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Didactical Activities Using Contemporary Learning Methodologies and Materials:

MSc SUSTAINABLE ENGINEERING: FACULTY OF ENGINEERING, UNIVERSITY OF STRATHCLYDE GLASGOW

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Context

Founded 18th Century (1796) - “A Place for Useful Learning” John Anderson (Scottish Enlightenment)

4 Faculties (Science, Business, Humanities & Social Science, Engineering)

Engagement with business and industry, and international academic partners, to address global challenges.
2015 brought the official opening of the University’s Technology and Innovation Centre (TIC), where many of our engineering researchers are now based. At £90 million, the project is Strathclyde’s single-biggest investment in our research and technology collaboration capacity. TIC is a hub for world-leading research, transforming the way academics, business, academia and the public sector collaborate. Up to 1,200 researchers, engineers and project managers from academia, industry and the public sector will work side-by-side in the heart of Glasgow. The Queen officially opened the building in July 2015.
Faculty of Engineering

Undergraduate Students
- Over 4000 undergraduate students
- Over 40 undergraduate degree courses
- All established courses professionally accredited
- Five of the top eight UK engineering UG courses (ranked by UCAS tariff points)

Postgraduate Students
- Over 1400 postgraduate students
- 800 taught postgraduate students
- Over 40 taught (MSc) degrees
- Almost 700 postgraduate research students
- PhD, EngD, MPhil, MRes
Sustainable Engineering Integrated Programme

The programme, established 15 years ago, through EPSRC funding, recognizes the need for integrated PGT activity that can respond to SD challenges (WCED, 1987), within multiple MSc courses offered from a range of the Faculty’s departments. Close engagement with industry and practice.

Graduated around 700 students (around 60% international students).

Generates £0.5 - £0.75M annually in fee income.

Courses:
- contain core (Faculty-wide) modules imparting key skills and knowledge that are key to the program
- contain subject-specific (specialist) modules
- have strong industrial links and involvement within group and individual project work
- offer cross-disciplinary opportunities
Programme MSc Courses 2016/17

Architecture & Ecology (Glasgow/Arizona)

Chemical Processing

Offshore Renewable Energy

Renewable Energy Systems and the Environment
Sustainable Engineering: Architecture and Ecology

- **Study mode and duration:**
  - MSc: 12 months full-time;
  - PgDip: 9 months full-time;
  - PgCert: 6 months full-time

- **Start date:** September 2016

- **International experience:** Arizona, USA
Structure

Part A: Instructional Modules
- Compulsory module in Sustainability
- At least two optional modules (from environmental impact assessment, project management, information management, design management, risk management, finance)
- At least three pathway modules (e.g. ecology and the built environment, energy resources and policy, Arcology (at Arcosanti), urban design theory, etc.)

Part B: Cross-disciplinary Group Project Work
- Groups of students from different themes tackle a practical problem with industrial involvement

Part C: Individual Project Assignment
- MSc students prepare a thesis for submission – with possible industrial involvement
Course content

Semester 1

Sustainability
This class will provide you with an understanding of the concepts of sustainability and sustainable development. The social, environmental and economic impact of development strategies will be identified and the mitigation of negative impacts discussed. The class will cover:
- Shifting world views
- Green politics
- Green Perspectives
- Climate change
- Sustainable development
- Limits to growth

Urban Theory
This class will develop your knowledge of the theoretical debate around urban form in relation to economic, environmental, cultural issues and social issues. It’ll cover:
- Historic and contemporary issues of urban theory
- The impact of urban theories on our cities and hinterlands
- Repercussions on lifestyles and sustainability

Energy Resources & Policy
You’ll gain an understanding of current trends in the energy market, and will enable a critical evaluation of emerging ideas, technologies and policies, particularly in relation to new and renewable energy supply systems. We’ll cover:
- Historical trends in energy production
- Nuclear plants
- Renewable energy sources
- Energy efficiency measures
- The transport sector
- Policy issues

Design Management
This class will provide a structured introduction to the design management process. Issues and tools. It’ll cover:
- Organisation structures for effective design
- Design models, approaches and methods
- The importance of costs and good design
- Innovation in design management
- Design performance

Information Management
You’ll be introduced to information management and develop basic skills in information storage and retrieval. We’ll cover:
- Modelling and using information
- Representing information
- Computer software packages relevant to industry
- Information storage and retrieval, acquisition and use
- Basic skills in developing information systems

Project Management
You’ll gain project management skills with particular emphasis on the effective and efficient use of resources. The class will cover:
- Project management techniques and project control
- Project teams; project features; project constraints and resources; quality assurance
- Presentation techniques as used in industry
- Budgetary control including cash flow, financial borrowing and investment
Semester 2

Arcology

You'll gain a critical understanding of the relationship between architecture and the earth's ecology, as developed at the urban laboratory Arcosanti in central Arizona, USA. The class will cover:

- the historical work of Paolo Soleri, including early examples of bioclimatic architecture
- the Arcology Theory: urban design as human ecology
- construction techniques and environmental strategies at Arcosanti
- lean alternatives to urban sprawl
- principles of ecological design in action

Group Project

You'll work collaboratively with students from different themes to develop solutions for specific projects addressing social, economic, or environmental aspects of sustainability within a practice-based environment.
Teaching Methods

Teaching methods include:
- Traditional lectures & seminar discussions
- Workshops
- Field trips/industry-based case studies
- Students presentations/reviews/conference
- Computer-aided learning (VLE)
Group Projects

MSc courses are constructed on a blend of specialist and generic modules delivered in part through the University’s Virtual Learning Environment (VLE), and within industry-based group projects.

Projects are key opportunities for industrial involvement in courses and knowledge exchange.

Results of the project work are presented to delegates at an annual student conference.

Industrial Links
Annual Project Conference

Annual event at which students present the outcomes of their group work.
Generally these will include a significant degree of analysis, simulation and/or experimental work.
The completed projects are presented to an invited audience of industrialists, architects, engineers, fellow students and staff.
AB 975 – Sustainability Module

The module integrates an understanding of sustainability and sustainable development with ideas on social, environmental & economic impact and impact mitigation.

It blends face-to-face communication between staff and students with information communication technologies via the university’s virtual learning environment (VLE).
AB 975 – Sustainability Module

Learning outcomes:

- Understand the concept of social, environmental, and economic sustainability
- Discuss population, urban, and economic growth strategies and their impacts
- Working interactively within a virtual learning environment to develop and communicate an understanding and awareness of these
AB 975 – Sustainability

Assessment:

Based on course work:

Tasks related to the VLE (40%)

Research paper (60%)