

CHEMICAL ENGINEERING



Branch Selection – 26th September 2007

OBJECTIVES OF THIS PRESENTATION

- to introduce chemical engineering
- to explain what chemical engineers do

What is Chemical Engineering?

The economic design, operation and management of **process** systems.

It has its foundation in:

- chemistry
- physics
- mathematics
- biological sciences
- economics

Processes

Chemical engineers are sometimes called *process* engineers.

They design, build and operate *processes*.

In a *process*, raw materials are converted by chemical and physical means to produce more valuable products, usually in a continuously-flowing stream.

raw materials



valuable products

Some examples of the process industries where chemical engineers work:

Oil refining	Refining of crude oil to produce petrol, other fuels, oils and feedstocks for the petrochemical industry
Petrochemicals	Processing of crude oil into plastics such as polythene, polystyrene, polypropylene
Chemicals	Making fertilisers, detergents, cosmetics
Pharmaceuticals	Making the medicines required by an expanding population worldwide.

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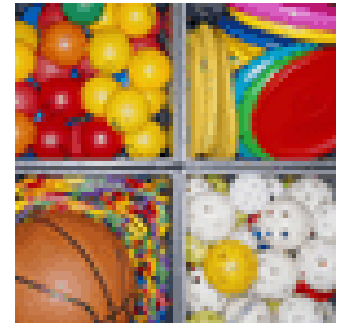
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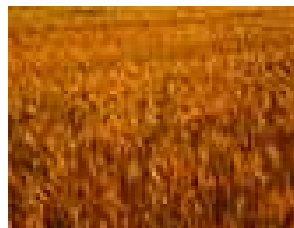
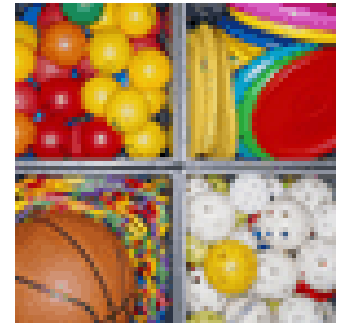
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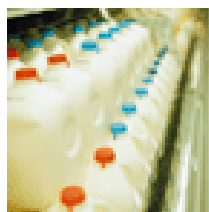
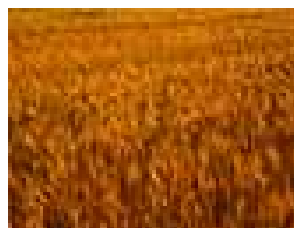
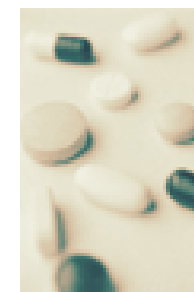
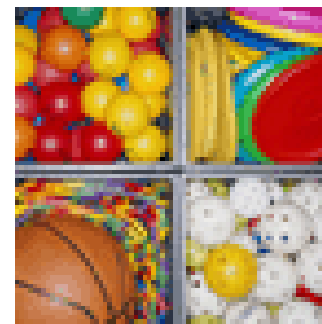
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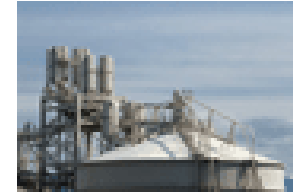
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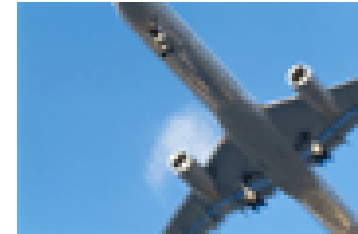
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Minerals	Processing bauxite ore to produce aluminium – used wherever we need a lightweight strong material or a good conductor of heat and electricity.
Food processing	Making beer from malted barley, hops and water. Making cheese, yogurt and dried milk from milk.
Environmental	Solving air and water pollution problems. Developing new processes with high efficiency and minimal impact of the environment.

