Energy Engineering
new discipline or pick and mix?

ISEE Conference 2010
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Overview

- Background
  - UCC M.Eng.Sc in Sustainable Energy 2005 - 2010
  - UCC B.E. Energy 2008 - 2010
- BE Programme Structure
  - Year 1 *Underpinning Science*
  - Year 2 – 3 *Engineering Fundamentals*
  - Year 4 *Energy Engineering*
- New Discipline or Pick and Mix?
  - Is energy engineering distinct?
  - Building services engineering, environmental engineering
- Conclusion

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MEngSc (Sustainable Energy)

- Background
  - Growing no.s of Research MEngSc in Sustainable Energy
  - Builds on research track record in sustainable energy
  - First students 2005 / 2006
- Growth
  - 20 applicants in 2005 to 290 applicants in 2009!
  - Intake 25 students per annum
  - Majority 1H or 2H1 with experience
- Reasons for Success
  - Timeliness and quality
  - 1st mover advantage

MEngSc (Sustainable Energy)

Taught Modules (50 credits)

- Wind Energy
- Sustainable Energy
- Hydro & Ocean Energy
- Power Electronics
- Energy in Buildings
- Energy Sys in Buildings
- Elec Power Systems
- Energy Systems Modelling
- Biomass Energy
- Solar & Geothermal Energy

Preliminary Research Project (10 credits)

Minor Research Thesis (30 credits)

BE (Energy)

- Background
  - MEngSc (Sustainable Energy) pointed to demand
  - Developed in tandem with Bologna and restructuring
  - First students 2008 / 2009
- Growth
  - 25 students in 2008 min points 530
  - 37 students in 2009 min points 510
- Reasons for Success
  - Timeliness and quality
  - 1st mover advantage

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1st Year – Underpinning Science

MA1008 Calculus and Linear Algebra for Engineers (10)

AM1023 Mechanics for Energy Engineers (5)

PY1006 Physics for Engineers II (5)

PY1007 Physics for Engineers I (5)

CM1001 Chemistry for Engineers (5)

CE1002 Engineering Graphics (5)

CE1003 Engineering Structures (5)

CE1005 Engineering Computation I (5)

EE1001 Circuit Analysis I (10)

NE1001 Intro to Energy Engineering & Energy Policy (5)

2nd Year – Engineering Fundamentals

AM2032 Numerical Methods and Programming (5)

CE2001 Solid and Structural Mechanics I (5)

CE2003 Fluids I (5)

CE2004 Fluids II (5)

EE2001 Power Engineering (10)

EE2007 Electronic Circuits (5)

EE2008 Signals & Systems (10)

ME2002 Engineering Thermodynamics (5)

PE2003 Heat transfer (5)

PE2004 Technical Communication Skills (5)

3rd Year – Engineering Fundamentals

EE3001 Control Engineering (10)

EE3011 Power Electronics (5)

EE3012 Electrical Machines (5)

ME3003 Mechanical Systems (5)

ME3004 Applied Thermodynamics & Work Transfer (5)

CE3006 Construction Project Management (5)

CE3007 Hydraulics I (5)

CE3010 Energy in Buildings (5)

CE3016 Sustainable Energy (5)

CE4011 Energy in Transportation (5)

NE3001 Primary Energy Engineering (5)

4th Year – Energy Engineering

NE4001 Energy Systems Analysis (5)

NE4002 Energy Engineering in the Commercial World (5)

NE4003 Energy Engineering Research Project (10)

EE4001 Applied Power Electronics & Motion Control (5)

EE4002 Control Engineering (5)

EE4010 Electrical and Electronic Power Systems (5)

ME4001 Power Plant Design and Operation (5 credits)

CE4016 Energy Systems in Buildings (5 credits)

CE4019 CAD (Heating, Ventilation and Air Conditioning) (5)

and modules to the value of 10 credits from the following :

NE4004 Wind Energy

NE4005 Ocean Energy (5)

NE4006 Biomass Energy (5)

