BIOCHEMISTRY
What is Biochemistry?

As defined by the Biochemical Society, “Biochemistry is the ‘Chemistry of Life.’
It is central to all areas of the biological or life sciences. The aim is to provide an understanding of every aspect of the structure and function of living things at the molecular level. It is a practical laboratory science that applies the molecular approaches of chemistry to the vast variety of biological systems. Biochemists work at all levels and with all types of biological organisms, ranging from biomolecules to man. There are close links with other specialist life sciences, such as Cell Biology, Genetics, Microbiology, Molecular Biology, Physiology and Pharmacology. In fact, in many cases the distinctions between these disciplines are becoming increasingly blurred. They use biochemical techniques, and biochemists work in all these areas. Biochemistry offers the tremendous challenge of seeking to understand the most fundamental of life’s processes at the molecular level, and to utilize this knowledge for the benefit of mankind. You will have read, for example, how biochemists, working with colleagues in other disciplines, have developed the new technologies of Molecular Biology and Genetic Engineering. These have enabled the production of therapeutically important human proteins such as insulin and blood clotting factors by cloning procedures, thus avoiding costly, time-consuming and inefficient isolation of these molecules from biological sources; the identification and possible remedying of genetic problems; and the use of DNA fingerprinting in forensic science.”

What is this career like?

“Biochemists work in many walks of life: industry, hospitals, agriculture, research institutes, education and associated areas. Many areas of everyday life as diverse as medical products and diagnostics, new food and its safety, crop improvement, cosmetics and forensic science owe their development or even existence to biochemists.

Industry
Pharmaceutical, food, brewing, biotechnology and agrochemical companies all need and employ biochemists to develop new products and monitor the production, quality control and safety of existing ones.

Medicine
Hospitals, public health laboratories and medical research institutes, as well as the pharmaceutical industry, all require biochemists. Here they provide a diagnostic service, carrying out tests on blood, urine and other body fluids, alongside researching the underlying causes of disease and the methods of treatment.

Agriculture and the Environment
Biochemists and biotechnologists, who often have a biochemistry degree, working in agriculture have been responsible for many developments, such as pest-resistant crops, improvements in
crop yields and tomatoes that keep better. They also monitor the environment. Employers include seed companies, local government, the Civil Service and water authorities.

**Education**
All levels of education offer prospects for biochemists. The combination of biology and chemistry, along with the training in numerical and analytical skills that is given in any area of science, makes biochemistry ideal for teaching throughout the school age range. There are also opportunities for more advanced teaching, usually associated with research, in universities and colleges, and in medical, dental and veterinary schools.

**Away from Science**
A science background can be an excellent starting point for many other careers. Biochemistry is a numerate subject that develops analytical thinking, creativity in problem solving, and the ability to handle large amounts of complex information—skills required in jobs in all walks of life, including, for example, sales and marketing, accountancy and finance, journalism, and patent work.”

**Related Career Titles** (from http://uncw.edu/career/biology.html)

<table>
<thead>
<tr>
<th>Agricultural Scientist</th>
<th>Environmental Engineer</th>
<th>Marine Engineering Tech</th>
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<tr>
<td>Agronomist</td>
<td>Environmental Health</td>
<td>Marine Fisheries/Worker</td>
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<td>Animal Scientist</td>
<td>Environmental Protection</td>
<td>Marine Geologist</td>
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<tr>
<td>Aquaculture Farmer</td>
<td>Ergonomist</td>
<td>Marine Sales</td>
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<tr>
<td>Aqua culturist</td>
<td>Fish Hatchery Tech</td>
<td>Marine Tourist Worker</td>
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<tr>
<td>Aquarium &amp; Museum</td>
<td>Fisheries Conservation</td>
<td>Market Research Analyst</td>
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<td>Aquarium Technician</td>
<td>Florist</td>
<td>Medical Illustrator</td>
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<tr>
<td>Aquatic Biologist</td>
<td>FDA Inspector</td>
<td>Medical Laboratory Tech</td>
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<tr>
<td>Assayer</td>
<td>Food Scientist-Tech</td>
<td>Medical Librarian</td>
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<tr>
<td>Barrier Beach Mgr</td>
<td>Forester</td>
<td>Medical Technologist</td>
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<tr>
<td>Bio-Engineer</td>
<td>Genetic Eng. Research</td>
<td>Meteorologist</td>
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<tr>
<td>Bio-Technologist</td>
<td>Geographer</td>
<td>Microbiologist</td>
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<tr>
<td>Biochemist</td>
<td>Health Officer</td>
<td>Molecular Biologist</td>
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<td>Biometrician</td>
<td>Horticulturist</td>
<td>Mortician</td>
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<tr>
<td>Boat Builder &amp; Repair</td>
<td>Hospital Administrator</td>
<td>Museum/Aquarium Admin.</td>
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<tr>
<td>Botanist</td>
<td>Hydrographic Surveyor</td>
<td>Mycologist</td>
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<tr>
<td>Chem. Oceanographer</td>
<td>Industrial Hygienist</td>
<td>Naval Architect</td>
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<tr>
<td>Chiropractor</td>
<td>Industrial Marine Econ.</td>
<td>Genetic Counselor</td>
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<tr>
<td>Coastal Resources Mgr.</td>
<td>Entomologist</td>
<td>Net Designer</td>
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<tr>
<td>College Professor</td>
<td>Forensic Chemist</td>
<td>Neurobiologist</td>
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<tr>
<td>Color Development Chemist</td>
<td>Limnological Technician</td>
<td>Oceanographer</td>
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<tr>
<td>Commercial Fishing Eng.</td>
<td>Marine-Coastal Consult</td>
<td>Paramedic</td>
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Coroner | Marine Bacteriologist | Parasitologist
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Crime Lab Analyst | Marine Biologist | Pharmaceutical Sales
Dentist | Marine Ecologist | Physician
Dietitian & Nutritionist | Physical Therapist | Salt Marsh Manager
Ecologist | Public Health Worker | Science Writer
Pharmacy Technician | Science Teacher | Soil Conservationist
Science Lab Tech. | State Parks & Recreation | Systems Analyst
Zoologist | Test-Inspection Tech. | Toxicologist
Wildlife Resources Mgr. | Wildlife Biologist | Science Illustrator
Technical Writer | Film Maker | Water Quality Technician
Geophysicist/Physicist | Seafood Processor-Researcher | Veterinarian
Commercial Inland Water Transportation Worker | Wastewater Treatment Chemist | Underwater Technician

