VPs Motivate a New Degree Programme in Engineering Design

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Our Visiting Professors

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** Indicates currently in post*

Current Structure of VP Programme

- Lectures showing the nature of Design in the VP's Industries
- Visits from recent graduates working for VPs to show what it is like working in industry
- Design Seminars where multi-disciplinary teams of students attempt conceptual designs in VP's area
- Group multi-disciplinary Design project in year 3
- Annual Public Lecture on Design
- Dinner and Whisky afterwards

Dinner and Whisky – the Idea

- Bristol offers: Aero, Civil, Mechanical, Electrical & Electronic Engineering, Computer Science and Engineering Mathematics
- Industry needs v.bright leaders who understand all the engineering disciplines and how the world works
- The idea:

Why doesn't Bristol offer to help form such people

An Elite Engineering Course at Bristol

- How do we get such a course to run
  - Dept. X already produces an Elite?
  - Where do we get the extra money to expand?
  - The site is already full, we have no space?
  - We don't need it!

- What should an Elite course in Engineering be like?

So what exactly did the VPs want?

- Leadership
- Multi-disciplinary Engineering skills
- Strong theoretical understanding
- Developed modelling skills
- A specialisation
- Economics, business, environmental and political understandings

- So how do you put all this into an Engineering course!

The Design Brief

- Attract top quality students
- General Engineering Degree
- All students must have a specialist skill
- Virtually no new course units must be required
- Problems:
  - All our degrees are specialist not general
  - After the first year our course units are for specialists but these students cannot be as specialist if they are to be generalists

Structure of the Degree Programme

Year 1	Year 2	Year 3	Year 4	Year 5
Design & Computing (20)	Design Project (30)	Industrial	Design Project (30)	Design Project (30)
Research & Communications (20)	Research & Communications (10)	placement	Research & Communications (20)	Research & Communications (20)
Maths with Maple (20)	Maths with Matlab (20)	year	Business Processes (10)	
Fluids &Thermo (20)	Product Realisation (20)	Industrial	Open Units (10/20)	Open Units (20/30)
Engineering Physics (20)		placement		
Linear Circuits & Electronics (20)	Specialist Streams (40)	year	Specialist Streams (40/50)	Specialist Streams (40/50)

MEng. in Engineering Design

A Degree Programme for the Engineer Leaders of the Future

Outcome of an Undergraduate Degree

- I suggest that the residual value of any educational process consists of:
  - a set of concepts
  - a set of ways of thinking
  - some personal skills for communicating
  - some manual skills
  - a set of personal values

What the VPs & Industry want

- Leadership
- Multi-disciplinary Engineering skills
- Strong theoretical understanding
- Developed modelling skills
- A specialisation
- Economics, business, environmental and political understandings

- We deliver or enhance this through “Research & Communication”

The Research & Communication Unit

- Runs right through the course
- Economics, business, environmental and political understandings taught by our Management Group
- Understandings
- Back of the Envelope Calculations

Understandings

The idea is:

We have on the web a list of all the key understandings in all the engineering subjects we teach

Associated with each we have pointers to where the students can find out more – it is intended to do this through a special search engine

Students research the understandings and then teach their fellow students, providing resources for the students to learn from. Finally they write questions to find out if their fellow students do understand

Staff also write questions and provide material

Back of the Envelope Modelling

- Estimate how long it would take a cyclist on a static cycle linked to a generator to boil a kettle of water.
- Estimate the lightest and so cheapest rocket that could be used to put a 10kg satellite into Earth orbit.
- What is the power output of *this* motor

- Both Back of the envelope examples and Understandings questions are very difficult to find. Please could VPs help by offering ideas to the author.

Recruitment

- Lots of hype about leaders of the future
- 20 applicants per day with 4 sets of interviewers
- Maths tests
- 3/4 hr interview with an industrial partner based on:
  - Leadership potential
  - Engineering Motivation
  - Technical competence in any subject
  - Physical understanding

Role of Sponsors

- Interview candidates
- Summer placements
- suggest projects
- help us to develop chosen projects
- Come and work with students on projects
- Enable the realisation of the projects

Industrial Placement Year

- During the Industrial Placement year the students will:
  - Work in a company aligned to their specialist interest. This will help bridge the difference between specialists, for the lectures are arranged and the Engineering Design students
  - Take tests on key concepts and methods using internet testing
  - write an end of year report to summarise their learning.

Conclusions

- Outstanding set of students
- Attitude of interest and drive
- Willing to help
- Companies are all thrilled by the students
- All placed for the summer except one

- Looks good so far but translating the idea into practice still leaves many problems to be overcome