



Trainee and Faculty Handbook



University of Michigan Institutional Training Program in Genomic Science

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<http://csg.sph.umich.edu/training/>



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Rationale for the Training Program

Driven by advances in the Human Genome Project and advances in genome technology, genetics and genomics are taking an ever more central role in the biomedical sciences. In the same way, advances in computational methods are driving the mathematical sciences forward. These factors, the increasingly quantitative nature of the biomedical sciences, and the explosive growth of genetic and genomic data, have resulted in a rapidly increasing demand for individuals trained at the interface of genomics, statistics, and computer science. The successful translation of DNA sequence and annotation to address questions of human health and disease and to improve understanding of human evolution require the talents and energies of individuals trained at this interface. There is a severe shortage of individuals with this training. The goal of the University of Michigan Genome Science Training Program (UMGSTP) is to help fill this niche by training pre- and postdoctoral students at the interface between genomics, statistics, and computer science, with particular emphasis on training statistical human geneticists and human molecular geneticists with a strong grounding in statistics and quantitative analysis.

Even before the Human Genome Project, there existed a shortage of individuals with this training; that shortage now is acute. A growing number of positions are available in academia and industry, primarily in the biotechnology and pharmaceutical sectors. Since only a handful of statistical geneticists are trained each year, these positions are difficult to fill. Graduates of this Training Program help fill the need for statistical geneticists and genome scientists.

The fundamental premise of the UMGSTP is that graduates should have substantial training in both the mathematical and biological sciences and at their interface. This training facilitates communication between disciplines, identification of relevant, important problems, and identification of the mathematical and computational tools required to solve those problems. The training program includes core and elective coursework required of predoctoral trainees and available to postdoctoral trainees. Optional courses are available, and can be elected as time and interest permit. Predoctoral trainees complete a dissertation with substantial content in the area of statistical or computational genetics. Doctoral committees include at least two participating faculty members from the training program: one as committee chair, and one from another department as outside member. Consistent interaction between program faculty and trainees ensures that program requirements are met and that graduates emerge as well-trained statistical or computational geneticists or as molecular geneticists well-versed in statistical and computational issues.

Upon completion of training, graduates of the program take positions in academia, government, or industry. Graduates are expected to be involved in a host of research areas which may include identification of genetic variants that predispose to human diseases, mapping of quantitative trait loci and determination of the genetic architecture of quantitative traits, bioinformatics, and genetic epidemiology. Each of these areas requires that trainees gain simultaneous expertise in statistical and computational and

molecular genetics. Whether experimental design and analysis or study execution are emphasized depends on each trainee's background and training emphasis, but graduates are expected to take a more active part in all aspects of studies than would be possible for individuals with single-discipline training. Graduates can be expected to find a ready market for their talents, and to contribute in a significant way to the successful application of the tools of genomics to the understanding of human health and disease.

Training Environment at the University of Michigan

University of Michigan (<http://umich.edu/>) The University of Michigan is one of the nation's great public institutions of higher education, and has for many years been a leader in genetics, genomics, and the mathematical sciences. Faculty members in the Departments of Biostatistics, Human Genetics, and Epidemiology are involved in research and training in statistical, computational, and molecular genetics. Faculty in the Departments of Bioinformatics, Ecology and Evolutionary Biology, Mathematics, Molecular, Cellular and Developmental Biology, and Statistics also are involved in these activities (Table 1). Most teaching at the University is done during a two-semester academic year running from early September through late April. Graduate programs at the University are administered through the Horace H. Rackham School of Graduate Studies.

Department of Biostatistics (<https://sph.umich.edu/biostat/index.html>) The Department of Biostatistics at the University of Michigan was established in 1959 as a unit in the School of Public Health, and grew to prominence as a center for research and training starting in 1971 under the leadership of Richard G. Cornell. The Department has a strong research focus in statistical genetics, genomics, and bioinformatics, and has been successful in attracting substantial numbers of high quality students in this area. The Department is home to the University of Michigan Center for Statistical Genetics, directed by Michael Boehnke (<http://csg.sph.umich.edu/>). Besides statistical genetics, genomics, and bioinformatics, Department research emphasizes computational statistics, categorical data analysis, survival analysis, longitudinal and correlated data analysis, multivariate analysis, linear models, nonparametric and semiparametric modeling, clinical trials, Bayesian statistics, analysis of sample surveys, and statistical analysis with missing data. Substantive research areas in which departmental faculty are involved include genetics, epidemiology, cancer, gerontology, organ failure and transplantation, diabetes, ophthalmology, and biomedical imaging. The Department offers programs leading to Masters and doctoral degrees in Biostatistics and also trains PhD postdoctoral fellows. Departmental faculty have active and well-funded research programs emphasizing the development of statistical methods and their application to substantive problems in biomedicine.

Department of Human Genetics (<https://medicine.umich.edu/dept/human-genetics/>)

The Department of Human Genetics in the Medical School at the University of Michigan was established in 1956 under the leadership of James V. Neel, and was the first of its kind in the country. Long known for its strength in statistical and population genetics, the Department currently has outstanding strengths in molecular and developmental genetics. The Department offers programs leading to Masters and doctoral degrees in Human Genetics, and to the Masters degree in Genetic Counseling. Department faculty also train PhD and MD postdoctoral fellows. A residency program for medical genetics fellows was certified in 1999 under the direction of Jeffry Innis, a Participating Faculty member of the UM GSTP. Departmental faculty have active and well-funded research programs in many areas of genetics, including population genetics, molecular genetics, biochemical genetics, developmental genetics, regulation of gene expression, molecular cytogenetics, and gene therapy.

Department of Epidemiology (<http://www.sph.umich.edu/epid/>) The Department of Epidemiology in the School of Public Health was established in 1941 by Thomas Francis. The Department practices epidemiology as a broad scientific discipline addressing the causes of health and disease in populations, and integrating causal concepts at the molecular, cellular, medical, and social levels. Department faculty specialize in addressing these levels both individually and collaboratively. The Department has a strong commitment to both research and teaching in genetic epidemiology. The Department is home to the Certificate Program in Public Health Genetics (<http://sph.umich.edu/genetics/>), directed by J. Scott Roberts. Besides genetic epidemiology, Departmental research emphases include molecular epidemiology, infectious disease epidemiology, cancer epidemiology, cardiovascular disease epidemiology, and epidemiologic methods.

Other Participating Faculty Besides faculty in the Departments of Biostatistics, Human Genetics, and Epidemiology, other Participating Faculty at the University of Michigan are actively involved in research and training in statistical genetics and genomics (Table 1). Faculty are added as trainees identify suitable faculty members for advising and dissertation committee service. The Program Advisory Committee is charged with evaluating requests from faculty who wish to participate.

