Program Directors:

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http://molecularmedicine.health.usf.edu
OVERVIEW:

Program Development And Goal:

The Masters Program in Bioinformatics and Computational Biology at the University of South Florida represents a multi-college partnership and a truly interdisciplinary collaboration. Participating departments include the Departments of Molecular Medicine (formerly Biochemistry & Molecular Biology) in the College of Medicine, Mathematics in the College of Arts and Sciences, Computer Sciences and Engineering and the Division of Biomedical Engineering in the College of Engineering, Epidemiology & Biostatistics in the College of Public Health and Information Systems & Decision Sciences in the College of Business Administration. The program is designed to meet the increasing demand for trained people in this emerging area, which crosses the traditional fields of biological, mathematical and computer sciences. The program, therefore, builds on and complements the current strengths of the university.

The Masters Program in Bioinformatics and Computational Biology was initiated and will be administered by the Departments of Molecular Medicine in the College of Medicine. The program development has been supported by a grant from the Alfred P. Sloan Foundation. At this time, only 13 institutions across the nation have won the highly competitive Sloan Awards to develop intensive two-year professional Master's degree programs in the rapidly growing field of bioinformatics and computational biology.

The goal of the Masters Program in Bioinformatics & Computational Biology is to provide students enrolled in the program with high quality training and education that will prepare them for careers in science, industry, health care and education. The curriculum has been designed accordingly and provides the theoretical background, the practical training and, with the internships, the “real life” experience, which will equip students with the essential tools for a successful career in the field of Bioinformatics & Computational Biology.

Program Description:

The Masters Program in Bioinformatics & Computational Biology is designed for 42 credit hours to be obtained during two years of study. Nine core courses will provide the foundation and basics before advanced work, including four electives, and a Master’s thesis or internship will be pursued. The curriculum is flexible and will be tailored to the individual student’s background, interests and career goals. However, electives must be selected from at least two of the participating departments to assure breadth of training.

Exceptional students with extra motivation and commitment can enroll in the Ph.D.-PLUS program. The Ph.D.-PLUS program provides the opportunity to study for a Ph.D. in Molecular Medicine and a Master’s degree in Bioinformatics and Computational Biology concurrently. Nine credit hours can be double credited. http://biochem.usf.edu/phdplus/index.html
CURRICULUM

Prerequisites: Calculus I-III, linear algebra, biostatistics, at least "C" and "maple" or "mathematica" or "math-cad", one year of general biology and one year of organic chemistry.

YEAR 1

Prematriculation: Fulfillment of prerequisite requirements

<table>
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<th>Semester:</th>
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<th>Course Title</th>
<th>Credits</th>
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<td>GMS 6200</td>
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<td></td>
<td>BCH 6888</td>
<td>Bioinformatics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MAT 5932</td>
<td>Sel. Topics in Combinatorics and Graph Theory</td>
<td>3</td>
</tr>
<tr>
<td>II</td>
<td>BCH 6411</td>
<td>Biomedical Genomics and Genetics</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>GMS 6889</td>
<td>Advanced Bioinformatics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>MAT 5932</td>
<td>Selected Topics in Probability Theory</td>
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YEAR 2

<table>
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<td>Research Ethics</td>
<td>2</td>
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<tr>
<td></td>
<td>CIS 6930</td>
<td>Advanced Data Structures</td>
<td>3</td>
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<tr>
<td></td>
<td>MAT 6932</td>
<td>Sel. Topics in Bioinformatics &amp; Comp. Biology</td>
<td>3</td>
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<tr>
<td></td>
<td>Elective</td>
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<td>3</td>
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<tr>
<td>IV</td>
<td>Elective</td>
<td></td>
<td>3</td>
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<tr>
<td></td>
<td>BCH 6942+BCH 6943 _Internship (140 contact hrs.)</td>
<td>total 4</td>
<td></td>
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</table>

The tasks and experiences of the internship will have to be summarized in an Internship Report. Before graduation, the student will provide a short (15 min) Power Point presentation of his/her internship experience to a small group of faculty.

