



UNIVERSITY OF LEEDS

# This is engineering

## Building the future

Professor Barbara Evans

University of Leeds

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**ice**

Institution of Civil Engineers



# What type of engineering?

- ▶ Civil engineering....
- ▶ Structural and architectural engineering...
- ▶ Mechanical engineering...
- ▶ Electrical and electronic engineering...
- ▶ Process and chemical engineering...
- ▶ Automotive engineering...
- ▶ Aeronautical engineering...
- ▶ Marine engineering...
- ▶ Medical and bio-medical engineering...



# Civil engineering is...

- ▶ ...about helping people and shaping the world; harnessing the forces of nature in the service of development.
- ▶ Civil engineers keep the world:
  - ▶ Switched on and powered up: supplying electricity and gas...
  - ▶ Alive and well: delivering clean water and sanitation...
  - ▶ On the move: building and maintaining roads, bridges, railways, airports, canals, ports...
  - ▶ Sheltered: designing and building the cities, homes and workplaces of the future...
  - ▶ Safe from catastrophe: providing flood alleviation and protection, earthquake resilience, protection from cyclones and tsunamis...
  - ▶ In with a chance: finding ways to capture value from waste, control greenhouse gas emissions and solve the problems of pollution.



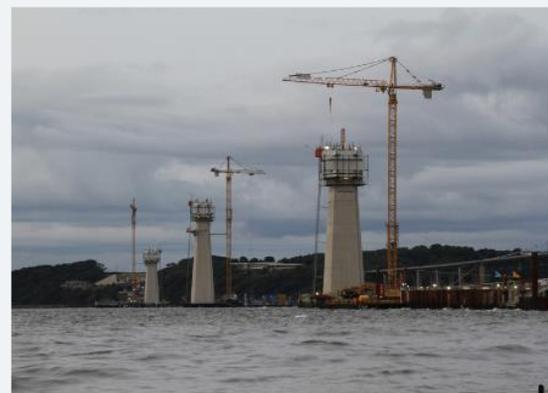
### Rebuilding a better Haiti

Civil engineers were vital in helping Haiti recover from disaster



### Delta Works sea defences

Sea defences are crucial to protecting communities across the Netherlands



### Queensferry Crossing bridge

Scotland's Queensferry Crossing will be the longest three-tower, cable-stayed bridge in the world



### Burj Khalifa

The Burj Khalifa is nearly 200m taller than the Tokyo Skytree, the world's second tallest building



### Queen Elizabeth Olympic Park

London's Olympic Park is the same size as the city's famous Hyde Park



### Panama Canal

The Panama Canal, at 77km long, is one of the world's greatest engineering achievements



# Heard of these engineers?

**Thomas Telford**  
1757-1834  
Canal Builder

Ellesmere Canal

Pont y Scyllt  
Aqueduct

**Isambard  
Kingdom  
Brunel**

1806-1859  
SS Great Britain

Great Western  
Railway

**Sir John Armitt**  
1946-

President 2012  
Olympic  
Delivery  
Authority

UK Railways

**Rowan Atkinson**  
1955-

MSc Electrical  
Engineering  
Oxford University

Began a PhD but  
got distracted!

**Sir Ove Nyquist  
Arup**  
1895-1988

Sydney Opera House  
London Zoo Penquin  
Pool

Ran his own  
company

**Hedy Lamarr**  
1914-2000

Invented a  
remote  
controlled  
comms system  
for the US Navy  
during WW2

**Emily Warren  
Roebing**  
1843-1903

First field  
engineer (Chief  
Engineer) for the  
Brooklyn Bridge

**Bill Nye**  
1955-

Mechanical  
Engineer at Boeing  
Corporation

“The Science  
Guy”

**Mate Rimac**  
1984-

Croatian innovator  
and entrepreneur

CEO of Rimac  
Automobile  
(electric cars)

