Infrastructure and Environment Research at The University of Auckland, Faculty of Engineering

Professor Suzanne Wilkinson
Faculty of Engineering: Theme Leader
Stats...

- University: ~40,000 students total, ~10,000 postgraduates
- Faculties (Engineering): ~4000 students total, ~1000 postgraduates
- Departments (C&E): ~1000 students total, ~250 postgraduates of which 120 PhD students, 40 staff
- Groups: 6
Where is the Built Env. Research?

**Univ. Inter-disciplinary Groups**

- Transforming Cities: Innovations for Sustainable Futures
- Institute of Earth Sciences and Engineering
- UoA Centre for Earthquake Research
- Centre for Infrastructure Research
- Transportation Research Centre

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Where is the Built Env. Research?

• FACULTIES
  Engineering,
  NICAI,
  Business,
  Law,
  Science
Faculty: Infr. & Env. Research Theme

Buildings and Structures
Environment and Sustainability
Water, Power and Communications
Transportation

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Better Buildings and Structures

- Tools and systems for life cycle costing/whole life value
- The effects of climate change, extreme natural events and fire on buildings and infrastructure.
- Procurement/Project Delivery
- **Solutions for buildings and bridges subjected to severe earthquake**
Variables for predicting seismic retrofit cost were identified. Variables that made a statistically significant contribution to the prediction of this cost were identified. Parametric regression models for predicting the seismic retrofit construction cost were developed.

- Area → Cost/m²
- Stories → Cost Variation
- High Seismicity
- Poor Soil Type
- Plan Irregularity
- Seismic Deficient Structures

\[ \text{Cost} = K \left( \text{Area} \right)^B \]
Improving the Environment and increasing Sustainability

- Improving sustainability assessment and technology
- Minimising waste from infrastructure development
- Improving use of natural resources in infrastructure development
- **Understanding green buildings**

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Influences of Human Behaviour on Energy Efficiency in Green Buildings: Sakina Mohktar

Show how human behaviour can assist with optimum energy efficient performance in buildings

Current management measures taken to engage occupants in energy conservation goals are not effective and not widely implemented.

<table>
<thead>
<tr>
<th></th>
<th>Green Building</th>
<th>Conventional Buildings</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Certified</td>
<td>Non-certified</td>
<td></td>
</tr>
<tr>
<td>New Zealand</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Malaysia</td>
<td>1</td>
<td>1</td>
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Water, Power and Communications

- improved water quality
- improving telecommunications design, delivery and management;
- improving power transmission.
- **Ensuring better storm water management**
Portland South Waterfront

Gap between knowledge and hands-on experience among construction professionals which impacts upon LID adoption decisions.

Collaboration required to:
speed up rate of LID uptake,
help shorten LID adoption learning curve;
facilitate effective and practical changes on the ground
Transportation

- Safe and efficient movement of people and goods by land, sea, and air;
- planning, design, construction, maintenance and operations of transport systems including their economic, social and environmental impact;
- better management of New Zealand transport infrastructure.
Key Practice Indicators of Team Integration in Transport Alliances: Khairil Ibrahim

- Focusing on goals and objectives
- Seamless operation with no organisational defined boundaries
- Integrated ICT systems
- Sharing information
- Communication
- Trust & Respect

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Department of Civil and Environmental Engineering

- Structures
- Water
- Environment
- Transportation
- Geotechnical
- Construction management
Construction Management Staffing

Suzanne Wilkinson

Vicente Gonzalez

Kepa Morgan

Garry Miller

Kenneth Yiu

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Challenges

How can we make infrastructure and communities more RESILIENT?

How can we improve CONSTRUCTION PRODUCTIVITY?

What are the NEW INNOVATIONS and how will they change the industry?

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Resilience: Christchurch structures/management/geotechnics

- Resilient Infrastructure and Buildings
- Resilient Organisations

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RecRes Project

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RecRes Project

- [www.recres.org.nz](http://www.recres.org.nz)
- Long-term study for Canterbury Recovery
- Evaluate *real-time* resource availability and resourcing issues
- Provide advice on resourcing availability, efficiency and improvements for rebuilding
- Respond to anticipated problems, monitor for best practice

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Disaster Reconstruction Resourcing

Are there shortages in human resources/materials/plant/equipment

Impact(s)

Arrangements

Changes

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INNOVATIONS: IT and BIM Research at UoA for the AEC Industry (Garry Miller, Vicente Gonzalez, Robert Amor and others)

- Collaboration between Civil and Environmental Engineering (Construction Management Team), Computer Science and the Architecture and Planning Departments.