Table 1. Participating Faculty

Name	Department(s)	Telephone	E-Mail
Gonçalo Abecasis	Biostatistics	763-4901	goncalo@umich.edu
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Description of the Training Program

Training Program Core Courses Predoctoral trainees are expected to undertake a set of Program Core required courses (Table 2A) and one or more Program Core elective courses (Table 2B). The purpose of the core courses is to provide trainees with the fundamental knowledge needed to work at the interface of human genetics and the mathematical sciences. Core courses include: a year of probability theory and statistical inference (Biostatistics 601/602 or Statistics 425/426), a semester of public health genetics (Epid 515), a semester of either biological chemistry or molecular biology (BioChem 415/515 or MCDB 427), and a course in the ethical conduct of scientific research (PIBS 503). These fundamental courses are followed by the first year sequence for doctoral students in Human Genetics (Human Genetics 541 and 542) emphasizing molecular genetics, a course in statistical genetics (Biostatistics 666), and the Core elective course(s). Each of the required Core courses generally is offered every year. Group tutoring for program trainees is available for Biostatistics 666 and Human Genetics 541 and 542, and other Core courses as resources permit. Postdoctoral trainees may wish to audit some of these Core courses.

Individual core courses may be waived by the Program Advisory Committee based on relevant prior coursework, or in special cases for students who enter the training program after having undertaken a substantial portion of their graduate training.

Table 2A. Required Core Courses for the Training Program

Course	Course Title	Hours
Biology 305	Genetics OR	3
Epidemiology 515	Genetics in Public Health	3
MCDB 427	Molecular Biology OR	4
BioChem 415/515	Introductory Biochemistry	3
Biostatistics 601/602	Probability and Distribution Theory and Biostatistical Inference OR	4/4
Statistics 425/426	Introduction to Probability and Introduction to Theoretical Statistics	3/3
Biostatistics 666	Statistical Models and Numerical Methods in Human Genetics	3
Human Genetics 541	Molecular Genetics	3
Human Genetics 542	Molecular Basis of Human Genetic Disease	3
PIBS 503	Research Responsibility and Ethics OR	1
	Responsible Conduct of Research and Scholarship*	0
Biostatistics 615	Statistical Computing OR	3
Bioinformatics 402	Programming for Graduate Students OR	3
Bioinformatics 575	Programming Laboratory in Bioinformatics	3

*RCRS is a not-for-credit course required of all School of Public Health students modeled after PIBS 503

Table 2B. Elective Core Courses for the Training Program

Course	Course Title	Hours
Biostatistics 665	Statistical Population Genetics	3
Biostatistics 866	Advanced Topics in Genetic Modeling	3
Biostatistics 830	Advanced Topics in Biostatistics (when genetics topic)	1-4
Bioinformatics 527	Introduction to Bioinformatics and Computational Biology	4
Epidemiology 516	Genomics in Epidemiology	4
Statistics 547	Probabilistic Modeling in Bioinformatics	3

Trainees are encouraged to discuss with their advisors which among the alternate courses (Biostatistics 601/602 or Statistics 425/426, MCDB 427, or BioChem 415/515) are most appropriate given their backgrounds and interests. Generally, Biostatistics 601/602 is more challenging mathematically than Statistics 425/426.

For Biostatistics trainees, the training program Core partially satisfies general requirements in Biostatistics (Biostatistics 601 and 602) and PhD requirements for advanced specialty training in Biostatistics (Biostatistics 666 and 866), and fully satisfies requirements for cognate courses (Human Genetics 541 and 542). The result is that the training program typically requires a commitment of up to eight credit hours beyond standard Departmental requirements. For Human Genetics trainees, six of the Core credit hours are required courses (Human Genetics 541 and 542); the Department also requires twelve credit hours in courses outside of Human Genetics. The training program requires no additional coursework beyond that required for a degree but may require additional coursework to prepare for the Training Program. For Epidemiology trainees, the program requires three years of coursework and four to six years total, as for any Epidemiology student. Since the only requirements for all predoctoral students are Epidemiology 811 and 890, and all other course work is determined by the student's area of research, students in the Training Program do not need to take additional credit hours beyond standard Departmental requirements.

For those trainees with the interest and time to pursue additional coursework, several departments at the University of Michigan offer a wide array of courses in genetics, (bio) statistics, biology, and computer science. Courses that trainees are particularly encouraged to consider are listed in Table 3.

Table 3. Other Recommended Courses for Trainees

Name	Course Title	Hours
Anthropology 452	Population Genetics and Anthropology	4
Bioinformatics 523	Bioinformatics Basic Biology Lab	2
Bioinformatics 547	Probabilistic Modeling in Bioinformatics	3
Biostatistics 646	Molecular Genetic and Epigenetic Data Analysis	3
Biostatistics 675	Survival Time Analysis	3
Biostatistics 680	Stochastic Processes	3
Biostatistics 695	Analysis of Categorical Data	3
Biostatistics 815	Advanced Topics in Computational Statistics	3
Biostatistics 820	Readings in Biostatistics (when genetics topic)	1-4
Complex Systems 501	Introduction to Complex Systems	3
Complex Systems 511	Theory of Complex Systems	3
Environmental Health Sci 504	Genes and the Environment	2
Epidemiology 582	Molecular Epidemiology	3
Health Management Policy 517	Issues in Public Health Genetics	3
Human Genetics 630	Advanced Topics in Cellular & Molecular Genetics	1
Human Genetics 803	Advanced Topics in Genetics	2
Human Genetics 821/822	Student Seminar	1
Statistics 500	Statistical Learning I: Regression	3
Statistics 501	Applied Statistics II	3
Statistics 503	Statistical Learning II: Multivariate Analysis	4
Statistics 547	Probabilistic Modeling in Bioinformatics	3
Statistics 548	Computations in Probabilistic Modeling in Bioinformatics	1

Seminar Series, Journal Clubs, Readings Groups, and Guest Faculty Program An integral part of the training program are the Genome Training Program Seminar Series and a variety of journal clubs and readings groups led by training program faculty. The Seminar Series includes presentations by several invited visitors each year. Most of the visitors are invited for two-day visits during which they present a seminar and have the opportunity to meet with trainees and interested faculty. Table 4 lists seminar speakers during the 2016-2017 academic year.

Journal club and readings group topics vary, but have included sequence analysis, complex diseases, mathematical population genetics, and the analysis of expression data. Journal clubs and readings groups generally meet weekly or biweekly.

Trainees also are encouraged to attend relevant presentations in the Genetics Short Courses, the weekly departmental seminars in Human Genetics, and relevant seminars in Ecology and Evolutionary Biology; Molecular, Cellular and Developmental Biology; Biostatistics; Bioinformatics; and Epidemiology.