Graduate students must maintain an overall average of 3.0 ("B") in all courses.
### ELECTIVE COURSES

#### Molecular Medicine:
- **BCH 6135**  Methods in Molecular Biology  4
- **BCH 6627**  Metabolic And Genetic Basis of Human Diseases  3
- **BCH 6876**  Selected Topics in Protein Structure/Function Analysis  2
- **GMS 7930**  Proteomics and Structural Biology  3
- **BCH 6876**  Special Topics in Molecular Modeling and Drug Design  2
- **BCH 6876**  Special Topics in Cell Signaling Pathways  2

#### Management Information Systems:
- **ISM 6124**  Advanced Systems Analysis and Design  3
- **ISM 6218**  Advanced Database Management  3
- **ISM 6225**  Distributed Information Systems  3
- **ISM 6930**  Data Warehousing and Data Mining  3
- **ISM 6930**  Information Technology in Medical Care  3

#### Computer Science and Engineering:
- **COT 6405**  Introduction to the Theory of Algorithms  3
- **CEN 6016**  Software Engineering  3
- **CAP 5625**  Introduction to Artificial Intelligence  3
- **CAP 6638**  Pattern Recognition  3
- **CAP 5400**  Digital Image Processing  3

#### Mathematics:
- **STA 5326**  Math Statistics  3
- **MAD 5305**  Graph Theory  3
- **MAD 4504**  Theory of Computation  3
- **STA 5166**  Computational Statistics I  3
- **MAT 6939**  Graduate Seminar  2

#### Epidemiology & Biostatistics:
- **PHC 6051**  Biostatistics II  3
- **PHC 6053**  Categorical Data Analysis  3
- **PHC 6054**  Design of Experimental Studies for Health Researchers  3
- **PHC 6058**  Biostatistical Inference I  3

#### Biomedical Engineering
- **ESB CIS 6930**  Bioinformatics in Biomedical Engineering  3
DESCRIPTIONS OF CORE COURSES

GMS 6200  **Biochemistry and Molecular and Cellular Biology**  
The overall objective of this course is to provide students with a solid foundation of biochemical principles that underlie normal cellular and physiological processes.

BCH 6888  **Bioinformatics**  
Bioinformatics I is designed to introduce students to the diverse applications of bioinformatics and computational biology software in probing both DNA and protein structure-function relationships. Students will develop familiarity with a broad range of algorithms designed to facilitate DNA sequence assembly and manipulation, protein structure analysis, motif identification, evolutionary alignments and structure prediction. Examples focus on major software applications that are routinely in Molecular Medicine.

MAT 5932  **Special Topics in Combinatorics and Graph Theory**  
This course studies combinatorial and graph-theoretic techniques needed in dealing with discrete objects.

BCH 6411  **Biomedical Genomics and Genetics**  
The course is designed to introduce students to multiple features of biomedical genomics and genetics such as genome composition and evolution, gene expression, genetic instability, mapping and identification of genes and susceptibility to Mendelian and complex diseases. Applications of genomics and genetics in therapeutic treatments including gene therapy, stem cell therapy and pharmacogenomics will also be discussed.

GMS 6889  **Advanced Bioinformatics**  
Advanced Bioinformatics is designed to provide an in depth analysis of DNA and protein function using information derived from both current DNA and protein sequence databases. Advanced algorithms will be used to survey gene/protein functions and construct 3-dimensional protein models that will be used for rational ligand design.

MAT 5932  **Selected Topics in Probability Theory**  
This course studies probability theory with an introduction to random processes.

GMS 7930  **Scientific Writing and Ethics**  
The objectives of the course are to involve the student in the complete writing of a scientific paper or grant proposal and to train the student in the area of scientific ethics.