- 8 Postgraduate students (4 PhDs and 4 MEs) and 4 staff members are involved covering:
  - BIM+Lean+Sustainability
  - Integrated Project Delivery/Procurement
  - Interoperability Issues in Construction
  - Augmented Reality
  - Real Time Data Collection Devices
  - BIM+Education in the AEC Industry
Improving project delivery methods

*Recommendations for using PPPs for school development; Tingting Liu*

Programme approach, bundle projects to increase the viability of PPPs.

School board consulted and engaged

Streamlined tendering process

Involve local private sector partner

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CCH: Factors construction productivity

• Waiting for council approvals
• Delays in main contractor providing information
• Excessive head contractor/client oversight or (New) procedures
• Inadequate work specification & changed specification after work began
• Waiting for EQC inspections/approvals.

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Introduction

Construction projects are becoming more complex, and as a consequence, modern management principles need to be brought to the fore to deliver successful project outcomes. These management approaches need to link closely with the implementation of technical solutions. The role of the professional manager in the construction industry is a challenging one, requiring skills management with a command of technical problem-solving skills coupled with modern construction management knowledge and know-how. This programme has been developed in response to calls from leading organisations to help equip future leaders to meet these challenges.

What is the MEngS (Construction Management) programme?

- A specialist taught programme at postgraduate level.
- One year full-time, or part-time over 2-4 years. Approximately half of the students on our programme are working part time, sponsored by their employers.
- Eight papers are taken from a range of topics in construction management. There are 5 core papers and a range of electives. Papers range from project management, cost engineering, and risk management for engineers, to logistics.[See table]
- Optional projects can be taken to study a subject or greater depth, and such projects may be undertaken in conjunction with the student’s industrial sponsor. One of the optional papers, called Work-Based Learning, is aligned to the MEngS professional competencies, and this helps students start preparing towards CEng.

<table>
<thead>
<tr>
<th>Core Papers</th>
<th>Elective Papers</th>
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<tbody>
<tr>
<td>Project Management 1</td>
<td>Cost Engineering</td>
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<tr>
<td>Project Management 2</td>
<td>Engineering Risk Management</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>Work Based Learning</td>
</tr>
<tr>
<td>Administration</td>
<td>Industry Based Project</td>
</tr>
<tr>
<td>Construction Management</td>
<td>Post Management</td>
</tr>
<tr>
<td>Engineering Construction</td>
<td>Logistics</td>
</tr>
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</table>

Who is the programme for?

For individuals pursuing a career in the construction industry who are looking to acquire in-depth knowledge and skills in subject areas related to construction management.

The programme is designed for individuals with some industrial experience, who already have a bachelor degree or equivalent. Typically people attracted to the programme have worked for a few years in the construction environment, and are looking to acquire new skills for the next career step. Others are seeking to change the direction of their career or to supplement their academic credentials.

The programme is relevant for people in all construction sectors, from the infrastructure, engineering and building sectors. It is equally relevant for individuals working for constructors, owners, and professional service providers.

Why undertake a Master in Engineering Studies degree specialising in Construction Management?

Graduates from the programme are confident women and men, equipped with skills and knowledge to meet the challenges they will face in their future careers. They can expect to:
- have well developed critical thinking skills.
- have knowledge of new concepts from leading research.
- have developed a range of management skills, approaches and techniques.
- be attractive to employers who are looking for engineers who are passionate about engineering, and have taken necessary steps to complement their technical training with a management qualification.

Where, When and How do I find out?

- There are two enrolments each year at the University of Auckland, with semesters starting in March and July.
- Each Semester is 12 weeks of teaching.
- Classes are typically held weekly during semesters at the Engineering Faculty. A number of our papers are designed to

Industry and Academic Partners

MEngS Construction Management runs with the full support of leading construction and project management companies in New Zealand. The Department of Civil and Environmental Engineering at The University of Auckland has strong links to industry and is the pre-eminent provider of construction education in New Zealand. All programmes are designed and developed in co-operation with leading construction companies. This ensures graduates obtain the precise skills and expertise employers want.

The Fletcher Construction Company Ltd is supporting the programme, along with other leading construction companies.

For further information

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