

Chemical Engineering: Scope and Career Opportunities

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What is Chemical Engineering?

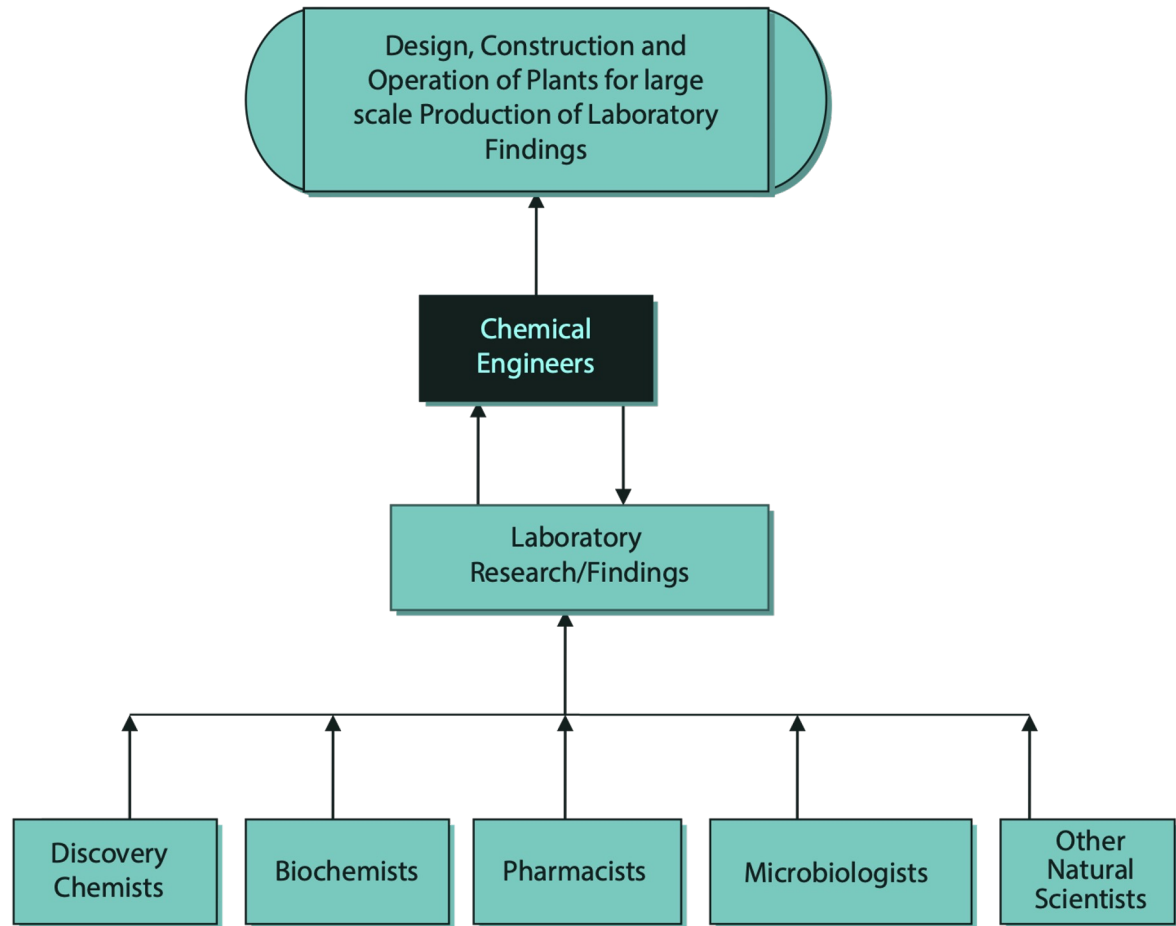
- branch of engineering concerned with the conceptual, front-end and detailed design, construction, and operation of technologies and plants that perform chemical reactions to solve practical problems or make useful products or provide chemical and environmental solutions for many societal needs.
- creatively combines the three basic physical sciences – *chemistry*, *physics*, and *biology* – along with *mathematics* to address the world's needs by
 - creating new technology
 - solving problems in existing technology

What is Chemical Engineering?

- **American Institute of Chemical Engineers (AIChE):** Chemical engineers use science and mathematics, especially chemistry, biochemistry, applied mathematics and engineering principles, to take laboratory or conceptual ideas and turn them into value added products in a cost effective, safe (including environmental) and cutting edge process. From the development of smaller, faster computer chips to innovations in recycling, treating disease, cleaning water, and generating energy, the processes and products that chemical engineers have helped create touch every aspect of our lives.

