology. It is a key qualification for running smelters.
- This knowledge is applied to real smelting projects, tailored to the needs of the Class. Intensive problem solving leads to new insights about your own operation, and your ability to put them into practice.

How does it differ from Industry Courses ?

- The Certificate has restricted class size, allowing intensive learning, interaction and plenty of humour.
- Pre-course and post-course assignments contribute to assessment and detailed feedback is provided on these.
- A significant period is spent on site at aluminium smelters, applying the theory to smelting practice.
- World Experts present key lectures in each area of the technology.

How do I take the Certificate if I work full-time ?

- The Certificate is designed for you.
- You complete assignments during a three month period, at your home.
- You also attend a 3 week intensive residential block in Australia/ New Zealand.

What doors does it open ?

- A new, international family of smelter specialists who share their learning. You will become known around the smelting world.
- Relationships with leading academics and consultants to the industry, for you to draw on later.
- A springboard for a Diploma or a Master of Engineering – designed to address a plant-oriented problem of importance to you.

Teaching/delivery methods

A majority of students will be working in the Light Metals industry, will have a practical knowledge of one aspect of reduction technology, and will be based outside of New Zealand or Australia. Several features of the course delivery have been designed in recognition of this:

- The Postgraduate Certificate will be run as three sections, the first and last sections being extramural, the second being a 3-week, on-site taught unit:
  1. Section 1 – Review & Fundamentals Assignments (extramural);
  2. Section 2 – On-site lectures, tutorials, site visits;
  3. Section 3 – Advanced Topics, projects/assignments (extramural).
- In Section 2, lectures are interspersed with tutorials, group and plant work to allow students to practice techniques and concepts covered.
- The lecturing is done by specialists from academia and industry.
- As far as practicable, extramural assignments and projects in Section 3 are tailored to specific technical issues of interest to the student(s).

Courses

Electrochemical Engineering

***CHEMMAT 717** – Corequisite: CHEMMAT 718, 726, 727*

Thermodynamics of aluminium electrolysis; heat and mass balance; components of the cell voltage; anode effect and its mitigation, resistance and voltage tracking; cell magnetics and magnetic modelling.

Completing students will understand the main and side reactions taking place in the reduction process and be able to assess the thermodynamic feasibility of other reduction paths. They will develop competency in the use of HSC Chemistry software to perform heat and mass balances across the reduction cell, predict effects of process changes and to interpret cell voltage and resistance tracks.

Aluminium Reduction Process Operations

***CHEMMAT 718** – Corequisite: CHEMMAT 717, 726, 727*

Monitoring overall aluminium cell performance – what are the appropriate parameters to measure, how are they measured and how are they used for process control. Optimising cell performance, scheduling of operations, dealing with process excursions, metal treatment and quality. Novel cell designs.

Methods for monitoring the cell parameters and interpreting the data will be covered. Students will be able to design trials to assess the influence of changes to cell operations.

The Light Metals Industry

***CHEMMAT 726** – Corequisite:*

CHEMMAT 717, 718, 727

An overview of the light metals, Ti, Al and Mg, their chemistry, metallurgy and processing. It also deals with trends in the global light metals production and uses, recent advances in extending applications for these materials and environmental issues in their production.

Students will be encouraged to explore the relative position of their industry in relation to other materials in the global market. Students will be able to perform an economic analysis of feedstock, and materials selection and availability; power supply and management relevant to their region.

Materials Performance and Selection for Light Metals Processing

***CHEMMAT 727** – Corequisite: CHEMMAT 717, 718, 726*

The performance requirements of anodes, cathodes, cell refractories and other aluminium cell construction materials are assessed. Techniques for monitoring materials performance in operation and post operation (autopsies) are discussed. This course also covers materials specifications, how well they predict performance in the aluminium cell as well as the relationship between the fabrication of the cell components and their performance. New materials.

Students will be able to perform autopsies to determine cause of cell failure and to select appropriate materials. They will gain an appreciation of the new materials being introduced into cell design.

Biographies

Professor Mark Taylor – BE Hon, PhD C Eng, FIChemE
University of Auckland

Mark Taylor graduated from Auckland University in 1984 with a PhD in Chemical and Materials Engineering. His career with the Comalco organisation spanned 18 years in a variety of roles including Implementation Manager for the smelter upgrade, Potroom Manager NZAS, General Manager Technology, General Manager at Boyne Smelters Ltd. Mark returned to the Auckland University in January 2003 as the Director, Light Metals Research Centre and is engaged in light metals research and consulting globally.

Professor John Chen – BE, PhD C Eng, FIChemE, FIPENZ, FRSNZ
University of Auckland

John J.J. Chen is a Fellow of the following: Institute of Chemical Engineers (London), Institute of Professional Engineers New Zealand, and the Royal Society of New Zealand. He is one the TMS Light Metals Division Council and the Aluminium Committee. He has worked in an aluminium smelter for 3 years, and has been an academic for 25 years, with 8 of those (1996-2004) as Head of the Department of Chemical and Materials Engineering, University of Auckland. He has published over 180 papers in international journals and conference proceedings, and over 60 proprietary technical reports. He has won the Best Reduction Technology Paper Awards at TMS in 1992, 1993 and 1996. His current research covers a number of areas in aluminium smelting technology.