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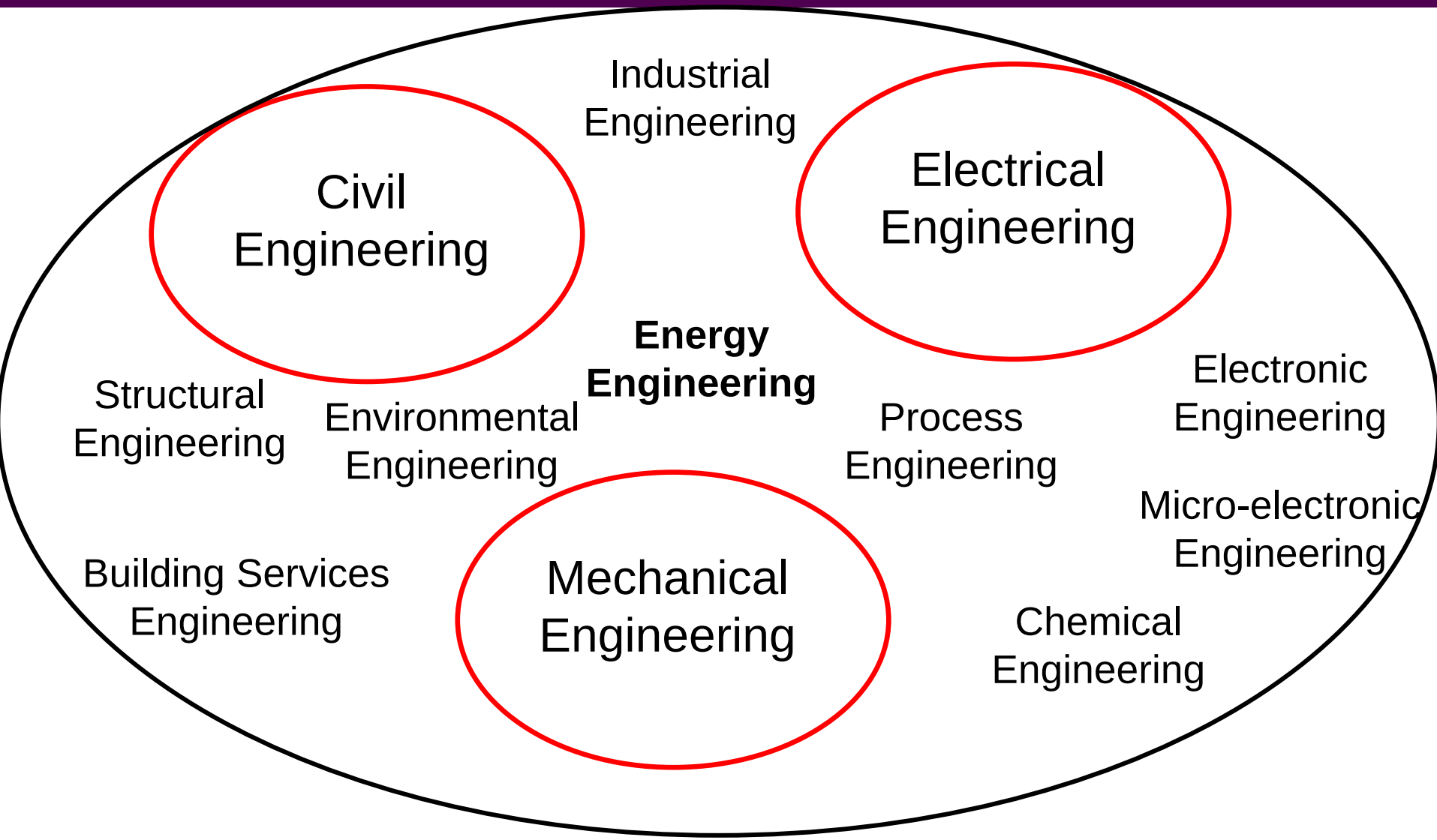
Is Energy Engineering Distinct?

- Definition
  - Energy engineering involves sourcing, assessing, designing, converting, transmitting and supplying useful energy to meet our needs for **electricity**, **transportation** and **heating and cooling**.
- Distinctness
  - Electrical engineers develop expertise in electricity
  - Civil engineers develop expertise in transportation
  - Mechanical engineers develop expertise in heating and cooling
  - **Energy engineers alone develop expertise in all three!**
  - 5th Year will build on this as starting point.
  - Could be structured in terms of 2 + 3 or 3 + 2

Is Energy Engineering a Discipline?



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Conclusion

- Energy engineering is distinct
- It draws on science and fundamental engineering (as all engineering disciplines)
- The graduate engineer will have demonstrated an ability to problem solve and design in **electricity**, **transportation** and **heating and cooling**.
- If energy engineering is not a new discipline, then maybe engineering itself is the only discipline.

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