How do you get ready?

- As an undergraduate, seek laboratory experiences such as research projects, volunteering with professors, summer jobs, or internships.
- Participate in research programs sponsored by organizations such as the National Science Foundation and the National Institutes of Health.
- Consider a certificate program or specialized master’s program to qualify for research technician positions.
- Earn a master’s degree for greater variety and autonomy on the job.
- Earn a Ph.D. to work on high-level research projects, to direct research programs, to enter high levels of administration, and to teach at four-year post-secondary institutions. Postdoctoral fellowships may also be required.
- Learn to work independently and as part of a team.
- Develop the ability to communicate clearly.
- Gain competencies in computers and mathematics.
- Read scientific journals and join related professional organizations.
- Combine an undergraduate degree in biochemistry with a degree in law, computer programming, business, education, information science or other discipline to expand career opportunities.

Related Major Skills (from http://uncw.edu/career/biology.html)

<table>
<thead>
<tr>
<th>Developing theories</th>
<th>Science and math ability</th>
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<tr>
<td>Conduct research</td>
<td>Perseverance</td>
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<td>Attending to data</td>
<td>Analytical skills</td>
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<td>Curiosity</td>
<td>Follow-through skills</td>
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<tr>
<td>Utilizing formulas</td>
<td>Perform experiments</td>
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<tr>
<td>Operate scientific equipment</td>
<td>Information handling &amp; organization</td>
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<tr>
<td>Practical knowledge and problem solving</td>
<td>Statistical awareness</td>
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<tr>
<td>Process data</td>
<td>Observation and decision making</td>
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<tr>
<td>Work independently and in groups</td>
<td>Technical skills</td>
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<tr>
<td>Oral and written communication</td>
<td>Remain objective</td>
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**What about the future?**

Employment of biochemists and biophysicists is projected to grow 19 percent from 2012 to 2022, faster than the average for all occupations. However, because it is a small occupation, the fast growth will result in only about 5,400 new jobs over the 10-year period.

For additional job outlook information, refer to [www.bls.gov/oco](http://www.bls.gov/oco).