CIS 6930  **Advanced Data Structures**  
Fundamentals and design of data organization for purposes of program efficiency, clarity and simplicity will be addressed. This course will be different from a traditional CS course in that it would use bioinformatics related examples and assignments. It will also be a graduate level course that non-CS majors can take, without prior exposure to an undergraduate course. This course will be the crucial bridge into advanced graduate level CS courses for non-CS majors.

MAT 6932  **Special Topics in Bioinformatics and Computational Biology**  
This course is intended to be a series of seminar type lectures covering mathematical techniques, models and theories in biological processes.
DESCRIPTIONS OF ELECTIVE COURSES

Molecular Medicine:

BCH 6135  **Methods in Molecular Biology**  
This practicum teaches state of the art methods and techniques that are applied in Molecular Biology such as PCR, RT-PCR, Immunoprecipitation Western (Immuno-) Blotting, Gel Mobility Shift Assays, Northern, Site-Directed Mutagensis, Sequencing.

BCH 6627  **Metabolic and Genetic Basis of Human Diseases**  
“Metabolic and Genetic Basis of Human Diseases” will deal with the genetic, molecular, and biochemical basis of human diseases. The objectives of this course are: (i) to provide a thorough understanding of the principles that underlie inheritance and expression of genetic information; (ii) to present a wide variety of genetic diseases, based on their different modes of inheritance and the different nature of the gene products responsible. We will discuss autosomal dominant, autosomal recessive, X-linked, and atypical patterns of inheritance. Several diseases will be discussed to serve as examples, including diseases related to metabolic pathways (anabolic, catabolic, and salvage), trafficking, receptors, channels, and transporters.

BCH 6876  **Selected Topics in Protein Structure/Function Analysis**  
Recent advances in protein structure acquisition and analysis have provided new approaches to understanding protein function. This course will focus on selected protein structural classes with the objective of understanding the role of specific structural motifs in regulating protein folding and architecture.

GMS 7930  **Proteomics and Structural Biology**  
Proteomics and functional genomics are rapidly developing areas that impact on a wide range of disciplines. The course, "Proteomics and Functional Genomics", emphasizes the interdisciplinary nature of proteomics and functional genomics and focuses on various aspects that will enable students to relate theoretical concepts and experimental approaches to a wide range of potential research problems. The course aims to provide a solid foundation and breadth of understanding in proteomics and functional genomics that will facilitate application to current or future research problems. The initial section of the course provides a brief overview of the human genome project and proteome initiatives. The second section focuses on tools and technologies that have supported advances in proteomics and functional genomics. The third section is a series of major subtopics and applications of proteomics and functional genomics. The fourth section focuses on various aspects of clinical proteomics and genomics, followed by a section of recent developments related to proteomics and functional genomics. The final section is devoted to student presentations on selected topics of particular interest to individual students.

BCH 6876  **Selected Topics in Molecular Modeling and Drug Design**  
Molecular modeling can provide valuable insights into the role(s) of specific amino acids residues in protein structure and ligand interactions. This course will examine the use of selected molecular modeling software suites to construct altered protein conformations in response to mutational events and to develop structures that represent various protein-ligand and protein-protein interaction.
Selected Topics in Cell Signaling Pathways

The interplay between intercellular and intracellular signaling constitutes the main information transfer mechanism underlying the development and function of multicellular organisms. A malfunction in even a single step in this signaling network can lead to severe developmental disorders, psychiatric, neurodegenerative, vascular, and hormonal diseases as well as many forms of cancer. The students will be introduced to many parts of the complex network of interacting signaling systems with an emphasis on development, metabolism, the nervous system, cell cycle control and defects in this systems.

Mathematics:

MAD 4504 Theory of Computation
This course provides an overview of various aspects of computation theory, including grammars, languages and automata theory.

STA 5326 Math Statistics
This course focuses on the mathematical underpinning of statistical techniques and models.