Table 4. 2016-2017 Seminar Speakers

Date	Speaker	Title
9/12/16	Suomya Raychaudhuri, Harvard Medical School	The Genomics of Immune-mediated diseases and traits
2/16/17	Yun Li, University of North Carolina at Chapel Hill	Statistical Methods, Computation Tools and Visualization of Hi-C Data
2/23/17	Lars Fritsche, K.G. Jebsen Center for Genetic Epidemiology	Exploring the Potential of Genome x Phenome-wide Association Studies
3/10/17	Claus Ekstrom University of Copenhagen	Integrative Data Analysis of the Danish Registries
3/21/17	Jonathan Terhorst, University of California, Berkeley	Robust and Scalable Inference of Population History and Selection from Hundreds of Whole Genomes
4/11/17	Mike Snyder, Stanford University	Managing Health and Disease Using Omics Data
4/13/17	Sandrine Dudoit, University of California, Berkeley	Using Single-Cell Transcriptome Sequencing to Infer Olfactory Stem Cell Fate Trajectories
4/21/17	Mingyao Li, University of Pennsylvania	Statistical Issues in Single-Cell RNA Sequencing Analysis

Training Program Orientation To begin the year, a one-day orientation gathers new and returning trainees and faculty together to review the goals and expectations of the GSTP. Other activities are planned to help trainees and faculty get to know each other and learn about some of the research that is occurring within the Program. Orientation is scheduled before classes begin so that new trainees meet other trainees and faculty who can act as a support network prior to classes starting.

Training Program Retreat A highlight each year is the annual retreat, generally held in May or June after classes have ended. The retreat is a one-day event at which students and faculty discuss a theme relevant to genome research. One or more outside speakers are also invited. Themes for recent retreats have included scientific presentation, grant proposal writing, grant proposal review, visual display of data, presentation skills and leadership skills. The retreat also provides students and faculty the opportunity to review the training program, its goals, its day-to-day activities, to suggest modifications, and allows training grant participants to interact in a less formal setting.

Training in the Ethical Conduct of Science The NIH mandates that trainees receive training in the ethical conduct of science. To meet this requirement, trainees are required to take part in two activities: the University of Michigan on-line self-study Program for Education and Evaluation in Responsible Research and Scholarship (PEERRS) and the course PIBS 503: Research Responsibility and Ethics.

PEERRS is a web-based program for members of the University of Michigan community engaged in research. Faculty, staff, and students are required to use the modules and certification tests to improve their knowledge and awareness of responsible research practices. The modules include: (1) Conflict of Interest; (2) Foundations of Good Research Practices; (3) Research Administration; (4) Human Subjects Biomedical and Health Sciences; (5) Human Subjects Social and Behavioral Sciences; and (6) Authorship, Publication, and Peer Review. Each module consists of 20-30 web pages containing core material, short case studies with questions, and pop-ups with additional information. Multiple-choice exams are given for each module. PEERRS provides an excellent introduction to responsible research practices, requires 8-12 hours to complete, and is both informative and engaging. Trainees are strongly encouraged to complete PEERRS within their first few weeks in the Program, and are required to do so in their first semester (<http://my.research.umich.edu/peerrs/>).

Human interaction and active discussion are critical when dealing with such an important and complex topic as research responsibility. For that reason, trainees also are required to enroll in the course PIBS 503: Research Responsibility and Ethics. This course covers topics which overlap those in PEERRS, including (1) Fraud, Fabrication and Plagiarism; (2) Data Storage and Ownership and Peer Review; (3) Animal Use and Care; (4) Human Subjects Research and IRBS; (5) Conflict of Interest; (6) Research in the Global Workplace; and (7) Dual Use Issues. Participants must also engage their PI in a discussion of ethical practices particular to their laboratory. The course combines lectures, panel discussions, informal debates, and faculty-led small group discussions. Trainees are required to take the course, and are strongly encouraged to do so in their first semester of the Training Program

(<https://medicine.umich.edu/medschool/education/phd-programs/about-pibs/pibs->

[curriculum/research-responsibility-ethics](#)). *Students in the School of Public Health are required to take a department approved alternative course.*

Trainee Research Experience All trainees are expected to be actively involved in research, beginning no later than the end of the first year of training support. Laboratory rotations across disciplines are encouraged for trainees with appropriate backgrounds and interests (such as a Biostatistics student working with a faculty member in Human Genetics). Student research activities and experience are actively monitored by faculty mentors, and are one of the key elements discussed in each student's annual review. Directed research experience beginning early in the trainee's program helps to insure that the transition from coursework to dissertation research is smooth and efficient. To assist trainees in becoming involved in research, the training program provides the opportunity for individuals new to the University of Michigan to join the training program in the summer prior to classes starting in September. This allows incoming trainees to become established in a research group and initiate work on a research project prior to the beginning of class work. Our experience suggests that this is a particularly useful way not only to get started with research, but also to become integrated in the University of Michigan community.

Dissertation work for trainees focuses on a topic involving statistical or computational genetics. This can range from a statistical dissertation that develops new theory and applies it to relevant data to a molecular genetics dissertation that identifies and applies appropriate mathematical or statistical tools to the scientific problem under consideration. The dissertation advisor is a member of the Participating Faculty of the training program; a second training program faculty member from another department also serves on the dissertation committee. Trainees thus have a strong emphasis on statistical and computational genetics throughout their program, with active monitoring and mentoring to insure graduates are well-trained statistical or computational geneticists, or molecular geneticists well versed in statistical and computational genetics.

Teaching Preceptorship Trainees are strongly encouraged to serve as instructors or teaching assistants for at least one semester. Teaching experience helps prepare trainees for their future careers, and improves job prospects for those interested in academic careers. Opportunities for teaching are available to students in the Departments of all Participating Faculty.

Sample Programs for PreDoctoral Trainees

Biostatistics All departments of biostatistics place a much heavier emphasis on coursework than one encounters in the biological sciences. Coursework provides an efficient means to teach an array of statistical tools and approaches to students who come to the graduate program with strong mathematical training but limited preparation in statistical theory and methods. A program for a Biostatistics UMGSTP predoctoral trainee requires 3 to 3.5 years of coursework and five to six years total, as for any Biostatistics student. An example program is presented in Table 5. It includes Biostatistics-required Masters and doctoral courses in biostatistics, mathematics, and epidemiology (Biostat 601, 602, 650, 651, 653, 680, 699; Math 451; Biostat 801, 802, 611; Epid 516), elective courses in biostatistics (Biostat 666, 695, 815, 820/830, 866), an undergraduate course in public health genetics (Epid 515), cognate courses in genetics and molecular biology (Hum Gen 541, 542; MCDB 427), and a course on the ethical conduct of scientific research (Biostat 810). The Training Program Core can be applied to PhD requirements for elective courses in biostatistics (Biostat 666 and 866), and fully satisfies requirements for cognate courses (Hum Gen 541 and 542). The result is that the Training Program requires up to ten credit hours beyond standard Departmental requirements, depending on trainee preparation.

Human Genetics Human Genetics emphasizes learning through lab rotations and places less emphasis on formal coursework. A sample program for a Human Genetics trainee is presented in Table 6. It includes core courses, student seminars, short courses, and lab rotations in Human Genetics (Hum Gen 541, 542, 803, 821, 822, 990), courses outside of Human Genetics (Biostat 601, 602, 666, 866; Pharm 502), and a course on the ethical conduct of scientific research (PIBS 503). An additional research rotation is included during the spring and summer at the end of the first year, but students do not register for a formal course at that time. Interested students are encouraged to augment this program with additional courses in Biostatistics. Likely choices include Biostat 830: Advanced Topics in Biostatistics, Biostat 650: Applied Statistics I - Linear Regression, and Biostat 651: Applied Statistics II - Extensions for Linear Regression. For Human Genetics trainees, six of the core credit hours are for required courses in Human Genetics (Hum Gen 541, 542); in addition, the Department requires twelve credit hours in courses outside of Human Genetics. The result is that the Training Program requires a commitment of up to six additional credit hours beyond standard Departmental requirements.

