

Collection Policy: Biological Statistics and Computational Biology

1.0 TEACHING, RESEARCH AND EXTENSION PROGRAMS

1.1 Mission and emphases of the department

The Department of Biological Statistics and Computational Biology is one of the premier biological (as opposed to biomedical) statistics programs in the country. Historically, the department was the Biometrics Unit in the Department of Plant Breeding and Biometry before it became the Department of Biometrics.

It concentrates its activities in two areas:

1. Basic research in statistics, biometry and biomathematics.
2. Applied research in computational biology

Statistical expertise is provided to the wider Cornell community via the Cornell Statistical Consulting Unit. Faculty and students consult and collaborate in the preparation of grant proposals, design of experiments, statistical analysis and interpretation of results, and specialized statistical programming,

1.2 Faculty research

There are 9 full time faculty members, 1 emeritus professor and 2 cross-appointment professors. Since 2004, the department has recruited several new professors and the departmental focus in genetics/genomics has broadened.

Basic Research: includes semi-parametric regression, models for DNA sequencing, Bayesian statistics, linear models, multivariate statistics, experimental design, statistical genetics, computational statistics, quantitative genetics/genomics, molecular evolution, functional data analysis, statistical methods for point process data, dynamical systems and Monte Carlo methods.

Applied Research: Historically, the department was the Biometrics Unit in the Department of Plant Breeding and Biometry, and later, the Department of Biometrics. Much of the current research conducted in BSCB is collaborative work with other researchers on campus. There are strong ties with the fields of Animal Breeding, Plant Breeding, Ecology and Evolutionary Biology, Entomology, Nutrition, Natural Resources, Statistics, Applied Mathematics, Operations Research, the plant sciences, and Epidemiology (a graduate minor which crosses several fields).

Post Graduate Program

In spring 2009, the department has 4 post-graduate students.

1.3 Graduate program

In spring 2009, there were 22 graduate students, whose areas of concentration mirror the faculty's interests.

1.4 Undergraduate program

In spring 2009, there were 75 undergraduate students majoring in Biometry and Statistics. Cornell is one of the few universities in the country where a student can major in this discipline at the undergraduate level. BSCB undergraduates bring interests in other subjects, including biology, business, mathematics, natural resources, and education.

1.5 Extension activity

The department has no formal extension duties.

1.6 Consulting services

The department participates in the Cornell Statistical Consulting Unit, a free statistical consulting service for the Cornell community. Most consulting clients of BSCB faculty are graduate students and faculty in the statutory colleges engaged in research. This service also assists staff and undergraduates from the statutory colleges, as well as clients from most other colleges on campus. Collaborative research projects sometimes develop from the consulting service. Graduate students attend the consulting sessions for training purposes.

1.7 Noteworthy facilities (e.g. unique classrooms, laboratories, farms, etc.)

None.

2.0 SUBJECT DESCRIPTION AND GUIDELINES

2.1 Subject definition

Biometry is the theory and application of statistics, mathematics, and computing to biological problems. Computational biology is the application of computer science, statistics, and mathematics to problems in biology. Much of computational biology is concerned with the analysis of molecular data, such as bio-sequences (DNA, RNA, or protein sequences), three-dimensional protein structures, gene expression data, or molecular biological networks (metabolic pathways, protein-protein interaction networks, or gene regulatory networks).

2.2 Subject scope

The research in the field of biometry goes hand in hand with research and developments in the biological sciences, making contributions to traditional areas such as agricultural field sciences; animal breeding; plant, animal, and human epidemiology; and ecology and evolutionary biology. Biometricians also make contributions to emerging trends in evolutionary biology, molecular genetics, and environmental sciences. If biometry is divided by type of activity rather than the field of application, then one could make the broad categorizations of design of scientific investigations (including both experiments and observational studies), analysis of data from these studies and other sources, bio-mathematical modeling, and theoretical and computational biology. A complete scientific project could involve aspects of all four. *[NOTE: It's rare that all four would be involved, although common that more than one would be involved.]*

A broad list of faculty interests should include:

Linear models, generalized linear models, random effects, Monte Carlo methods, statistical

genetics/genomics, Bayesian statistics, population genetics/genomics, computational statistics, molecular evolution, model selection, dynamical systems, functional data analysis, high dimensional visualization, semi-parametric regression, quantitative genetics/genomics; statistical genetics; computational biology; pathway modeling; multivariate analysis, experiment design, comparative genomics, statistical methods for point process data, epidemiology and public health, statistical computing, combinatorics.

Other areas which should be collected include

No suggestions by departmental faculty.

A list of subject areas not mentioned above but of interest to faculty -- or -- items that should be shifted from above to this section.

No suggestions by departmental faculty.

Exclusions from collection profile: Books of problems or exercises.