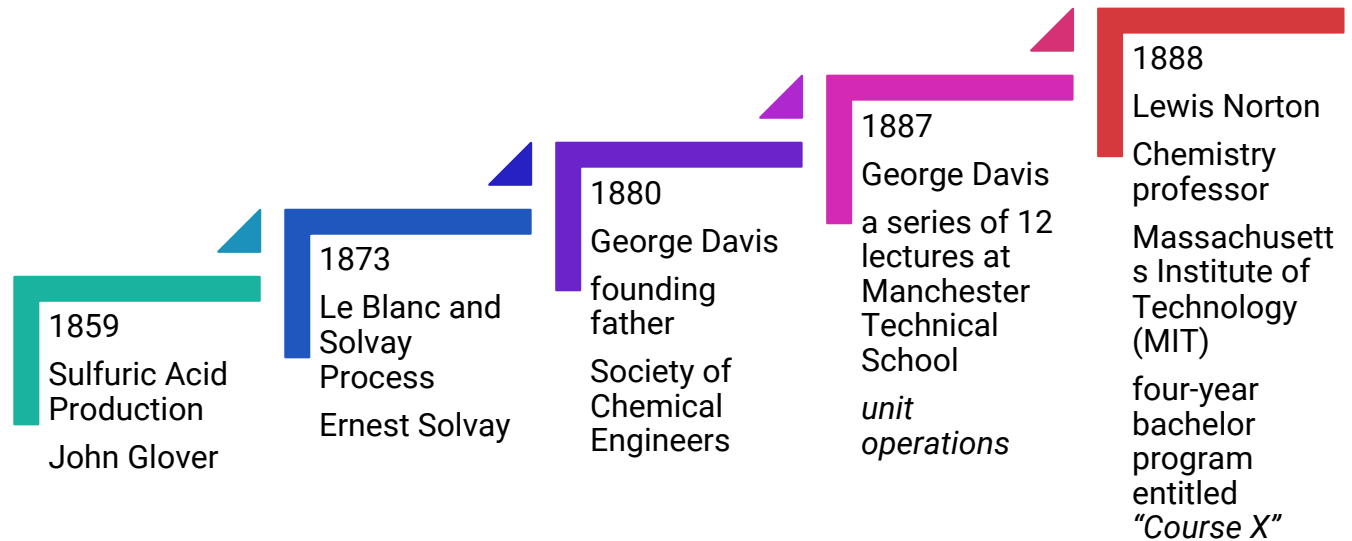
Introduction to Chemical Engineering: Tools for Today and Tomorrow by Solen & Harb, Wiley 2011.

