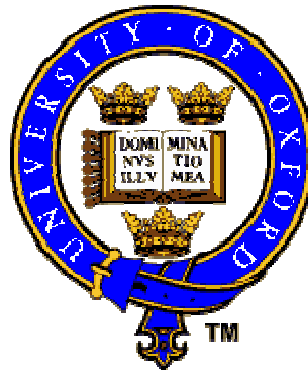


RAEng Visiting Professorship in Engineering Design for Sustainable Development

RH Booth (RC Darton)

University of Oxford

Department of Engineering Science



Engineering at Oxford

- **Integrated Engineering Science Department, with
*Civil, Electrical, Information, Mechanical, Chemical***
- **4 year course to Masters level**
- **624 students in total at present (all branches)**

First 2 years are general

Two major courses in 3rd year

More specialisation in final year

**Needed to integrate new subject in to
the existing course structure.**

Technical outline years 1 - 3

- 1. Four lectures to 2nd Year (3 times)**
A case study in sustainable energy
- 2. 1 week course work module to 2nd year (twice)**
‘Energy & the Environment’
- 3. Year 3 Design project (twice):**
Hydrogen for fuel cell powered bus fleet.
- 4. Four lectures & tutorial to year 4 Chem Eng:**
 - *Life Cycle Assessment - a Tool for Sustainable Development?*
 - *Fuel Cells – a Process Engineering Challenge.*

All material developed & presented by the VP
Optional modules, ~ 20 students per module

A case study on Sustainable Energy

Four lectures to year 2 :

- Introduction to Sustainable Development.**
- Scope for Renewable Energy.**
- Clean Cars & Renewable Fuels.**
- A Sustainable Energy Future?**

**Course content revised each year,
eg increased emphasis on social issues.**

1. Introduction to Sustainable Development

- **Background and definitions**
- **Issues**
- **Review of some publications**
- **The changing role for engineers**
- **Global warming**
- **Sustainability indicators**

2. Scope for Renewable Energy

- **World energy use: *Supply and demand, economics.***
- **Potential for Renewables: *Availability, utilisation, status***
- **Economics: *Learning curves, current & future energy costs.***

3. Clean cars & Renewable Fuels

- **Environmental issues**
- **Trends in car emissions**
- **Efficiency of current designs**
- **Hybrid vehicles (incl. fuel cells & hydrogen)**
- **Examples of ‘clean’ cars**
- **Renewable fuels**

Need to change both car design concept and fuels.

4. A Sustainable Energy Future?

- **Scope for energy efficiency & renewable energy**
- **Environmental impacts**
- **Intermittency**
- **Changes in the power market**
- **Scenario analysis (*Fossil resources, nuclear*)**
- **Energy company activities**
- **Conclusions:**
 - Sustainable use of energy is achievable – if we have the will!!*

Energy & the Environment

1 week course work module to 2nd year

- **Introduction to Sustainable Development,**
- **Climate Change,**
- **Conventional and Renewable Energy technologies,**
- **Conservation,**
- **Fuel cells and hydrogen economy,**
- **Project case study – Jeff Hulse’s Byker project**
- **Scenario planning and strategy.**

Includes 3 guest speakers

Visit to Sue Roaf’s eco-house

Lectures followed by tutorials or role play

Targets for Years 4 & 5

- 1. VP disengagement –**
Lecturing to be handed over to full time staff by end year 5.
Reducing from 50 hours / year to 30 to 20.
- 2. Integrate Year 2 lectures in to core course**
8 lectures: ‘Environment & Sustainability’,
VP plus RC Darton – college tutors.
- 3. Remove duplication from CWM & year 4.**
- 4. Assessing Sustainability of year 3 projects.**
Lecture plus methodology
- 5. Dissemination.**

Assessment of outcomes

+ ve feedback from students,

Not 'Doom & gloom!'

CWM oversubscribed

Numbers taking the options increasing.

+ ve support from mentor

Valuable support in developing materials.

Full time on CWMs.

3 months at Sydney University – similar course.

Developing own lecture materials for 2001/02

+ ve support from staff

Accepted as important part of the course

Year 2 Case study in the core course 2001/02,

(expanded to 8 lectures).

Year 4 fuels cells lecture and tutorial handed over.