Epidemiology A program for an Epidemiology predoctoral trainee requires three years of coursework and four to six years total, as for any Epidemiology student. An example program is presented in Table 7. It includes Epidemiology-required doctoral courses (Epid 811, 812, 890), courses in biostatistics (Biostat 601, 602, 650, 651, 666), and additional courses in genetics (Hum Gen 541, 542). Because the only requirements for all predoctoral students are Epidemiology 811, 812, and 890, and all other course work is determined by the student's area of research, students in the Training Program do not need to take additional credit hours beyond standard Departmental requirements.

Predocctoral Training Programs for Trainees from Other Departments Trainees from other departments, including Bioinformatics, Ecology and Evolutionary Biology, Molecular and Cellular Biology, Mathematics, and Statistics, together with their mentors, are expected to develop programs of courses of a comparable nature. As with the sample course programs outlined above, these course programs include the PhD requirements of the trainee's home department and all UMGSTP Core courses.

Training Programs for Postdoctoral Trainees Training programs for postdoctoral trainees vary depending on background, but combine research training with the opportunity to audit courses in computational, statistical, population, and molecular genetics. Likely courses include Human Genetics 541 and 542, Biostatistics 666, 820, 830, and 866, and Biology 490. While the primary goal of a post-doctoral fellow is to carry out research and publish papers, well-chosen coursework can be a useful component of the postdoctoral experience.

Table 5. Sample Program for Biostatistics Predoctoral Trainees

Year 1, Fall

Bioinformatics 523	Bioinformatics Basic Biology Lab (“Biology Boot Camp”) (2)
Biostatistics 601	Probability and Distribution Theory (4)
Biostatistics 650	Applied Statistics I: Linear Regression (4)
Biostatistics 666	Statistical Models and Numerical Methods in Human Genetics (3)
Public Health 610	Introduction to Public Health (1)
Biostatistics 810	Approaches to the Responsible Practice of Biostatistics (1)

Year 1, Winter

Biostatistics 602	Biostatistical Inference (4)
Biostatistics 646	High-Throughput Molecular Genetic and Epigenetic Data Analysis (3)
Biostatistics 651	Applied Statistics II: Extensions for Linear Regression (3)
Mathematics 451	Advanced Calculus I (3)

Year 2, Fall

Biostatistics 615	Statistical Computing (3)
Biostatistics 653	Applied Statistics III: Longitudinal Analysis (3)
Epidemiology 515	Genetics in Public Health (3)
Biostatistics 801	Advanced Inference I (3)

Year 2, Winter

Biostatistics 699	Analysis of Biostatistical Investigations (4)
Epidemiology 516	Genomics in Epidemiology (4)
Biostatistics 802	Advanced Inference II (3)

Year 3, Fall

Biostatistics 680	Applications of Stochastic Processes I (3)
Biostatistics 695	Analysis of Categorical Data (3)
Biostatistics 830	Statistical Modeling of High-Throughput Sequencing Data (3)
Human Genetics 541	Molecular Genetics (3)

Year 3, Winter

Biostatistics 665	Statistical Population Genetics (3)
Biostatistics 815	Advanced Topics in Computational Statistics (3)
Biostatistics 880	Statistical Analysis with Missing Data (3)
Human Genetics 542	Molecular Basis of Human Genetic Disease (3)

These are example course schedules only. Ideal schedules will vary between students based on interests and past coursework, and some of the classes listed may not be offered every year. Students should discuss their own course schedules with their advisors.

Table 6. Sample Program for Human Genetics Predoctoral Trainees

Year 1, Fall (PIBS)

Biostatistics 601	Probability and Distribution Theory [†] (4)
Human Genetics 541	Molecular Genetics (3)
Human Genetics 544	Basic Concepts in Population and Statistical Genetics (3)
Human Genetics 821	Genetics Program Student Seminar (1)
PIBS 503	Research Responsibility and Ethics (1)
PIBS 600	Biomedical Sciences Independent Study (1-3)
PIBS 800	Professional/Career Development Seminar (1)

Year 1, Winter (PIBS)

Biostatistics 602	Biostatistical Inference [†] (4)
Human Genetics 542	Molecular Basis of Human Genetic Disease (3)
Human Genetics 551	Computational Genomics (3)
Human Genetics 803	Current Topics in Genetics (1)
Human Genetics 822	Genetics Program Student Seminar (1)
PIBS 600	Biomedical Sciences Independent Study (1-3)

Year 2, Fall (GSTP)

Biostatistics 666	Statistical Models and Numerical Methods in Human Genetics (3)
Human Genetics 821	Genetics Program Student Seminar (1)
Human Genetics 990	Research Rotation (3-6)
Statistics 500	Statistical Learning I: Regression (3)

Year 2, Winter (GSTP)

Human Genetics 822	Genetics Program Student Seminar (1)
Human Genetics 990	Research Rotation (3)
Pharmacy 502	Introduction to Scientific Communication (2)
Statistics 503	Applied Multivariate Modeling (3)
	Elective Course from another department (3)

Year 3, Fall (GSTP)

Biostatistics 866	Advanced Topics in Genetic Modeling (3)
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Year 3, Winter (GSTP)

	Elective Course from another department (3)
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All Human Genetics doctoral students receive funding in their first year from the Program in Biomedical Sciences (PIBS); GSTP support generally starts in the second year, although GSTP participation from the first year is encouraged.

These are example course schedules only. Ideal schedules will vary between students based on interests and past coursework, and some of the classes listed may not be offered every year. Students should discuss their own course schedules with their advisors.

[†] - Depending on previous mathematical background and training, students may consider substituting Statistics 425/426 for Biostatistics 601/602. For students without relevant, prior programming experience, a computer science course is required.

Table 7. Sample Program for Epidemiology Predoctoral Trainees

Year 1, Fall

Biochemistry 515	Introductory Biochemistry (3)
Biostatistics 601	Probability and Distribution Theory (4)
Epidemiology 811	Critical Appraisal of Epidemiologic Studies (3)
Human Genetics 541	Molecular Genetics (3)
Epidemiology 889	Responsible Conduct of Research & Scholarship (1)

Year 1, Winter

Biostatistics 602	Biostatistical Inference (4)
Epidemiology 824	Advanced Epidemiological Methods (3)
Human Genetics 542	Molecular Basis of Human Genetic Disease (3)
Epidemiology 889	Responsible Conduct of Research & Scholarship (1)

Year 2, Fall

Bioinformatics 575	Programming Laboratory in Bioinformatics (3)
EHS 504	Genes and the Environment (2)
Epidemiology 515	Genetics in Public Health (3)
Human Genetics 544	Basic Concepts in Population and Statistical Genetics (3)
Human Genetics 803	Current Topics in Human Genetics (2)

Year 2, Winter

Biostatistics 666	Statistical Models and Numerical Methods in Human Genetics (3)
Epidemiology 516	Genomics in Epidemiology (4)
Epidemiology 582	Molecular Epidemiology (3)
Epidemiology 890	Doctoral Seminar in Epidemiology (2)
Human Genetics 630	Advanced Topics in Cellular and Molecular Genetics (1)

Year 3, Fall

Biostatistics 650	Applied Statistics I: Linear Regression (4)
Biostatistics 866	Advanced Topics in Genetic Modeling (3)
Human Genetics 630	Advanced Topics in Cellular and Molecular Genetics(1)
HBHE 610	Issues in Public Health Ethics (3)

Year 3, Winter

Bioinformatics 530	Introduction to Bioinformatics, Systems Biology and Predictive Modeling (3)
Biostatistics 651	Applied Statistics II: Extensions for Linear Regression (3)
Biostatistics 830	Advanced Topics in Biostatistics (1-4)

EHS and HBHE are the departments of Environmental Health Sciences and Health Behavior and Health Education in the School of Public Health.