Chemical Engineers

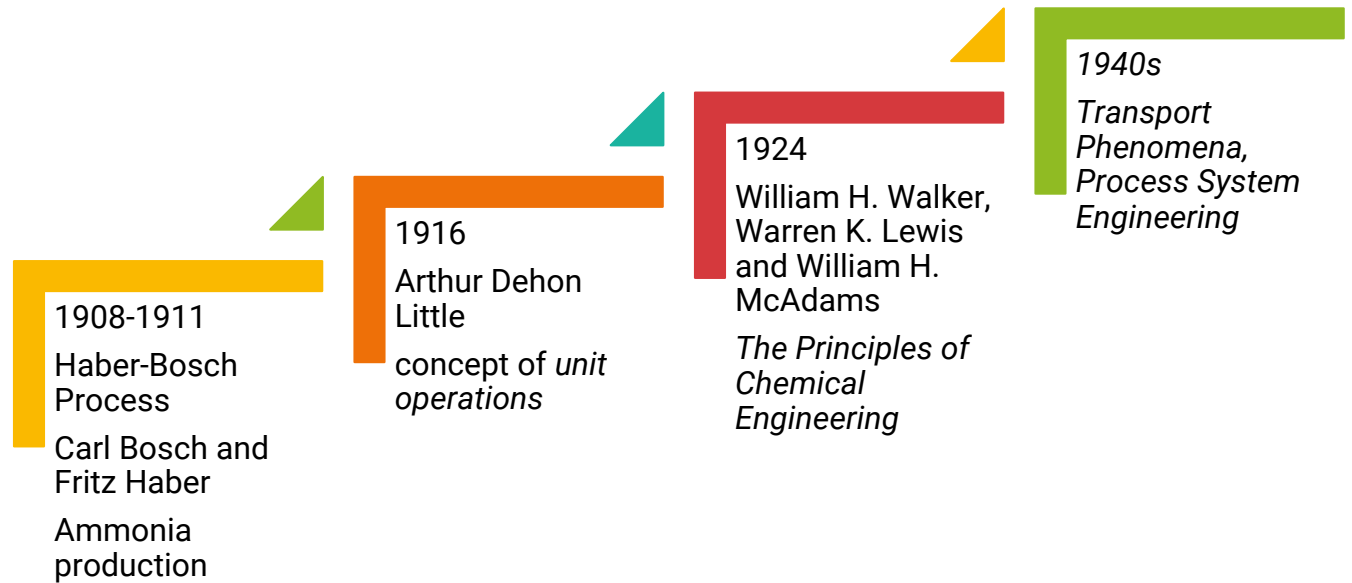


Introduction to Chemical Engineering by Uche Nnaji, Wiley 2019.

Emergence of Chemical Engineering



Emergence of Chemical Engineering



Professional Associations

- 1908 – the American Institute of Chemical Engineers (AIChE)
- 1922 – the UK Institution of Chemical Engineers (IChemE)
- 1947 - Indian Institute of Chemical Engineers (IICChE)

**A few
impactful
contribution
to the society
and mankind**

- Semiconductor Fabrication
- Medicines & Antibiotics
- Environmental Protection
- Crude Oil Processing
- Plastics
- Synthetic Fibers
- Synthetic Rubber
- Gases from Air
- Food
- Cleaner Energy
- Products for Growing Population

Grand Challenges

[The 2050 Challenge
– AIChE]

- 1. Make Solar Energy Economical**
- 2. Provide Energy from Fusion**
- 3. Develop Carbon Sequestration Methods**
- 4. Manage the Nitrogen Cycle**
- 5. Provide Access to Clean Water**
- 6. Restore and Improve Urban Infrastructure**
- 7. Advance Health Informatics**
- 8. Engineer Better Medicines**
- 9. Reverse – Engineer the Brain**
- 10. Prevent Nuclear Terror**
11. Secure Cyberspace
12. Enhance Virtual Reality
13. Advance Personalized Learning
- 14. Engineer the Tools of Scientific Discovery**

Fundamental Topics in Chemical Engineering

- Material balances
- Fluid mechanics
- Thermodynamics
- Heat transfer
- Mass transfer
- Reaction engineering
- Process control
- Plant Design & Economics
- Materials