**Available at Albright College Career Development’s Resource Library**

- Great Jobs for Biology Majors, by Blythe Camenson
- Careers for Animal Lovers and Other Zoological Types, by Louise Miller
- Careers for Environmental Types and Others Who Respect the Earth, by Jane Kinney and Michael Fasulo
- Careers for Nature Lovers and Other Outdoor Types, by Louise Miller
- Careers for Plant Lovers and Other Green Thumb Types, by Blythe Camenson
- Careers for Scientific Types and Others with Inquiring Minds, by Jan Goldberg
- Opportunities in Biological Science Careers, by Charles A. Winter
- Opportunities in Biotechnology Careers, by Sheldon S. Brown
- Opportunities in Dental Care Careers, by Bonnie Kendall
- Opportunities in Environmental Careers, by Odom Fanning
- Opportunities in Eye Care Careers, by Kathleen Belikoff
- Opportunities in Forestry Careers, by Christopher M. Wille
- Opportunities in Horticulture Careers, by Jan Goldberg
- Opportunities in Physical Therapy Careers, by Bernice R. Krumhansl
- Opportunities in Physician Careers, by Jan Sugar-Webb
- Opportunities in Public Health Careers, by George E. Pickett & Terry W. Pickett
- Opportunities in Research and Development Careers, by Jan Goldberg
- Opportunities in Sports Medicine Careers, by William R. Heitzmann
- Opportunities in Veterinary Medicine Careers, by Robert E. Swope
- Great Jobs for Chemistry Majors, by Mark Rowh
- Career Opportunities in Science, by Susan Echaore-McDavid
- Careers for Competitive Spirits and Other Peak Performers, by Jan Goldberg
- Careers for Geniuses and Other Gifted Types, by Jan Goldberg
- Careers for Introverts and Other Solitary Types, Blythe Camenson
- Opportunities in Chemistry Careers, by John H. Woodburn
- Opportunities in Energy Careers, by John H. Woodburn
• Opportunities in Environmental Careers, by Odom Fanning
• Opportunities in Forensic Science Careers, by Blythe Camenson
• Opportunities in Medical Technology Careers, by Karen Karni
• Opportunities in Pharmacy Careers, by Fred Gable
• Opportunities in Research and Development Careers, by Jan Goldberg
• Opportunities in Science Technician Careers, by JoAnn Chirico
• The Complete Guide to Environmental Careers in the 21st Century, The Environmental Careers Organization

Disclaimer
Links to Internet sites are provided for your convenience and do not constitute an endorsement by Albright College Career Development Center.

Job and Internship Search Links

• HireBio http://www.hirebio.com
• Health Care Job Store http://www.healthcarejobstore.com
• Naturejobs http://naturejobs.nature.com/js.php
• Tiny Tech Jobs http://www.tinytechjobs.com
• Science Careers http://www.sciencecareers.org
• CDC Jobs http://jobs.cdc.gov/
• Pre-Med Internship Opportunities http://people.rit.edu/gtfsbi/Symp/premed.htm
• Careers with the Agricultural Research Service http://www.ars.usda.gov/careers
• Life Sciences World http://www.lifesciencesworld.com/
• BioSpace http://www.biospace.com
• NewScientist Jobs http://www.sciencejobs.com
• Maritime Employment Opportunities http://www.maritimeemployment.com
• Biology Jobs http://www.BiologyJobs.com
• ChemJobs.net http://www.chemjobs.net
• National Institute of Health http://www.jobs.nih.gov/ ; For internships go to http://www.training.nih.gov
• BIO Pharm Guy www.biopharmguy.com
• AstraZeneca http://www.astrazeneca-us.com/careers/
• TEVA Pharmaceuticals http://www.tevausa.com/
• Merck http://www.merck.com/
• Pfizer http://www.pfizer.com/careers/
• Bayer http://www.mybayerjob.us/en/
• Glaxo Smith Kline http://www.gsk.com/
• Sanofi-Aventis http://www.sanofi-aventis.us/
• Johnson and Johnson http://www.careers.jnj.com/
• Novartis https://www.novartis.com/careers
• Cabot Corporation http://www.cabotcorp.com/company/careers
• Lancaster Labs http://pharm.lancasterlabs.com/
• Carbogen Amcis http://www.carbogen-amcis.com/
• Hovione http://www.hovione.com/
• Firmenich http://www.firmenich.com/
• DOW Chemical http://www.dow.com/
• UCT, Inc http://www.unitedchem.com/
• Heraeus http://www.heraeus.com/en/home/default.html
• Environmental Standards, Inc. http://www.envstd.com/
• Croda http://www.croda.com/home.aspx?s=1
• Innospec http://www.innospecinc.com/
• Aerotek http://www.aerotek.com/
• Joulescientific http://www.joulescientific.com/
• Adecco http://www.adeccousa.com/pages/welcome.aspx

Career Planning Links

• Careers in Forensic Science http://www.aafs.org
• Medical/Health Exploration http://www.nlm.nih.gov/services/medicaled.html#general

Professional Association Links

• The American Society for Cell Biology http://www.ascb.org
• American Association for Clinical Chemistry http://aacc.jobcontrolcenter.com/search.cfm
• American Association of Zoo Keepers http://www.aazk.org
• American Aquarium and Zoo Association http://aza.org/
• The American Institute of Biological Sciences http://www.aibs.org
• International Biometric Society http://www.biometricsociety.org/
• RSC’s Chemical Science Network http://www.rsc.org/chemistryworld/index.asp
• American Academy of Forensic Sciences http://www.aafs.org
• American Society of Crime Laboratory Directors http://www.ascld.org
• Chemical and Engineering News Online http://pubs.acs.org/cen/index.html
• American Institute of Chemical Engineers http://www.aiche.org
• American Institute of Chemists http://www.theaic.org