MAD 5305 Graph Theory
Graph theory provides a basis for studying the relationships between discrete objects. This course will concentrate on various graph-theoretic properties.

STA 5166 Computational Statistics I
Statistical analysis of data by means of statistics package programs. regression, ANOVA, discriminant analysis and analysis of categorical data. Emphasis on inter-relation between statistical theory, numerical methods and analysis of real life data.

Computer Science and Engineering:

COT 6405 Introduction to the Theory of Algorithms
Analysis techniques for algorithms. Characterizing algorithms in terms of recurrence relations, solution of recurrence relations, upper and lower bounds. Graph problems, parallel algorithms, Nondeterministic Polynomial time. Completeness and approximation algorithms, with relationship to practical problems.

CEN 6016 Software Engineering I
Basic principles and formal methods for systematic development of software systems. Software life cycle, formal specifications, design, verification, and reliability analysis.

CAP 5625 Introduction to Artificial Intelligence
Basic concepts, tools and techniques used to produce and study intelligent behavior. Organizing knowledge, exploiting constraints, searching spaces, understanding natural language and problem solving strategies

CAP 6638 Pattern Recognition
Syntactic pattern recognition, Classification techniques, Performance characterization.
CAP 5400  Digital Image Processing
Image formation, sources of image degradation, image enhancement techniques, edge detection operators and threshold selection, low-level processing algorithms for vision, image data compression

Management Information Systems:

ISM 6124  Advanced Systems Analysis and Design
This course covers advanced topics of information systems development. Students learn to manage and perform activities throughout the information systems development life cycle. State-of-the-art system development processes, methods, and tools are presented.

ISM 6218  Advanced Database Administration

ISM 6225  Distributed Information Systems
Analysis, design, implementation, and management of distributed information systems and networks.

ISM 6930  Data Warehousing and Data Mining
This course covers the rapidly emerging data warehouse and data mining technologies that are likely to play a strategic role in business organizations. Topics include the differences between operational and analytical database systems, dimensional modeling and star schemas, data warehouse performance issues, data quality, the data warehouse development cycle, data warehouse navigation, and data mining techniques. The Oracle database system will be used to illustrate many of the concepts covered in class.

ISM 6930  Information Technology in Medical Care
An examination of the application of information technology in the contemporary medical care industry from both an administrative and patient care perspective. Topics will include medical care decision making, information systems planning, designing and implementing information systems and the role of information technology in patient care.

Epidemiology & Biostatistics:

PHC 6051  Biostatistics II
Intermediate level biostatistical methods with a focus on analysis of variance, multiple regression, and analysis of covariance. Emphasis on residual diagnosis and model building with application to epidemiological and health studies.

PHC 6053  Categorical Date Analysis
Studies of techniques used in analyzing data where subjects have been cross-classified by two or more categorical variables. Special emphasis given to problems frequently arising in epidemiology, public health and medicine.
PHC 6054  **Design of Experimental Studies for Health Researchers**
This course offers an interdisciplinary overview on the design and analysis of experimental or observational studies in health related research. It focuses on the use of statistical principles and strategies to ensure the validity, reliability, and efficiency of a design and corresponding data analysis.

PHC 6057  **Biostatistical Inference I**
This course provides an overview of the theoretical foundation of biostatistical inference with an emphasis on applications to biological, medical, and health science research.

**Biomedical Engineering:**

ESB CIS 6930  **Bioinformatics in Biomedical Engineering**
The course discusses applications of bioinformatics and computational biology in areas such as biomechanics, implant device development, biomaterials & biocompatibility, rehabilitation engineering, biomedical imaging, biosensors & biomedical instrumentation, novel drug delivery, cardiovascular and biorheology technology and health management.
FULFILLMENT OF PREREQUISITES

Prerequisites:

1. Calculus I-III,
2. Linear algebra,
3. Biostatistics,
4. At least "C" and "maple" or "mathematica" or "math-cad",
5. One year of general biology
6. And one year of organic chemistry.