Job opportunities

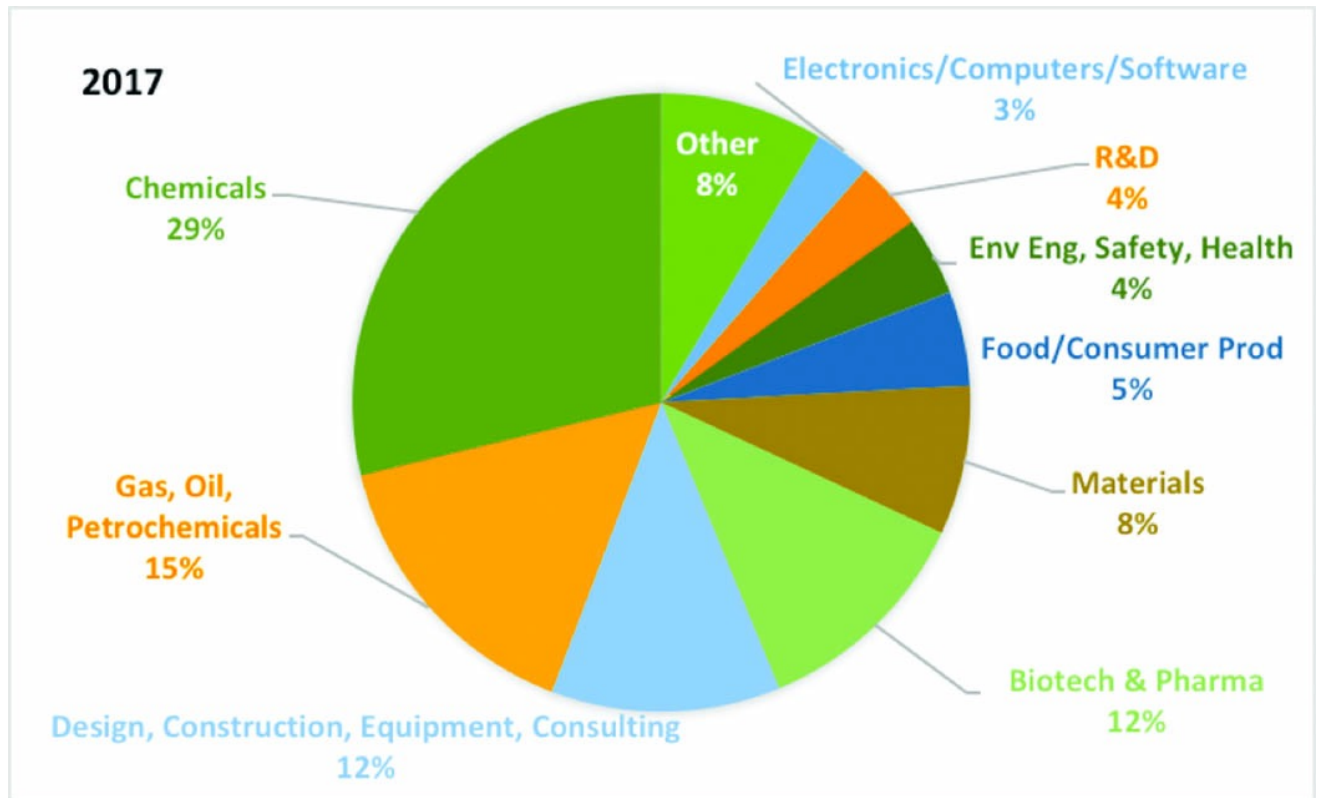


Image source: www.aiche.org

UK median salary by industry sector

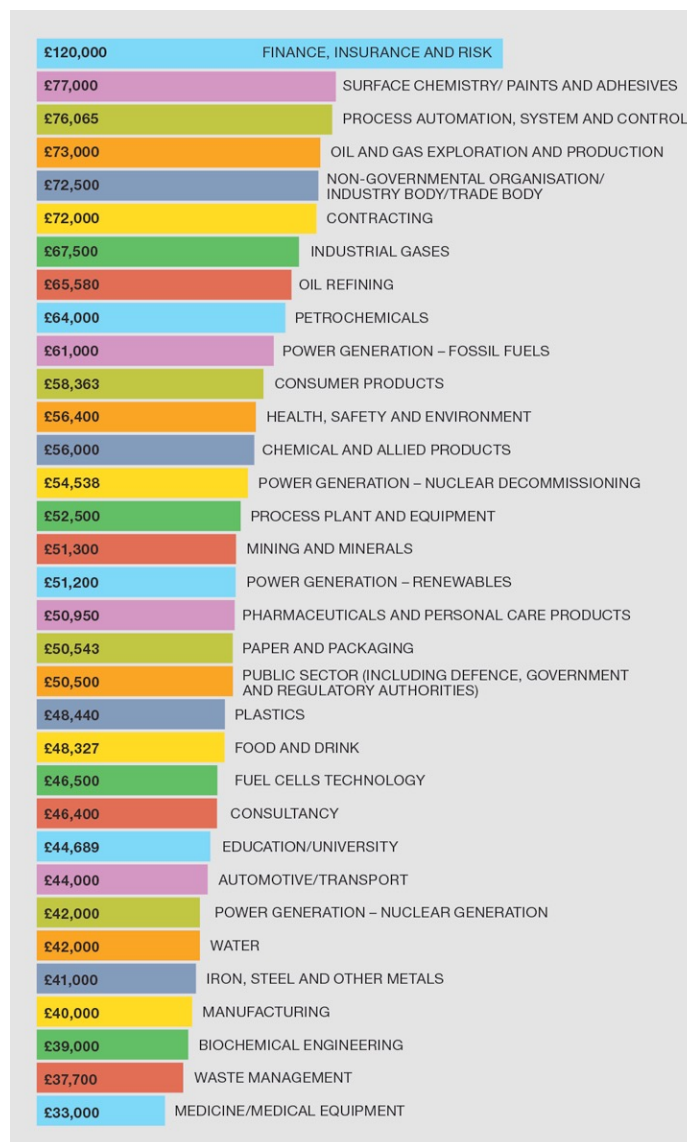


Figure source: www.thechemicalengineer.com

Thank you.

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<http://www.facweb.iitkgp.ac.in/~arnabatta>