These are example course schedules only. Ideal schedules will vary between students based on interests and past coursework, and some of the classes listed may not be offered every year. Students should discuss their own course schedules with their advisors.

Table 8. Sample Program for Bioinformatics Predoctoral Trainees

Year 1, Fall (PIBS)

Bioinformatics 527	Introduction to Bioinformatics and Computational Biology (4)
Biostatistics 601	Probability and Distribution Theory† (4)
Human Genetics 541	Molecular Genetics (3)
PIBS 503	Research Responsibility and Ethics (1)
PIBS 600	Biomedical Sciences Independent Study (1-3)
PIBS 800	Professional/Career Development Seminar (1)

Year 1, Winter (PIBS)

Bioinformatics 575	Bioinformatics Computing (3)
Bioinformatics 602	Bioinformatics Journal Club (1)
Human Genetics 542	Molecular Basis of Human Genetic Disease (3)
PIBS 600	Biomedical Sciences Independent Study (1-3)
PIBS 800	Professional/Career Development Seminar (1)

Year 2, Fall (GSTP)

Biostatistics 666	Statistical Models and Numerical Methods in Human Genetics (3)
Bioinformatics 990	Research Rotation (3)
Statistics 500	Statistical Learning I: Regression (3)

Year 2, Winter (GSTP)

Bioinformatics 990	Research Rotation (3)
Bioinformatics 545	High-Throughput Molecular Genomic and Epigenetic Data Analysis (3)
Statistics 503	Statistical Learning II: Multivariate Analysis (4)

Year 3, Fall (GSTP)

Biostatistics 615	Statistical Computing (3)
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Year 3, Winter (GSTP)

Elective course from another department (usually statistics if also pursuing a Statistics MS) (3)

These are example course schedules only. Ideal schedules will vary between students based on interests and past coursework, and some of the classes listed may not be offered every year. Students should discuss their own course schedules with their advisors.

All Bioinformatics doctoral students receive funding in their first year from the Program in Biomedical Sciences (PIBS); GSTP support generally starts in the second year, although GSTP participation from the first year is encouraged.

†Depending on previous mathematical background and training, students may consider substituting Statistics 425/426 for Biostatistics 601/602.

PIBS 800 (required during the PIBS terms) consists of special presentations on professional and personal development, including how to give a scientific presentation, nontraditional careers, how to communicate effectively, and how to maintain physical and mental wellness.

Mentoring

Each trainee will select or be assigned to a faculty mentor in their own department, with the option of a faculty mentor in another department and/or a more senior trainee mentor. The goal of this multi-prong mentoring approach is to encourage interaction and support from several individuals with different backgrounds and expertise. Once the dissertation advisor is identified, the dissertation advisor becomes the faculty mentor; if not already a participating faculty, s/he is invited to join, upon approval by the Program Advisory Committee. The primary faculty mentor meets regularly with the trainee to discuss class schedule, research program, compliance with traineeship requirements, and overall progress to degree. The secondary mentor and senior trainee mentor meet with new trainees in their first few weeks at Michigan, and as needed thereafter. At least one member of the participating faculty outside the trainee's own department generally serves on the trainee's doctoral committee.

The Program Director is always available to trainees to discuss individual programs of study as well as the overall training program, and meets annually with trainees to provide supplementary information on the training program, answer questions, and listen to suggestions and hear concerns. The Program Advisory Committee reviews student schedules annually to verify that the student programs are consistent with the requirements of the training program.

Applying to the Program and Trainee Selection

Applicants to this program generally are of three types: (1) predoctoral students who seek doctoral training in the mathematical sciences with a strong emphasis in human genetics, (2) predoctoral students who seek doctoral training in the biological sciences with a strong interest in biostatistics and human genetics, and (3) postdoctoral students with PhDs in the mathematical or biological sciences who seek training at the interface between statistical and molecular genetics. Applicants may come from the participating departments of Biostatistics, Human Genetics, and Epidemiology or from the departments of the other participating faculty: Bioinformatics, Ecology and Evolutionary Biology; Molecular, Cellular and Developmental Biology; Mathematics; Statistics; or from departments not currently identified with the training program.

Students apply initially to one of the departments of the participating faculty. Departments or participating faculty then nominate students for support by the training program; students also may nominate themselves by contacting the program director directly. Applicants who contact the training program directly are queried regarding their interests and sent to the appropriate department.

The Program Advisory Committee evaluates applicants based on relevance of interests to Training Program goals, confidence that the applicant will fulfill Training Program requirements, grades and universities attended, preparation for graduate program and the UMGSTP, GRE scores, letters of recommendation, and any other evidence of quality and competence provided by the applicants and their sponsoring departments.

Program trainees are expected to complete all training program requirements. (See page 7)

The training program supports thirteen pre- and postdoctoral trainees each year. Funding usually is for an initial two years of support **with the third year possible on a competitive basis**. Students who are not chosen to be financially supported by the program may still be offered training member status. These students will be supported financially by their home departments, and may include training program alumni, individuals who are not eligible for training program support (for example, international students), and well-qualified students who were not selected for training program support. Members will be eligible to participate in all training program activities. Applications for trainee membership and support for the 2018-2019 academic year are due March 1, 2018.

Program Administrative Structure

The Program administrative structure includes the Program Director, the Program Associate Director, and the Program Advisory Committee.

The Program Director is responsible for the overall administration of the UMGSTP. S/he is a member of one of the three participating departments, Biostatistics, Human Genetics, or Epidemiology. The Program Director serves as chair of the Program Advisory Committee, and is responsible for interactions with the funding agency. Together with the Program Advisory Committee, s/he is responsible for setting the overall direction of the UMGSTP, including curriculum, seminars, trainee recruitment and admissions, and monitoring of student progress. In concert with the Participating Faculty, s/he insures that trainees fulfill all Program requirements. The Program Director meets with trainees at the start of their first year to discuss UMGSTP support and requirements, and annually to insure those requirements are being fulfilled. The Program Director is available to trainees to provide information on the Training Program, to answer questions, and to receive suggestions. Such discussions may include the topic of Core courses and how well they meet trainee needs. Based on these comments, informal feedback -- such as suggestions for minor changes in emphasis -- may be provided to course instructors, most of whom are Participating Faculty in the UMGSTP. The Program Director is also the liaison with the Participating Departments and with other Participating Faculty.