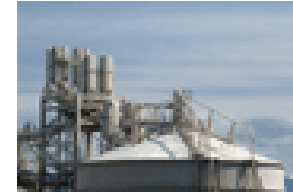
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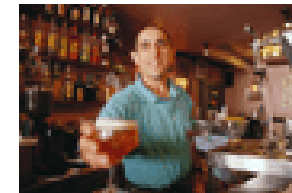
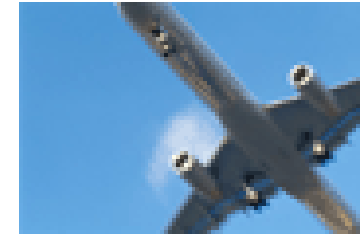
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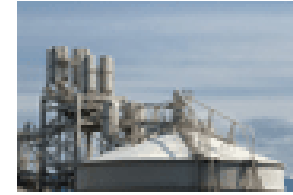
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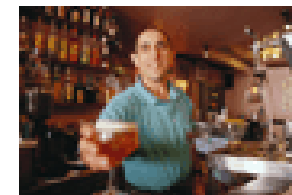
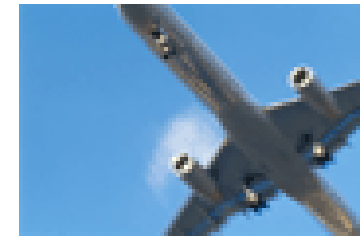
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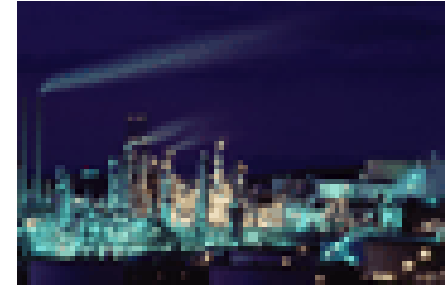
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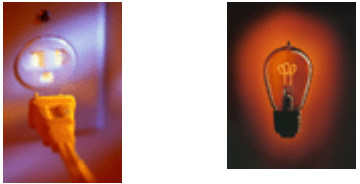


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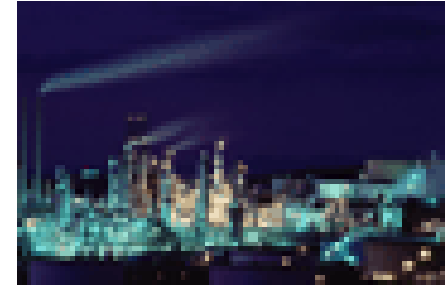
Energy	Developing new high efficiency, environmentally friendly processes for generation of electric power from fossil fuels.
Paper	Recovery and recycling of chemical used in breaking down wood into wood pulp for manufacture of paper.
Biotechnology	Developing processes for using renewable raw materials (e.g. plants) for manufacture of fuels, medicines, plastics, chemicals etc.

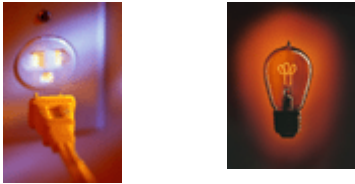

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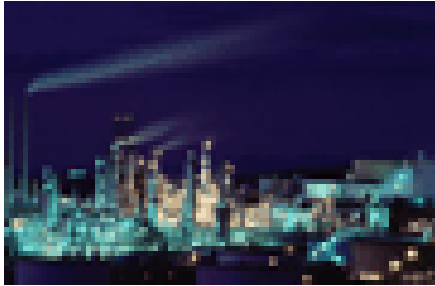


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Process engineer

Design Engineer

Research Engineer

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Process engineer –

Works on an existing process

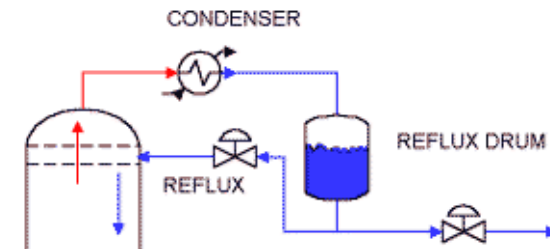
Maintains production

Solves problems (troubleshooting)

Works on ways of increasing production rates when required (de-bottlenecking)