2.3 Emerging trends in the subject area

Some major trends in biological statistics and computational biology: Non-parametrics, computational inference, model selection, graphical models.

List of recent trends in field and interests by the department.

No suggestions by departmental faculty.

3.0 SPECIAL INFORMATION NEEDS AND RESOURCES

3.1 Special information needs of those working in this subject area.

No suggestions by departmental faculty.

3.2 Special collections or noteworthy resources in the field

MathSciNet -- Online

Current Index to Statistics -- Math Library and ILR Library.

Index to Statistics and Probability. Math Library

BIOSIS -- Online

3.3 Endowment funds or special funding arrangements

Biomedical--Epidemiology

Longley-Cook--General biology

Mann Endowment--General biology

Regula--General biology

Sarna--Genetics

4.0 TYPES OF MATERIALS

4.1 Priorities for types of materials

See Priorities Table.

4.2 Format

4.3 Geographical guidelines

The countries generating statistical/biometrical/computational biological information of interest are the U.S, China, England, France, Germany, Japan, India, Russia, and Taiwan.

4.4 Language guidelines

Almost all the important publications are available in English. As a rule, do not purchase non-English language materials.

4.5 Chronological guidelines

Unless recommended by the department, do not purchase materials published more than 10 years ago.

5.0 OTHER RELATED LIBRARY COLLECTIONS

The department uses the Math Library as heavily as it does Mann. The Engineering, Veterinary, ILR, and Johnson School of Management Libraries are also used.

6.0 POLICY QUESTIONS, COLLECTION NEEDS, FUNDING PROBLEMS OR OPPORTUNITIES

There is a need for general statistics texts which are not specifically biologically-oriented. Specific texts will be recommended by department faculty. Textbooks for programming in the C+ language would also be useful. Textbooks for programming in the R, S-PLUS, MATLAB, Minitab, SAS, and JMP statistical software would also be useful.

7.0 PRINCIPAL LC CLASSES

QA273-299	Mathematics. Probabilities. Mathematical Statistics.
QH323.5	Biology. Evolution.
QH426	Biology. Genetics.

8.0 RELATED COLLECTION POLICIES

Education--mathematics education

9.0 PRIORITIES TABLE for BIOLOGICAL STATISTICS AND COMPUTATIONAL BIOLOGY

Code	IMPORTANCE / INTENSITY CODE DEFINITIONS
NA	Not applicable to discipline.
0	Ephemeral; of insufficient value to be provided by library.
1	Of short term interest, but with little or no enduring value; very selectively acquired; retained, uncataloged, for limited duration only, e.g. newsletters in newly emerging, poorly documented areas, and manuals or pamphlets for reserve reading.
2	Limited scholarly interest or utility; collected very selectively, but not of high priority.
3	Important for research and/or instruction; should be well represented, but collected selectively rather than intensively.
4	Very important for faculty and/or students; intensively collected, i.e. every effort is made to provide as deep coverage of this literature as possible.
5	Essential to work in the discipline; the most important type of material for research or instruction purposes. Ensuring the highest possible coverage should be the library's top priority in this discipline.

Code	Serials
5	Journals, scholarly
5	Journals, technical
-	Journals, other (describe)
3	Annual reviews, advances in ...
2	Scientific and technical reports and research bulletins of major academies, learned societies, professional research and educational organizations and government agencies
2	Proceedings, of international congresses or symposia
2	Proceedings, national or local
2	Statistical series (this would be statistical DATA series, i.e. Census)
0	Trade journals and periodicals

0	Popular periodicals, hobby
0	Popular periodicals, semi-technical
0	Popular periodicals, farm press
3	Newsletters/newspapers
0	Proceedings of legislative bodies
0	Student publications
0	Administrative publications of major academies, learned societies, professional, research and educational organizations and government agencies
0	Corporate annual reports
0	Yearbooks
3	Press releases
0	Working papers
0	International Research Center Annual Reports
Code	Monographs
3	Major scholarly monographs
3	Professional and technical
3	Subject histories
5	Textbooks, upper division, graduate [<i>NOTE: in statistics and computational biology</i>]
2	Biographies
2	Popular monographs
2	Technical reports/bulletins
2	Government reports
2	Proceedings, international
2	Proceedings, national

1	Theses and dissertations from outside CU
2	Festschrift
0	Patents
0	Corporate histories
0	How-to book/handbooks/ lab manuals
0	Pamphlets
0	Maps
	Encyclopedias

Collection Policy History

Completed by C. McCulloch; Edited by Henry Murphy

February 3, 1993

Revised by Carlos Castillo-Chavez, Sam Demas, Steven Schwager and Linda Stewart

August 22, 1996

Revised by Gregory Lawrence, Steven Schwager, September 2009.