The Program Associate Director assists the Program Director on all tasks listed above. In addition, s/he plays a leading role in trainee recruitment and retention. The Associate Director is a member of a Participating Department not represented by the Program Director, and provides liaison with that Department. S/he also serves on the Program Advisory Committee.

The Program Advisory Committee is the governing body of the Training Program, and provides advice to the Program Director and Associate Director on all matters relating to the Training Program. Committee members include representatives from each of the participating departments of Biostatistics, Human Genetics, and Epidemiology, and

Participating Faculty outside the participating departments. Formal meetings of the Program Advisory Committee occur several times each year, and Committee members interact frequently by e-mail, at seminars, at informal lunches, and at other Training Program events.

Program Advisory Committee members are responsible for setting curriculum, for student recruitment, and for selecting trainees to support. Each year, the Program Advisory Committee meets to review trainee progress, to insure trainee programs are consistent with the requirements of the UMGSTP, and to determine whether trainee funding should continue. In conjunction with the trainees, the Program Advisory Committee is responsible for selection and hosting of guest faculty and seminar speakers, and plans the annual retreat and guest faculty visit. In the event a member of the Program Advisory Committee withdraws, the remaining members of the Committee select a new member. In the event that the Program Director or Associate Director should leave the University of Michigan or be unable to serve, the Committee is responsible for identifying a new Program Director or Associate Director.

The Program Advisory Committee considers suggestions or requests for program modification. This might include modifications to the Core curriculum or course waivers or substitutions based on prior coursework. Simple substitutions, such as a statistics course for a comparable biostatistics course, are routinely granted; more complex substitutions, such as replacement of a Core course, require clear justification. Students who enter the training program after already having started their graduate program may under special circumstances be allowed a reduced set of training program requirements. The guiding principle in such deliberations is to offer flexibility without compromising program goals.

While the Program Advisory Committee plays the primary role in setting Program direction, other Participating Faculty and trainees may contribute to decisions made and directions taken. Faculty input usually is informal through interaction with the Director or other members of the Program Advisory Committee. The fall orientation and the spring retreat are also times at which the UM GSTP faculty and students discuss the Program and possible improvements.

The Participating Faculty members carry out the most important work of the UMGSTP, the day-to-day training and mentoring of the trainees. Participating Faculty serve as PhD advisors and committee members, teach courses, supervise laboratory rotations, and serve as role models for the trainees. The participating faculty for this training program (Table 1) represent a wide range of departments and schools at the University of Michigan. In addition to the training faculty, there are many other faculty on campus interested in genetics and the mathematical sciences, and trainees are encouraged to interact with them. We expect to continue to add to the participating faculty of the training program that way.

Maintaining the Training Grant

Funding for this training grant began July 1, 1995 and lasted for five years. Competing renewal applications were submitted and approved for additional years of funding, now through June 30, 2020. Annual reports to the National Human Genome Research Institute are required each year, and a competing renewal proposal every five years. We ask that trainees help with both these efforts, so that funding will continue during the current funding period, and so that the training grant will continue to be renewed in order for other students to be supported. Specifically, we ask trainees to:

- (1) prepare brief annual reports describing the research they are doing, the courses they have taken, and listing papers and abstracts on which they are an author or coauthor;
- (2) acknowledge support from training grant T32 HG00040 in any papers on which they are author or coauthor and on which they worked at any time during their tenure as a training program trainee;
- (3) keep the Program Director informed of where they are working after their time as a trainee ends;
- (4) provide the Program Director with their current curriculum vita prior to grant resubmission.

Lists of current and past trainees follow (Tables 9 and 10).

Table 9. Current Program Trainees

Name	Department	Pre/ Post- doctoral	Advisor	Year Admitted to U of M	Year Admitted to GSTP
Alexandre Daly	Human Genetics	Pre	Camper	2014	2017
Sarah Hanks	Biostatistics	Pre	Boehnke	2016	2016
Abhay Hukku	Biostatistics	Pre	Wen	2016	2016
Kristen Kelly	Epidemiology	Pre	Mezuk	2016	2017
Zena Lapp	Bioinformatics	Pre	Snitkin	2016	2017
Yatong Li	Biostatistics	Pre	Lee	2016	2017
Michelle McNulty	Biostatistics	Pre	Zoellner	2016	2016
Sierra Nishizaki	Human Genetics	Pre	Boyle	2014	2016
Peter Orchard	Bioinformatics	Pre	Parker	2015	2016
Christine Rygiel	Environmental Health Sciences	Pre	Dolinoy	2017	2017
Nicole Wakim	Biostatistics	Pre	Jiang	2016	2016
Alexandra Weber	Bioinformatics	Pre	Burmeister	2016	2016
Joshua Weinstock	Biostatistics	Pre	Abecasis	2016	2016

Table 10. Past Program Trainees

Past Predoctoral Trainees

Name	Department	Mentor	Years in Training Program	Current Position
Amanda Artis	Biostatistics	Zöllner	2010-2014	Biostatistician Biostatistics and Epidemiology Cleveland Clinic Cleveland, OH
Margaret Bakewell	Ecology & Evolutionary Biology	Zhang	2007-2009	Associate Director Center for Research on Learning and Teaching University of Michigan
Andrew Beck	Biostatistics	Boehnke	2014-2016	Software Developer Epic Madison, WI
Christine Beck	Human Genetics	Moran	2008-2011	Assistant Professor Jackson Labs Farmington, CT
Victoria Blanc	Biology	Adams	1997-1999	Biorepository Director University of Michigan Health System Ann Arbor, MI
Cathryn Bock	Epidemiology	Peyser	1998-2001	Associate Professor Oncology Wayne State University School of Medicine Detroit, MI
Katharine Brieger	Epidemiology	Abecasis/ Bakulski/ Koenig	2015-2017	PhD Student Epidemiology MD Student University of Michigan Ann Arbor, MI
David Buchner	Human Genetics	Meisler	2000-2002	Assistant Professor Genetics and Genome Sciences Case Western Reserve University Cleveland, OH
Jenna VanLiere Canzoniero	Bioinformatics	Rosenberg	2007-2008	Assistant Professor of Medicine Johns Hopkins School of Medicine Baltimore, MD