Courses that have to be taken for fulfillment of pre-requirements of the Master's Program in Bioinformatics and Computational Biology do not have to be taken at the University of South Florida. Some classes from the University of South Florida that will be accepted for fulfillment of the entrance requirements are listed below:

<table>
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<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>ESB CIS 4930</td>
<td>C++</td>
</tr>
<tr>
<td>ESB CGS 5765</td>
<td>Unix/C</td>
</tr>
<tr>
<td>ESB CIS 6930</td>
<td>Intro to VLSI CAD</td>
</tr>
<tr>
<td>CHM 2210</td>
<td>Organic Chemistry I</td>
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<tr>
<td>CHM 2211</td>
<td>Organic Chemistry II</td>
</tr>
<tr>
<td>BSC 2010</td>
<td>Biology I: Cellular Processes</td>
</tr>
<tr>
<td>BSC 2011</td>
<td>Biology II: Biological Diversity or Cell Biology</td>
</tr>
<tr>
<td>PCB 3023</td>
<td>Cell Biology</td>
</tr>
<tr>
<td>MAC 2243</td>
<td>Life Sciences Calculus I-III</td>
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<tr>
<td>MAC 2311</td>
<td>Calculus I-III</td>
</tr>
<tr>
<td>MAS 1100</td>
<td>Constructive Number Theory and Linear Algebra</td>
</tr>
<tr>
<td>MAS 3105</td>
<td>Linear Algebra</td>
</tr>
<tr>
<td>PHC 6050</td>
<td>Biostatistics I</td>
</tr>
<tr>
<td>PHC 6057</td>
<td>Biostatistical Inference I</td>
</tr>
</tbody>
</table>

Please note:
- Not all courses are offered in each semester.
- Some courses require extensive prerequisites. Please discuss with the individual course directors if some pre-requirements can be waived due to prior training.
- For more information on individual courses check the following web sites:
  - Oasis schedule of classes: http://isis2.admin.usf.edu/ssearch/search.asp
  - Search a bull: http://www.ugs.usf.edu/sab/sabs.cfm
APPLICATION AND ADMISSION

In order to be considered for admission, a first time graduate student or a student transferring from a graduate program at another university must fulfill the following requirements:

General Admissions requirements:

- A bachelor's degree
- Must fulfill the prerequisites as stated in the curriculum
- A minimum undergraduate GPA of 3.0 on a 4.0 scale
- A minimum combined GRE general test score of 1100 (verbal and quantitative portions), not older than 5 years
- Three letters of recommendation
- Statement of purpose
- Complete transcripts of undergraduate work and any previous graduate work
  - a transcript evaluation is needed for international students, see: http://web.usf.edu/iac/admissions/transcript.html
- A completed online USF Application to Graduate Studies

The general guidelines of the USF Graduate School apply: http://admissions.grad.usf.edu/criteria.html

Financial Aid:

For inquiries about financial aid please visit: http://usfweb2.usf.edu//finaid/grad.htm

Fellowships and Grants:

http://www.grad.usf.edu/newsite/diversity/fellowships.asp

USF Career Center:

http://usfweb2.usf.edu/career/students/career_fairs.htm

Application deadlines:

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<th>Domestic Students</th>
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<td>Spring</td>
<td>October 1</td>
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<td></td>
<td>Spring</td>
<td>June 1</td>
</tr>
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<thead>
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<th>International Students who are currently IN the United States</th>
<th>Fall</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spring</td>
<td>August 1</td>
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</tbody>
</table>

Late admission is possible in selected cases.
For answers to questions regarding the international admissions process, please go to http://web.usf.edu/iac/admissions/faq.html.

