INDIVIDUALIZED GENOMICS AND HEALTH, MASTER OF SCIENCE

MS in Individualized Genomics and Health
advanced.jhu.edu/igh (http://www.advanced.jhu.edu/igh/)

Individualized genomics and health is a rapidly growing area of research and applied science. The growth is due in large part to the increasing dependence on DNA and RNA sequence analysis of human and microbial genomes for diagnosis and treatment of disease. This emerging field requires a workforce with multi-disciplinary skills in bioinformatics, bioscience, regulatory science, policy, and ethics. The goal of this degree program is to produce a highly skilled workforce with the theoretical knowledge and practical skills to meet the demands of the academic, research, and business communities.

As the field of individualized genomics and health requires practitioners to have multiple competencies, the core of the Master’s degree will include foundation courses in epigenetics, human molecular genetics, ethical, legal and regulatory aspects of individualized genomics, bioinformatics, and individual genome analysis. After completion of the core requirements, students may choose to concentrate in Laboratory Diagnostics, Genomics, Regulatory Science or Policy, or choose a general concentration.

Admissions Criteria for all Advanced Academic Programs (https://e-catalogue.jhu.edu/arts-sciences/advanced-academic-programs/enrollment-services/admission/)

PROGRAM SPECIFIC REQUIREMENTS

In addition to the materials and credentials required for all programs, the Master of Science in Individualized Genomics and Health requires:

- A 4-year bachelor’s degree in the life sciences or engineering with a grade-point average of at least 3.0 on a 4.0
- Organic chemistry or AS.410.302 Bio-Organic Chemistry
- Biochemistry or AS.410.601 Biochemistry
- Advanced cell biology I, or AS.410.603 Advanced Cell Biology I
- Molecular biology, or AS.410.602 Molecular Biology
- Biostatistics or AS.410.645 Biostatistics

The Admissions Committee reserves the right to request additional information, such as a GRE score or letters of recommendation, from applicants to assess their candidacy for admission.

PROGRAM REQUIREMENTS

- Six required core courses
- Four electives

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>AS.410.610</td>
<td>Epigenetics, Gene Organization &amp; Expression</td>
<td>4</td>
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<tr>
<td>AS.410.612</td>
<td>Human Molecular Genetics</td>
<td>4</td>
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<tr>
<td>AS.410.629</td>
<td>Genes &amp; Disease</td>
<td>4</td>
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<tr>
<td>AS.410.633</td>
<td>Introduction to Bioinformatics</td>
<td>4</td>
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Electives (Four required)

Total Credits 16

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<th>Title</th>
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<tr>
<td>AS.410.687</td>
<td>Ethical, Legal &amp; Regulatory Aspects of the Biotechnology Enterprise</td>
<td>4</td>
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<tr>
<td>AS.410.736</td>
<td>Genomic and Personalized Medicine</td>
<td>4</td>
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Total Credits 40

Concentrations

**Laboratory Diagnostics**

Select three of the following:

- AS.410.641 Clinical & Molecular Diagnostics
- AS.410.656 Recombinant DNA Laboratory
- AS.410.659 Advanced Recombinant DNA Lab
- AS.410.666 Next Generation DNA Sequencing and Analysis
- AS.410.671 Gene Expression Data Analysis and Visualization

Total Credits 12

**Genomics**

Select three of the following:

- AS.410.634 Practical Computer Concepts for Bioinformatics
- AS.410.635 Bioinformatics: Tools for Genome Analysis
- AS.410.666 Next Generation DNA Sequencing and Analysis
- AS.410.671 Gene Expression Data Analysis and Visualization
- AS.410.709 Cancer Genomics
- AS.410.734 Practical Introduction to Metagenomics

Total Credits 12

**Regulatory**

Select three of the following:

- AS.410.676 Food And Drug Law
- AS.410.702 Biomedical Software Regulation
- AS.410.721 In Vitro Diagnostic Regulation

Total Credits 12

**Policy**

Select three of the following:

- AS.410.708 Medical Product Reimbursement
- AS.410.721 In Vitro Diagnostic Regulation

Additional courses being developed

Total Credits 12

MS in Individualized Genomics and Health with Thesis Option
Students interested in pursuing the MS in Individualized Genomics and Health with the thesis are required to take 11 courses. The thesis requires a two-semester research project. Students complete AS.410.800 Independent Research in Biotechnology, and then AS.410.801 Biotechnology Thesis the following semester. Students interested in this option should consult with the program adviser.

**LEARNING OUTCOMES**

Students will be able to:

- Explain the molecular and genetic basis for human disease including the role of epigenetic.
- Analyze interaction between Inherited, symbiotic, disease, and environmental inputs to health.
- Apply bioinformatics tools to the analysis of human DNA sequences.
- Explain the ethical, legal and regulatory aspects of individualized genomics and health.
- Discuss the laboratory methods required to identifying genes responsible for disease.