Name	Department	Mentor	Years in Training Program	Current Position
Jedidiah Carlson	Bioinformatics	Zöllner	2013-2016	PhD Student Bioinformatics University of Michigan Ann Arbor, MI
Andrea Cassidy-Bushrow	Epidemiology	Peysner	2002-2004	Assistant Scientist Public Health Sciences Henry Ford Health System Detroit, MI
Raymond Cavalcante	Bioinformatics	Sartor	2013-2015	Senior Bioinformatics Analyst Epigenomics Core University of Michigan Medical School Ann Arbor, MI
Jennifer Chisa	Human Genetics	Burke	2003-2004	Chief Scientific Officer Oakland Genetics Rochester, MI
Su Chu	Biostatistics	Abecasis	2011-2013	Postdoctoral Fellow Brigham & Women's Hospital Harvard Medical School Boston, MA
Nathan Cohen	Biostatistics	Abecasis	2014-2016	Biostatistician Jaeb Center for Health Research Tampa, FL
Justin Colacino	Environmental Health Sciences	Rozek	2011-2013	Assistant Professor Environmental Health Sciences University of Michigan Ann Arbor, MI
Tim Connallon	Ecology & Evolutionary Biology	Knowles	2006-2008	Lecturer Biological Sciences Monash University Clayton, Victoria Australia
Karen Conneely	Biostatistics	Boehnke	2001-2003 2004-2005	Associate Professor Human Genetics Emory University Atlanta, GA

Name	Department	Mentor	Years in Training Program	Current Position
Melinda Curran MacDougall	Biostatistics	Abecasis	2010-2012	Senior Programmer Arbor Research Collaborative for Health Ann Arbor, MI
Mike DeGiorgio	Bioinformatics	Rosenberg	2010-2011	Assistant Professor Biology Pennsylvania State University University Park, PA
Kathryn Demanelis	Environmental Health Sciences	Rozek	2014-2016	Postdoctoral Fellow Public Health Sciences University of Chicago Chicago, IL
Julie Douglas	Biostatistics	Boehnke	1995-1998	Associate Professor Mathematics Skidmore College Saratoga Springs, NY
William Duren	Biostatistics	Boehnke	1996-1998	Bioinformatics Programmer CCMB Initiative University of Michigan Ann Arbor, MI
Michael Epstein	Biostatistics	Boehnke	1996-1999	Professor Human Genetics Director Center for Computational and Quantitative Genetics Emory University Atlanta, GA
Tasha Fingerlin	Biostatistics/ Epidemiology	Boehnke Kardia	1999-2002	Researcher National Jewish Health Associate Professor Epidemiology Colorado School of Public Health Aurora, CO
Diane Flasch	Human Genetics	Moran	2011-2013, 2015-2016	Postdoctoral Fellow Computational Biology St. Jude Children's Hospital Memphis, TN
Matthew Flickinger	Biostatistics	Boehnke	2007-2010	Application Programmer Biostatistics University of Michigan Ann Arbor, MI

Name	Department	Mentor	Years in Training Program	Current Position
Michele Gornick	Human Genetics	Gruber	2007-2009	Research Investigator Internal Medicine University of Michigan Medical School Ann Arbor, MI
Wendy Grus	Ecology & Evolutionary Biology	Zhang	2005-2007	Data Analyst Hulu Seattle, WA
Omar Halawa	Bioinformatics	Athey	2004-2005	Anesthesiologist/Pain Specialist Oregon Anesthesiology Group Oregon City, OR
Pelle Hall	Bioinformatics	Sartor	2014-2016	
Doug Hom	Biostatistics	Zöllner	2009-2011	Biostatistician III Novartis Boston, MA
Keith Hunley	Anthropology	Merriwether	1999-2001	Associate Professor & Associate Chair Director of Undergrad Programs Anthropology University of New Mexico Albuquerque, NM
Anne Jackson	Human Genetics	Burke	1995-1997	Research Area Specialist Lead Biostatistics University of Michigan Ann Arbor, MI
Adam Jacob	Biostatistics	Scott	2015-2016	Senior Actuarial Assistant Centene Corporation Chicago, IL
Ethan Jewett	Bioinformatics	Rosenberg	2010-2011	Statistical Geneticist 23andMe Mountain View, CA
Kristina Jordahl	Biostatistics	Boehnke/ Kardia	2010-2012	PhD Student Epidemiology University of Washington Seattle, WA
Desmond Kearsley	Biostatistics	Boehnke	2015-2017	Actuarial Assistant Risk Adjustment Centene Corporation Chicago, IL

Name	Department	Mentor	Years in Training Program	Current Position
Charlie Krafchak	Epidemiology	Richards	2002-2004	Deceased, May 2009
Phoenix Kwan	Biostatistics	Boehnke	2011-2013	Principle Data Scientist Comcast Broomfield, CO
Ethan Lange	Biostatistics	Boehnke	1995-1998	Professor Division of Biomedical Informatics and Personalized Medicine University of Colorado Denver, CO
Carl Langefeld	Biostatistics	Boehnke	1996-1999	Director, Center for Public Health Genomics; Section Head and Professor, Biostatistical Sciences Wake Forest University School of Medicine Winston-Salem, NC
Ben Lerch	Biostatistics	Abecasis	2013-2015	Bioinformatics Test Engineer II Pacific Biosciences Menlo Park, CA
Heather Lerner	Ecology and Evolutionary Biology	Mindell	2003-2006	J. Moore Museum Director & Assistant Professor Biology Earlham College Richmond, IN
Albert Levin	Epidemiology	Kardia	1999-2002	Assistant Scientist and Director of the Henry Ford Health System Center for Bioinformatics Public Health Sciences Henry Ford Health System Detroit, MI
Xiao-Yi Li	Biostatistics	Boehnke	2005-2007	Data Scientist Research & Development DuPont Philadelphia, PA
Wei Lu/Vera Chiu	Human Genetics	Meisler	1998-2000	Mathnasium Owner and Center Director Ann Arbor, MI

Name	Department	Mentor	Years in Training Program	Current Position
Kathryn Lunetta	Biostatistics	Boehnke	1995-1996	Professor Biostatistics Boston University Boston, MA
Sharmila Basu Mann	Human Genetics	Burmeister	1996-1997	Director K-12 Institute Education Commission of the States Denver, CO
Elliott Margulies	Human Genetics	Innis	1999-2001	Director Scientific Research, Population and Medical Genomics Illumina San Diego, CA
Richard McEachin	Bioinformatics	States	1998-2000	Assistant Research Scientist Computational Medicine and Bioinformatics Managing Director Bioinformatics Core Biomedical Research Core Facilities University of Michigan Ann Arbor, MI
Brian Metzger	Ecology & Evolutionary Biology	Wittkopp/ Zhang	2009-2013	Postdoctoral Fellow University of Chicago Chicago, IL
Bryan Moyers	Bioinformatics	Zhang	2013-2015	Postdoctoral Fellow HudsonAlpha Institute for Biotechnology Huntsville, AL
Matthew Nelson	Human Genetics	Sing	1998-1999	Head Genetics GlaxoSmithKline Adjunct Associate Professor, Biostatistics, University of North Carolina, Chapel Hill Raleigh-Durham, NC
Bethany Niell	Epidemiology	Gruber	2001-2003	Radiologist Moffitt Cancer Center Tampa, FL

