WHAT CAN I DO WITH A MAJOR IN … CHEMICAL ENGINEERING

OCCUPATIONAL SUMMARY:
Design chemical plant equipment and devise processes for manufacturing chemicals and products, such as gasoline, synthetic rubber, plastics, detergents, cement, paper, and pulp, by applying principles and technology of chemistry, physics, and engineering.

EMPLOYMENT REQUIREMENTS: Considerable Job Preparation Needed
A bachelor's degree is the minimum formal education required. However, many employers also require graduate school and some require a Ph.D., M.D., or J.D. (law degree).

EMPLOYERS & SUGGESTED STRATEGY:
Please ask your Career Advisor (CDF) for identifying employers or additional resources for your occupation of choice.

Chemical industry including: Agricultural chemicals, Plastics, Industrial chemicals, Petroleum, Pharmaceutical, Cosmetic, Food processing, Atomic energy development, Environmental - Consulting organizations - Federal government including: Department of Energy, Environmental Protection Agency - Independent research institutes - Manufacturing plants including automotive, airplane, paper, microelectronics, textiles, metals, and rubber

Suggested Strategy: Take chemistry classes for electives to strengthen resume and develop excellent verbal and written communication and interpersonal skills. Acquire technical work experience through internships or co-ops during college years.

A DAY IN THE LIFE:
The headline of the brochure for the American Institute of Chemical Engineers states that chemical engineers are responsible for the production of items, “from microchips to potato chips.” Chemical engineers work in the chemical, fuel, aerospace, environmental, food, and pulp and paper industries, among many others. Responsibilities range from research and design to development, production, technical sales, and, for those with good communication skills, management. Chemical engineering is a problem-solving profession with a practical bias; expect to answer the question “how” more than any other. Chemical engineers translate the discoveries chemists make into real-world products. If a chemist invents a better fertilizer, for example, a chemical engineer might design the method to make mass production of that fertilizer possible. Much of this work is planning: theoretical “modeling” of production processes and analysis that takes place on computer or in preliminary reports. Chemical engineers work with chemists, accountants, human resource personnel, and regulators to create efficient, safe and cost-effective methods of reproducing valuable items. Chemical engineers work in teams, mostly for large corporations. Engineers thrive on the intellectual challenge they get from their work. Good chemical engineers are always trying to refine their systems, improve them, and make them safer and more efficient.

PAYING YOUR DUES:
Like all engineers, the would-be chemical engineer must pass a rigorous set of academic requirements. Coursework must include a full spectrum of chemistry courses, some physics, electrical engineering, mathematics, computer science, and biology, as well as some applied materials science courses for those who want to go into manufacturing industries. English courses are extremely helpful, as many chemical engineers must write and review reports. Over 140 colleges and universities offer accredited chemical engineering curricula. Master’s and doctoral degrees are preferred for those who hope to achieve any supervisory or directed research positions. The most difficult thing about becoming a chemical engineer is adapting theoretical knowledge to a practical discipline. Many engineers find it helpful to attend professional seminars and subscribe to publications, such as Chemical Engineering, which explore their area of responsibility in the light of industry breakthroughs. Others enjoy the support of professional organizations, such as the American Institute of Chemical Engineers (AIChE). Employers, for the most part, view chemical engineering as a practical discipline and look for experience in production, manufacturing, or management to verify these traits in potential employees. Each state has its own written exam for chemical engineers who wish to work in the public sector.

Tasks

• Perform tests throughout stages of production to determine degree of control over variables, including temperature, density, specific gravity, and pressure.
• Develop safety procedures to be employed by workers operating equipment or working in close proximity to on-going chemical reactions.
• Determine most effective arrangement of operations, such as mixing, crushing, heat transfer, distillation, and drying.
• Prepare estimate of production costs and production progress reports for management.

Knowledge

**Engineering and Technology** — Knowledge of the practical application of engineering science and technology. This includes applying principles, techniques, procedures, and equipment to the design and production of various goods and services.

**Chemistry** — Knowledge of the chemical composition, structure, and properties of substances and of the chemical processes and transformations that they undergo. This includes uses of chemicals and their interactions, danger signs, production techniques, and disposal methods.

**Mathematics** — Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.

Skills

**Science** — Using scientific rules and methods to solve problems.

**Critical Thinking** — Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.

**Active Listening** — Giving full attention to what other people are saying, taking time to understand the points being made, asking questions as appropriate, and not interrupting at inappropriate times.

**Complex Problem Solving** — Identifying complex problems and reviewing related information to develop and evaluate options and implement solutions.

**Reading Comprehension** — Understanding written sentences and paragraphs in work related documents.

**Troubleshooting** — Determining causes of operating errors and deciding what to do about it.

**Active Learning** — Understanding the implications of new information for current and future problem-solving and decision-making.

**Technology Design** — Generating or adapting equipment and technology to serve user needs.

**Mathematics** — Using mathematics to solve problems

Abilities

**Problem Sensitivity** — The ability to tell when something is wrong or is likely to go wrong. It does not involve solving the problem, only recognizing there is a problem.

**Deductive Reasoning** — The ability to apply general rules to specific problems to produce answers that make sense.

**Information Ordering** — The ability to arrange things or actions in a certain order or pattern according to a specific rule or set of rules (e.g., patterns of numbers, letters, words, pictures, mathematical operations).

**STATE & NATIONAL WAGES (2007):**

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**INFORMATIONAL WEBSITES:**

online.onetcenter.org/  
www.acinet.org/  
www.princetonreview.com