**Kalpana Chawla**  
1962-2003

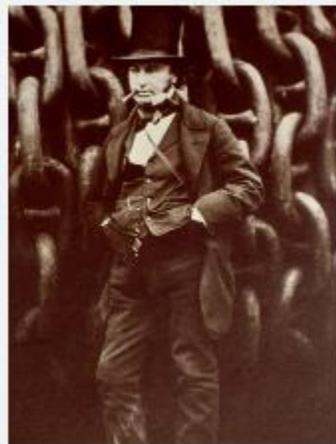
Astronaut, first  
flew on the  
Shuttle in 1997  
Died in the  
Columbia  
disaster

**Timnit Gebru**  
Dates unknown

Post doctoral  
researcher  
examining the  
the ethics of A.I.  
at Microsoft



# Heard of these engineers?





# Routes in to engineering: Apprenticeships

Apprenticeships allow you to work (and be paid), while getting a qualification. You'll usually be directly employed by a consultant, contractor or client organisation.

## Entry requirements

- ▶ For a level 3 Advanced Apprenticeship, you'll need
  - ▶ at least five GCSEs at A\*-C grades, including English, science and maths (6 or above).
- ▶ For a Higher Apprenticeship, or a Scottish Technical Apprenticeship, you would normally have completed either:
  - ▶ A level 3 Advanced Apprenticeship
  - ▶ A BTEC level 3 Diploma or Extended Diploma in Construction and the Built Environment - Civil Engineering, or
  - ▶ A-levels (including maths) or Scottish Highers



# Routes in to engineering: Higher education

If you've already passed a BTEC level 3 or have A-levels (in maths and physics), many colleges and some universities offer full- or part-time courses:

- ▶ Higher National Certificates (HNC) at level 4
- ▶ Higher National Diplomas (HND) at level 5
- ▶ Foundation degrees (level 5) in civil engineering

After completing an HND or foundation degree, you can go straight into a job. But there's often an opportunity to transfer to a university to take a one or two-year top-up degree to a BSc or BEng and become professionally qualified as an incorporated engineer (IEng).

## Typical Entry Requirements

- ▶ A BTEC level 3 Diploma or Extended Diploma in Construction and the Built Environment (Civil Engineering)
- ▶ A-levels (including maths)
- ▶ Scottish Highers



# Routes in to engineering: University

If you want to go to university you have three main types of course to choose from:

- ▶ a general engineering degree that lets you study a wider range of topics in the first and second year, before focusing on a specific subject/area
- ▶ a specialist engineering degree (ie civil engineering)
- ▶ a topic-specialised engineering degree (ie architectural or public health)

Types of degrees

- ▶ Three year BSc/BEng; Four-year MEng (or MA at Oxbridge)
- ▶ Sandwich, year abroad, year in industry

Things to think about

- ▶ Professionally accredited courses (look for JBM accreditation) and four years study for eligibility for professional Chartered Engineering status



# Engineering as a foundation: what will you study?

- ▶ Advanced applied mathematics, structural and stress analysis, hydraulics (open channels, pipes, airflows...), geotechnics, geology and hydrology, advanced materials science, economics, project and contract management, environmental assessment, surveying, GIS
- ▶ Modelling
  - ▶ Computational fluid dynamics
  - ▶ Finite element analysis
  - ▶ Multi-criteria statistical analysis
- ▶ Complex decision making and problem solving
- ▶ Working in teams
- ▶ Crossing disciplines
- ▶ Fieldwork and laboratory practical work
- ▶ An advanced design or research project in your final two years



# A career in unexpected places...





# A career in unexpected places...





# For more information:



<http://www.engc.org.uk/>



<https://www.ice.org.uk/>



<https://engineering.leeds.ac.uk/>



[https://engineering.leeds.ac.uk/staff/478/  
Professor\\_Barbara\\_Evans](https://engineering.leeds.ac.uk/staff/478/Professor_Barbara_Evans)

# Thank you