Name	Department	Mentor	Years in Training Program	Current Position
Laila Poisson	Biostatistics	Ghosh	2003-2005	Assistant Professor Public Health Sciences Henry Ford Health Systems Assistant Professor Wayne State University Detroit, MI
Jenny Poynter	Epidemiology	Gruber	2003-2005	Associate Professor Pediatric Epidemiology & Clinical Research University of Minnesota Minneapolis, MN
Yindra Puentes	Bioinformatics	Burmeister Sen	2012-2014	MCAT Content Lead Uworld, LLC Irving, TX
Kristen Stevens Purrington	Epidemiology	Gruber	2007-2009	Assistant Professor Cancer Biology School of Medicine Wayne State University Detroit, MI
Rosemary Putler	Biostatistics	Zöllner	2014-2016	Research Lab Specialist Department of Pediatrics University of Michigan School of Medicine Ann Arbor, MI
Corbin Quick	Biostatistics	Scott	2013-2015	PhD Student Biostatistics University of Michigan Ann Arbor, MI
Sara Rashkin	Biostatistics	Abecasis	2011-2013	Postdoctoral Fellow Epidemiology and Biostatistics University of California San Francisco, CA
Mark Reppell	Biostatistics	Boehnke	2009-2011 2012-2013	Senior Scientist II AbbVie Genomics Research Center Chicago, IL
Joshua Rest	Ecology and Evolutionary Biology	Mendell	2000-2002	Associate Professor Ecology and Evolution Stony Brook University Stony Brook, NY

Name	Department	Mentor	Years in Training Program	Current Position
Allison Richards	Human Genetics	Cheung	2014-2015	Postdoctoral Fellow Center for Molecular Medicine and Genetics Wayne State University Detroit, MI
Cassie Robertson	Biostatistics	Boehnke Scott	2012-2014	PhD Student Center for Public Health Genomics University of Virginia Charlottesville, VA
Henry Robertson	Biostatistics	Boehnke	2004-2005	Data Manager Population Health University of Texas at Austin Austin, TX
Rebecca Rothwell	Biostatistics	Zöllner	2011-2013	Mathematical Statistician Food and Drug Administration Silver Spring, MD
Laura Rozek	Epidemiology	Gruber	2000-2003	Associate Professor Environmental Health Sciences University of Michigan Ann Arbor, MI
Conner Sandefur	Bioinformatics	Douglas	2007-2008	Assistant Professor Biology University of North Carolina, Pembroke Pembroke, NC
Sarah Scarlett	Biostatistics	Taylor	2013-2015	Statistician Fulcrum Analytics Norwalk, CT
Valerie Schaibley	Human Genetics	Li	2009-2011	Administrator Center for Applied Genetics and Genomic Medicine University of Arizona Health Sciences Tucson, AZ
Stephanie Stenzel Schmit	Epidemiology	Gruber	2010-2012	Assistant Member Cancer Epidemiology Moffitt Cancer Center Tampa, FL

Name	Department	Mentor	Years in Training Program	Current Position
Nicole Scott	Human Genetics	Long	2006-2009	Founder and CEO Cybele Microbiome San Diego, CA
Theresa Daigneault Scott	Biostatistics	Abecasis	2001-2003	Senior Application Developer Division of Neonatology Vanderbilt University Medical Center Nashville, TN
Kaanan Shah	Human Genetics	Douglas	2008-2011	Computational Biologist Tempus Inc Chicago, IL
Ali Shojaie	Statistics	Shedden	2005-2007	Associate Professor Biostatistics University of Washington Seattle, WA
Andrew Skol	Biostatistics	Boehnke	2000-2003	Senior Statistical Geneticist Section of Genetic Medicine Department of Medicine University of Chicago Chicago, IL
Jennifer Smith	Epidemiology	Kardia	2006-2008	Assistant Professor Epidemiology University of Michigan Ann Arbor, MI
Lydia Smith	Anthropology	Merriwether	2001-2003	Laboratory Manager, Evolutionary Genetics Laboratory Associate Specialist, Museum of Vertebrate Zoology/Integrative Biology University of California, Berkeley Berkeley, CA
R Alex Smith	Bioinformatics	King/Ionides	2013-2015	PhD Student Bioinformatics University of Michigan Ann Arbor, MI
Andrei Stefanescu	Biostatistics	Wen	2012-2015	PhD Student Epidemiology Tulane University New Orleans, LA

Name	Department	Mentor	Years in Training Program	Current Position
Heather Stringham	Biostatistics	Boehnke	1998-1999	Research Area Specialist Lead Biostatistics University of Michigan Ann Arbor, MI
Zachary Szpiech	Bioinformatics	Rosenberg	2010-2012	Postdoctoral Fellow Bioengineering and Therapeutic Sciences University of California San Francisco San Francisco, CA
Cris Van Hout	Human Genetics	Douglas	2005-2007	Statistical Geneticist Regeneron Genetics Center Tarrytown, NY
Jodi Vanden Eng	Biostatistics	Boehnke	2002-2004	Research Statistician Centers for Disease Control & Prevention Atlanta, GA
Peter Walter	Biostatistics	Kang	2011-2013	Data Analyst Advanced Radiology Grand Rapids, MI
Robert Weyant	Biostatistics	Boehnke	2009-2011	Data Scientist Powerly Royal Oak, MI
Janis Wigginton	Biostatistics	Boehnke	1997-1998	Application Programmer/Analyst Lead Biomedical Research Core Facility University of Michigan Medical School Ann Arbor, MI
Brooke Wolford	Bioinformatics	Willer/ Boehnke	2015-2016	PhD Student Bioinformatics University of Michigan Ann Arbor, MI
Abigail Woodroffe	Epidemiology	Richards/ Abecasis	2003-2006	Senior Research Associate IMPAQ International Boston, MA
Greg Zajac	Biostatistics	Abecasis	2015-2017	PhD Student Bioinformatics University of Michigan Ann Arbor, MI

Name	Department	Mentor	Years in Training Program	Current Position
Matt Zawistowski	Biostatistics	Zöllner	2005-2007	Research Area Specialist Lead Biostatistics University of Michigan Ann Arbor, MI

Past Postdoctoral Trainees

Name	Department	Mentor	Years in Training Program	Current Position
Paul Greiner	Biostatistics	Lange	1996-1998	Editor Forte Science Communications Tokyo, Japan
Cecil Lewis	Human Genetics	Long	2005-2007	Professor Anthropology University of Oklahoma Norman, OK
Jennifer Lachowiec	Ecology and Evolutionary Biology	Wittkopp	2015-2016	Assistant Professor Plant Sciences and Plant Pathology Montana State University Bozeman, MT
Amanda Pendleton	Human Genetics	Kidd	2015-2017	Postdoctoral Fellow Human Genetics University of Michigan Ann Arbor, MI
David Reed	Anthropology	Merriwether	1999-2001	Research Laboratory Specialist Lead Ophthalmology & Visual Sciences University of Michigan Ann Arbor, MI
Bill Stewart	Biostatistics	Abecasis/ Boehnke	2005-2008	Principal Investigator Battelle Center for Mathematical Medicine, The Research Institute at Nationwide Children's Hospital Columbus, OH
Tanya Teslovich	Biostatistics	Boehnke	2008-2010	Associate Director of Statistical Genetics Regeneron Tarrytown, NY
Richard Watanabe	Biostatistics	Boehnke	1995-1996	Professor Division of Biostatistics Preventative Medicine University of Southern California Los Angeles, CA