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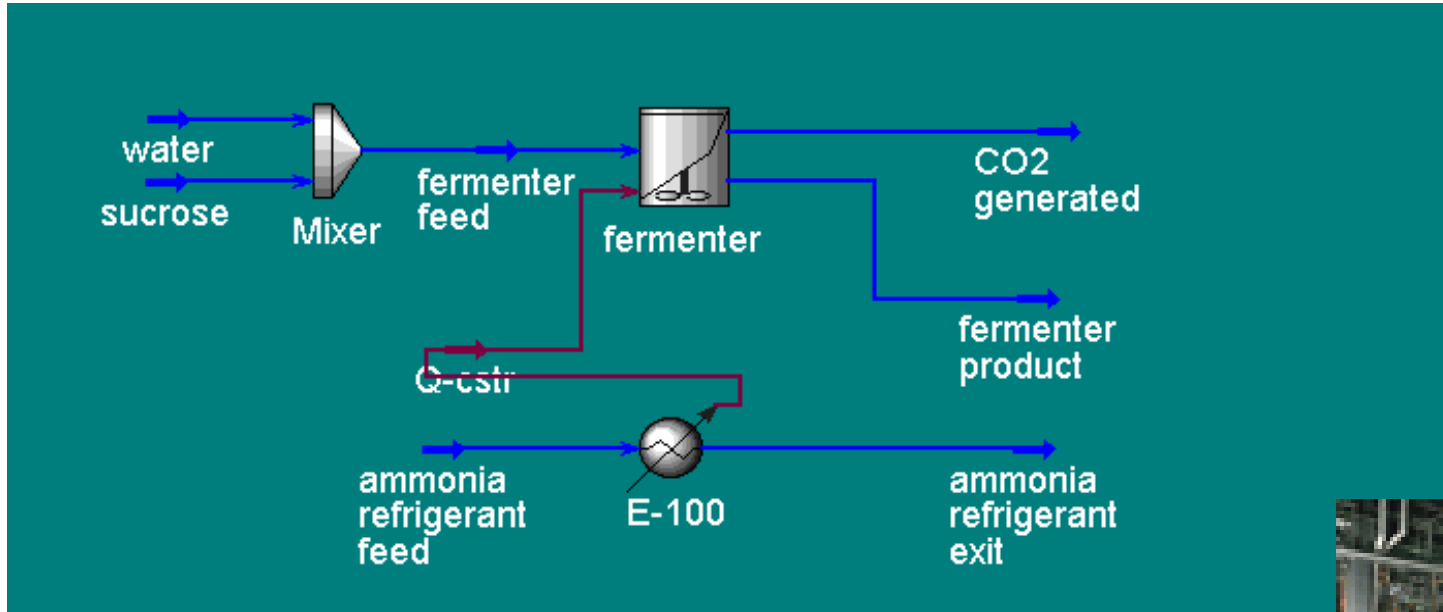
Design Engineer –

Designs **processes** and **equipment** for clients within or external to his own company.

Design must be safe, profitable and have minimal environmental impact.



What kind of jobs do chemical engineers do?



Research Engineer –

Invents new **products** and **processes**.

Improves efficiency, safety and environmental performance of existing processes.

Challenges facing chemical engineers in the 21st century

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Chemical engineers will expand on their existing skill areas into the following areas:

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Chemical engineers will expand on their existing skill areas into the following areas:

Smart Products

Development and manufacture of “smart” products –

Tailor-made products made sustainably using the most advanced science and technology.

Requiring the application of new techniques:

- Nanotechnology
- Biotechnology
- Clean technology

Challenges facing chemical engineers in the 21st century

Chemical engineers will expand on their existing skill areas into the following areas:

Biomanufacturing

Underpinning developments in

- biotechnology
- food processing
- pharmaceuticals

Requiring chemical engineering skills in scale-up, simulation, modelling and advanced control.

Challenges facing chemical engineers in the 21st century

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Clean technologies

Development of environmentally *clean* technologies for product manufacturing and power generation.

Challenges facing chemical engineers in the 21st century

Chemical engineers will expand on their existing skill areas into the following areas:

Sustainable manufacture

Develop processes for manufacturing existing and new products from renewable raw material sources.

Features of Chemical Engineering at Monash University

Common first year

Options:

Biotechnology

Nanotechnology

Sustainable Processing

Study abroad - UK and USA

Industrial placements

CHEMICAL ENGINEERING



Questions:

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