CEM Graduate Program Structure

Department of Civil Engineering
Stellenbosch University
South Africa
Prof Jan Wium

Murray & Roberts Chair for Construction Engineering and Management
Cape Town 50 km Stellenbosch
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CEM History at Stellenbosch

• Department of Civil Engineering (1945)
  – Structural Engineering
  – Transportation Engineering
  – Water Engineering
  – Geotechnical Engineering

• CEM Chair established in January 2010
  – Murray & Roberts sponsorship
  – Module in final year under graduate
  – Graduate program (MSc/PhD)
The field of Construction Engineering and Management

Financier

Operator

Owner

Implementer

Developer
Post graduate program aims:

| Problem solving       | • Thesis                                    |
|                      | • Monthly: problem identification, steps, solutions |
| Exposure to practice | • Work in practice                          |
|                      | • Interaction with practitioners through open courses |
| Beyond the normal    | • International exposure                    |
|                      | • *Multi-disciplinary group work*            |
Post graduate program requirements

• Masters degree program
• PhD program
• Mid to advanced career management program
Post graduate program structure

• Ideal MSc :
  - MEng : Course based (65%) with research project (35%)
    • Part time
    • Full time

• Alternative MSc offered :
  - MEng : Research based (30% course based credits as pre-requisite for 100% thesis)
    • Full time

• PhD : Following MEng : 100% research based

• Advanced career (4 weeks intensive)
Course requirements:

**Management**

- Infrastructure planning
- Leadership and strategic management
- Construction economics and macro industry drivers
- Entrepreneurship and business ethics
- Procurement models
- Construction contracts
- Variations and change impact analysis, arbitration and mediation
- Project management and support services – project control, reporting and earned value, configuration control, project set-up, project close-out
Course requirements: Management (cont.)

• Financial management – accounting practices, tax, project finance, capital budgeting

• Decision and risk - risk management, quantitative risk analysis, authority frameworks, business process, business continuity, disaster recovery, risk based audit

• Insurance – adequacy of assets and liability cover, contractors all risk, professional indemnity, claims management, performance bonds, guarantees and warrantees.

• Corporate Governance – internal audit, board structures, project steering committees
Course requirements:

Construction Engineering

• Advanced construction methods – industrial design, temporary works, design build integration, modularisation, constructability, new materials and technology

• Innovation and technology management – emerging global trends, value engineering

• Quality control and assurance

• Health, Safety, Environment and Community

• Informatics – construction and project management systems
Course requirements:

Construction Engineering (cont.)

- **Facility management** – plant and equipment, operations and maintenance
- **Infrastructure development** – public infrastructure, buildings, industrial development
## Courses & Course components

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<th>Courses &amp; Course components</th>
<th>Client</th>
<th>Designer</th>
<th>Contractor</th>
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<td>Strategic &amp; System management</td>
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<td>Project management</td>
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<td>Financial &amp; Economic management</td>
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<td>Construction contract law</td>
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<td>Construction risk management</td>
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<td>Project procurement (+PPP)</td>
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<td>Construction management : Production &amp; Construction</td>
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<td>Infrastructure asset management</td>
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<td><strong>Human Resource management</strong></td>
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Teaching and learning

• Ideal:
  – Combination of:
    • Formal teaching with ample interaction and group discussions
    • Group work and comprehensive self study assignments
Research

• Masters :
  – Solving industry problems
  – Application of available knowledge to local industry
  – Collaboration with industry required
    • The role of questionnaires (?) (Limited success)
    • Support needed of a number of industry firms

• PhD :
  – Fundamental research
Mid career advanced management course ("CMP")

- Middle management programme for Engineers & other related practitioners
- Annual : 4 weeks intensive course
- Participants : 10-15 years experience
- Since 1976 (bi-annually) (annually since 2007)
Stellenbosch University

The End