**Application Material:**

Domestic Application to Graduate Studies:
http://www.grad.usf.edu/newsite/admissions/grad_app.asp

International Application to Graduate Studies:
http://web.usf.edu/iac/admissions/

**Send** a hard copy of the online application and all additional documentation to:

Bioinformatics Program  
Dr. Inge Wefes,  
Department of Molecular Medicine  
College of Medicine,  
University of South Florida  
12901 Bruce B. Downs Blvd./ MDC Box 7  
Tampa, FL. 33612-4799

**Program Directors:**

For more information contact the program directors:

Michael Barber, Dr. Phil., mbarber@hsc.usf.edu (813) 974-9702  
Inge Wefes, Ph.D., iwefes@hsc.usf.edu (813) 974-5360
EMPLOYMENT PERSPECTIVES IN BIOINFORMATICS

http://www.aw-bc.com/info/campbell_krane/1_faq.html
What prospects are there for work in bioinformatics in the future?
There is already an extensive need for professionals with a background in bioinformatics and that need will continue to grow. For instance, the genomic information available at the National Center for Biotechnology Information (NCBI) currently doubles every 14 months and industry analysts forecast that the market for genomic information alone (and the technology to use it) will reach an annual US $2 billion by 2005. The current shortfall of bioinformaticians has been estimated to be as much as fifty-fold!

http://www.bio-itworld.com/archive/061202/class.html
Demand for the marriage of biology and IT skills
The demand for the marriage of biology and IT skills is a recent phenomenon, with the higher priority placed on a biological background, according to Boston-area recruiting firm Remington International, which also notes starting salaries of $60,000 to $90,000 are typical for qualified applicants.

http://www.nature.com/drugdisc/nj/articles/nj6939-566a.html
Short supply
Improving proteomic techniques will tackle questions in cell biology, signal transduction and clinical research. But workers with the key knowledge in protein biochemistry, mass spectrometry and bioinformatics are hard to find, says Kendall Powell.

John Bergeron is being swamped. His team feeds peptide after peptide, isolated from a range of cellular components, into the lab's mass spectrometer, which in turn churns out reams of data. The researchers then scramble to use this information to identify new proteins and the cellular processes in which they are involved. Even though only a quarter or so of the proteins are identified, Bergeron says that his group at McGill University in Montreal, Canada, can barely keep up. Bergeron's experience is not unique — he, along with colleagues in North America and Europe, is finding it difficult to find qualified scientists to help tame the outpouring of protein data.

Areas of employment for bioinformaticians
Published by the Institute of BioScience and Technology © Cranfield University

The pharmaceutical industry: The considerable potential for the discovery of new drugs has ensured that pharmaceutical companies are the predominant investors in bioinformatics, and a major employer of bioinformaticians. As bioinformatics technologies are applied not only in early discovery but all along the drug discovery process, the demand for bioinformaticians is unlikely to diminish in the near future.

The bioinformatics industry: In recent years, many new companies have been established solely to provide bioinformatics products and services. Activities are focussed mainly on the development of software and databases, but also include work related to business issues and intellectual property rights. Students with the mix of biology, computing and commercial expertise gained on the Cranfield course have the potential to progress rapidly in these companies.
The biotechnology industry: Aside from pharmaceuticals, bioinformatics promises to aid research and development in many other areas, including medical diagnostics, pathology, genetic engineering and the next generation of high throughput biological data acquisition. The IT industry: The rise of bioinformatics has generated a substantial new market for IT infrastructure and services, with many companies seeing strong opportunities for growth in the life sciences.

Sloan Foundation:
A 1999 study commissioned by the Sloan Foundation indicated that entry level salaries for graduates of Masters programs ranged from $45,000-$100,000. It was also estimated that current “supply” is sufficient to satisfy only 15% of the “demand” for students trained in bioinformatics and computational biology and demand appears to be increasing.
FLORIDA BIOTECHNOLOGY COMPANIES

"Through an extensive research and interviewing process, Enterprise Florida developed a database of Florida-based biotechnology companies. There are currently over 80 Florida companies that apply biological knowledge and techniques pertaining to molecular, cellular, and genetic processes to develop products and services, including applications in medicine, agriculture, and environmental management. This database does not include biotech services companies."


