

BIOINFORMATICS CAREERS

General Information

- **Bioinformatics is an interdisciplinary field that incorporates computer science and biology to research, develop, and apply computational tools and approaches to manage and process large sets of biological data.**
- The Bioinformatics career focuses on creating software tools to store, manage, interpret, and analyze data at the genome, proteome, transcriptome, and metabolome levels. Primary investigations consist of integrating information from DNA and protein sequences and protein structure and function.
- Bioinformatics jobs exist in biomedical, molecular medicine, energy development, biotechnology, environmental restoration, homeland security, forensic investigations, agricultural, and animal science fields.
- Most bioinformatics jobs require a Bachelor's degree. Post-grad programs, University level teaching & research, and administrative positions require a graduate degree.

The following list provides a brief sample of responsibilities, employers, jobs, and industries for individuals with a degree in this major. This is by no means an exhaustive listing, but is simply designed to give initial insight into a particular career field that would employ the skills and knowledge gained through this major.

Areas	Employers	
Environmental/Government <ul style="list-style-type: none"> • Sequence genomes of bacteria useful in energy production, environmental cleanup, industrial processing, and toxic waste reduction. • Examination of genomes dependent on carbon sources to address climate change concerns. • Sequence genomes of plants and animals to produce stronger, resistant crops and healthier livestock. • Transfer genes into plants to improve nutritional quality. 	<ul style="list-style-type: none"> • BLM • DOE • EPA • NOAA • USDA • USFS • USFWS • USGS 	<ul style="list-style-type: none"> • Private Contractors • National Parks • State Wildlife Agencies • Army Corp of Engineers
Industrial <ul style="list-style-type: none"> • Study the genetic material of microbes and isolate the genes that give them their unique abilities to survive under extreme conditions. • Genetic sequencing of Bio-produced amino acids as an alternate protein source. • Examination of physiology and genetic make-up of bacteria critical to manufacturing dairy products, alcohol, and fermented foods. • Identifying genetic markers for detecting pathogenic strains to prevent infections. • Utilize genomic data to engineer bioweapons and develop response plans. 	<ul style="list-style-type: none"> • DOD • DOE • NIH, NCI • Military Services • Food & Drug Administration • U.S. Dept. of Agriculture • Food & Beverage Suppliers 	
Information Technology <ul style="list-style-type: none"> • Develop software programs to detect homologous sequences. • Compare protein sequences among protein databases to determine biochemical function of specific proteins. • Global distribution of software tools to the scientific research community. 	<ul style="list-style-type: none"> • DOD • NIH • Computer Science Depts. • Research facilities 	

<ul style="list-style-type: none"> • Identification of evolutionary processes, mutations, hydrophathy regions, and compositional biases. 	
Medical/Pharmaceutical <ul style="list-style-type: none"> • Genome examination of heredity disease response to environmental or medicinal influences to prescribe effective drug therapy. • Use computational tools to identify and validate new drug targets. • Develop diagnostic tests to measure an individual's susceptibility to various diseases. • Manage laboratory information, improve medical records systems and document clinical trial records for regulatory agencies. 	<ul style="list-style-type: none"> • NIH • Clinics, Hospitals • Research Universities • Pharmaceutical Companies • Department of Health and Human Services
Research Labs <ul style="list-style-type: none"> • Design computer algorithms to help analyze and understand DNA & other complex molecules. • Research and determine chemical action of substances, such as drugs, serums, hormones, and food on tissues and vital processes. • Genetic sequencing of eukaryota, bacteria, and archaea to determine an evolutionary structural, functional, and comparative analysis of genes and genomes from various organisms. 	<ul style="list-style-type: none"> • CDC • NHGRI • Hospitals • Health Dept. • Private Companies • Research Universities & Institutions
Teaching <ul style="list-style-type: none"> • Lecture about the systems and advances in bioinformatics. • Conduct bioinformatics research, write grants and publications, and teach/train students. 	<ul style="list-style-type: none"> • Community Colleges • Computer Science Depts. • Universities, Public Health Schools

Job Titles	Industries
Agriculturist	Academia
Bioinformatics analyst, engineer, programmer	Agriculture
Biologist (Env., fisheries, plant, marine)	Biotechnology
Biomedical researcher	Commercial medical labs
Biophysicist, biotechnologist	Consulting
Biostatistician	Environmental, Food engineering
Clinical lab tech	Government
Computational biologist	Healthcare
Epidemiologist	Hospitals
Geneticist, Gen. Engineer	Independent research foundations
Medical illustrator, technologist	Medical Research Lab
Physician	Manufacturing
Professor	Military
Research specialist, tech	Pharmaceutical
Software programmer, development specialist	Private companies
Technician	Regulatory agencies
Technical writer	Research & Development

References:

http://www.ebi.ac.uk/2can/bioinformatics/bioinf_what_1.html

<http://www.ebi.ac.uk/luscombe/docs/mim-review.pdf>

<http://bioinformaticstools.webs.com/definitions.htm>