

COMPUTATIONAL AND DATA SCIENCES

<http://cos.gmu.edu/academics/undergraduate/majors/cds>

Name and description of the field.

The BS Degree in Computational and Data Sciences combines computational techniques, applied mathematics, and discipline-based science courses. The innovative curriculum of this B. S. degree in Computational and Data Sciences is based on the distinction between computational vs. computer science. It bridges an understanding of traditional science subjects with visualization techniques, databases, data mining, and modeling and simulation topics. It prepares students for opportunities in industry, government and graduate school.

Are there concentration options within this major?

There are three concentration options: Physics (21 credits), Chemistry (21 credits), or Biology (21 credits).

What special skills or abilities are needed to succeed in this major?

Good high school preparation in mathematics along with an interest in the use of computers is needed. A prospective student should also be interested in one of the above sciences.

Is it possible to minor in Computational and Data Sciences?

A minor in bioinformatics is available - <http://cos.gmu.edu/academics/undergraduate/minors/bioinformatics>

Specific Job Titles include:

Computational Modeling and Data Mining Researcher, Computational Biologist, Bioinformatics/Computational Proteomics Analyst – since such new field titles are varied

Sample Job Descriptions:

Computational Biologist

Description

Innovations in DNA sequencing technology are opening up radically new applications in science and medicine.

Qualifications

Exceptionally deep computational understanding and abilities. Enjoy solving very difficult problems. Biology background not required, experience in industry welcome. Position involves mixture of algorithm design, rapid prototyping and implementation; analysis of very large data sets; interaction with laboratory personnel; and writing for internal use and publication.

Requirements

Advanced degree in math or computer science or comparable research experience, strong programming skills in C++ on Linux, and excellent oral and written communication skills. Must be capable of self-directed research within broader goals set by group. A minimum of three years of relevant experience needed. Candidates meeting these requirements are strongly encouraged to apply, regardless of experience level or prior exposure to the field.

Bioinformatics/Computational Proteomics Analyst

Background

The Center for Proteomics is a recently established, state-of-the art proteomics research facility. There is a new group focusing on developing and utilizing combined computational and wet lab approaches for interaction and expression proteomics.

Responsibilities

The successful candidate will participate in developing new databases and algorithms for analyzing proteomics data from LC-MS platforms and participate in development of new computational resources for the center. Areas of specific interest include development of algorithms and software for quantitative LC-MS proteomics and disease-focused interaction proteomics (see Ewing et al, 2007. [link])

Requirements:

Successful candidates should possess a B.S./M.S./PhD. in computer science, bioinformatics or molecular biology. Relevant experience in data-mining large-scale 'omics datasets or analysis of mass-spectrometry data would be a definite plus. Competence in one or more of: Linux, Perl, Java, C++, R, MySQL/or equivalent is required.

Preferences

EXPLORING MAJORS

Relevant experience in data-mining large-scale 'omics datasets or analysis of mass-spectrometry data. Experience with open-source projects for large-scale biology/proteomics such as bioperl, bioconductor, trans proteomics pipeline also a plus.

What are recent graduates doing?

In addition to pursuing graduate study for the professional and academic fields listed above, recent graduates are following varied careers in consulting firms, laboratories, and government agencies.

Specific organizations include: ManTech SRS, NRL, daihatsu (auto motor co), Global Sciences and Technology, Ferris State University, Shared Spectrum Company, International Global Environmental Society, George Mason University, Naval Surface Warfare Center, SAS Institute, Argonne National Laboratory, Lawrence Berkeley National Laboratory, Sandia National Laboratories U.S. Department of Energy, Lawrence Livermore National Laboratory, Los Alamos National Laboratory

Positions include: M&S Programmer/Analyst Scientist/Programmer, General Engineer, Application Scientist, Assistant Professor, Engineer II, Postdoctoral Researcher, Scientist, Analytics Software Tester

Resources for further information:

A key element in effective decision making is having sufficient information about the major or career being explored. Sources of information include people in the field, professional associations relating to the field, faculty and your career services counselor. Below are additional resources to aid in exploration:

Science Related Job/Internship Postings:

- <http://cos.gmu.edu/students/careerservices>
- <http://www.aaas.org/careercenter/>
- Educational Programs at Argonne - <http://www.anl.gov/Careers/Education/index.html>
- DOE Computational Science Graduate Fellowship (CSGF) - <http://www.krellinst.org/csgf/index.shtml>
- Lawrence Berkeley National Laboratory 12-week summer program - <http://www.lbl.gov/CS/Careers/SummerStudents.html>
- Lawrence Livermore National Laboratory Internships in Terascale Simulation Technology (ITST) - <https://internships.llnl.gov/>
- Los Alamos National Laboratory student employment web page and summer program - <http://www.lanl.gov/education/index.shtml> & <http://math.lanl.gov/SummerPrograms/>
- Sandia National Laboratories Laboratory Critical Skills Development Programs - <http://www.sandia.gov/employment/special-prog/index.html>
- U.S. Department of Energy Science Undergraduate Laboratory Internships - <http://www.scied.science.doe.gov/scied/erulf/about.html>
- Presidential Commission on Computational Science - <http://www.cos.gmu.edu/~jwallin/URCM/computational.pdf>
- The NSF Computational Science for Undergraduates in the Mathematical Sciences Program <http://www.nsf.gov/pubs/2006/nsf06559/nsf06559.pdf>

Networking Resource: <http://www.mentornet.net/>

Professional Associations:

- **American Association for the Advancement of Science** - <http://www.aaas.org/>
- **Society of Industrial and Applied Mathematics** - <http://www.siam.org/>
- **Mason Student Clubs/Orgs/Societies Science and Technology Umbrella** - http://sa.gmu.edu/student_orgs/orgs.php#stu

Whom should students contact for further information?

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