Also, “the Scripps Research Institute is establishing a major science center in Palm Beach County, Florida, focusing on biomedical research, technology development and drug design”. www.scripps.edu/florida/e_index.html

Abc Research Corp Gainesville
Accentia Biopharmaceuticals Tampa
Altior Bioscience Corp Miramar
Aphron Corporation Miami
Applied Genetic Technologies Corp Alachua
Applied Genetics Laboratories, Inc. Melbourne
Aquagene, Llc Alachua
Argonide Nanomaterial Technologies/ (The Argonide Corporation) Sanford
Axogen, Inc Gainesville
Banyan Biomarkers Alachua
Bc International Corp Alachua
Berna Products Coral Gables
Bio Nucleonics Inc. Miami
Bioavailability Systems, Llc Cocoa Beach
Biodyne Inc. Sarasota
Bioheart, Inc. Weston
Biomed Immunotech Alachua
Biomedtech Laboratories, Inc Tampa
Bioresource Technology, Inc. Lauderhill
Cardiovascular Sciences, Inc Orlando
Copharos, Inc. Ponte Vedra Bch
Custom Biologicals Boca Raton
Custom Synthesis Inc. Delray Beach
Cygene, Inc. Coral Springs
Cytorex Biosciences Inc Weston
Daimonion Diagnostics Llc Gainesville
Dnaprint Genomics Inc Sarasota
Dor Biapharma Miami
Dyadic International
Ecoarray Llc
Encor Biotechnology Inc
Exactech, Inc.
Forseti Biosciences, Inc.
Geneex Inc
Global Laboratories, Inc.
Gmp Companies, Inc. Ft.
Goodwin Biotechnology, Inc
Integrated Plant Genetics Inc
Ivigene Corp
Ixion Biotechnology, Inc
Life Sciences, Inc.
Molecular Meds
Morphogenesis Inc
Nabi Biopharmaceutical
Nanobac Life Sciences
Nanomedex
Nanosystems Research, Inc
Nanotherapeutics
Neurostem (Formally Regenmed)
Novamin
Oglesby Plant Laboratories Inc
Oragenics Inc
Osprey Biotechnics
Osprey Pharmaceutical Company
Pasteuria Biosciences Llc
Quick-Med Technologies, Inc.
Regeneration Technologies Inc
Saneron Ccel Therapeutics, Inc
Smith & Nephew Inc
Somatocor Pharmaceutical Inc
Source Molecular Corporation
Sunol Molecular Corporation
Tequesta Marine Biosciences
Toxin Technology, Inc.
Transdermal Technologies
Transgenex Therapeutics Inc
Tutogen Medical, Inc.
Usbiomaterials
Vaxdesign Corporation
Vicor Technologies Inc
Viragen, Inc

Jupiter
Alachua
Alachua
Gainesville
Delray Beach
Plantation
Alachua
Alachua
Alachua
Plantation
St. Petersburg
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Oldsmar
Boca Raton
Tampa
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Alachua
Ponte Vedra B.
Alachua
Gainesville
Alachua
Temple Terrace
Largo
Alachua
Miami
Miramar
Boca Raton
Sarasota
Lake Park
Tampa
Alachua
Alachua
Orlando
Boca Raton
Plantation
FLORIDA PHARMACEUTICAL COMPANIES

“There are currently 81 companies, employing more than 4,000 Floridians in the pharmaceutical and medicine manufacturing industry. The state’s pharmaceutical companies tend to be clustered along the high tech corridor (particularly in the Tampa bay area) and in south Florida. The industry can further be broken down into the following sub-categories:"


*Medicinal And Botanical Manufacturing (Naics 325411)
*Pharmaceutical Preparation Manufacturing (Naics 325412)
*In-Vitro Diagnostic Substance Manufacturing (Naics 325413)
*Biological Product Manufacturing (Naics 325414)

A Healthy Alternative Inc. | Punta Gorda
Advanced Nutrients Science Int'l. | Largo
Arnet Pharmaceutical Corp. | Fort Lauderdale
Aurora Laboratories Inc. | Palm City
Balassa Laboratories Inc. | Port Orange
Bausch & Lomb Pharmaceuticals | Tampa
Beach Products Inc. | Tampa
Bgs Medical Products Inc. | Venice
Biodyne Inc. | Sarasota
Bio-Nucleonics Inc. | Miami
Biotelemetrics Inc. | Boca Raton
Cardinal Health Inc. | St. Petersburg & Winter Haven

Cargill Inc. | Auburndale
Central Admixture Pharmacy | Hialeah
Conseal International Inc. | Longwood
Coronet Industries Inc. | Plant City
Dci Biologicals | Dunedin
Florida Supplement Corp. | Hollywood
Great American Natural Pdts | St. Petersburg

Gulf Coast Nutritionals Inc. | Naples
H V S Labs Inc. | Naples
Health & Nutrition Systems | West Palm Beach
Healthlink | Jacksonville
Hill Dermaceuticals Inc. | Sanford
Horizon Worldwide Export Corp. | Miami
Innovative Health Products Inc. | Largo
Ion Laboratories Inc. | Clearwater
Ivax Baker Norton | Miami
Ivax Corp. | Miami
Kato Sales Inc.
King Pharmaceuticals Inc.
Kirk Pharmaceuticals Inc.
Kos Pharmaceuticals Inc.
Kos Pharmaceuticals Inc.
Lex Inc.
Life Extension Foundation
Life Sciences Inc.
Millenium Natural Health Inc.
Montco Research Products Inc.
Monticello Drug Co
Nabi Biopharmaceuticals
Nature's Path Inc.
Nature's Products Inc.
Naturopathic Laboratories Intl.
Naturopathic Research Labs
Nephron Pharmaceuticals Corp.
North Amer Biopharmaceuticals
Nutraceutics Corp.
Nutrition Formulators Inc.
Optimum Nutrition Inc.
Osprey Biotechnics Inc.
Pal Laboratories Inc.
Peak Performance Nutrients Inc.
Pegasus Laboratories Inc.
Pet Net Pharmalogic Llc
Pharmakon Laboratory Inc.
Plantation Botanicals Inc.
Prostahelp Inc.
Protech Manufacturing & Packg
Quest International Inc.
Re-Vita Manufacturing Co
Rexall Sundown Inc.
Saw Plmto Berries Coop Of Fla
Schering-Plough Corp.
Schleicher & Schuell Microscience
Sentry Supplement Co Inc.
Smith & Nephew Inc.
Southern Botanicals
Star Pharmaceutical Inc.
Swiss Caps Usa Inc.
Synergy Nutritional Industries
Thermadrol.Com
Transdermal Technologies Inc.
Trim International
Unico Holdings Inc.
Viragen Inc.
Vista Pharm
Altamonte Springs
St. Petersburg
Fort Lauderdale
Hollywood
Miami
Miami
Miami
Hollywood
St. Petersburg
Miami
Hollister
Jacksonville
Boca Raton
North Port
Fort Lauderdale
Clearwater
North Port
Orlando
Hollywood
Fort Lauderdale
Miami
Sunrise
Oneco
Miami
Boca Raton
Pensacola
Fort Lauderdale
Tampa
Felda
Coral Gables
Clearwater
North Miami
Orange Park
Boca Raton
Naples
Hialeah
Riviera Beach
Opa Locka
Largo
Clearwater
Pompano Beach
Miami
Fort Walton Beach
Fort Lauderdale
West Palm Beach
Pensacola
Lake Worth
Plantation
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