

# Bioinformatics, MS

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**Computer Science Chairperson: Dennis Brylow, Ph.D.**

**Mathematical and Statistical Sciences Chairperson: Anne Clough, Ph.D.**

**Program Director: Mehdi Maadooliat, Ph.D.**

Bioinformatics website (<https://www.marquette.edu/grad/programs-bioinformatics.php>)

## Degree Offered

Master of Science, students are admitted under Plan B (non-thesis option) but Plan A (thesis option) is also offered

## Program Description

This interdisciplinary program is jointly offered by Marquette University and Medical College of Wisconsin. The program prepares students for a multidisciplinary career in the biomedical sciences using mathematics, statistics and computer science. It is designed to provide students quantitative tools for analyzing data and problems associated with molecular, cellular, physiological and particularly, genetic systems. Students may select courses from a list of approved courses offered by the following departments at Marquette: Computer Science; Mathematical and Statistical Sciences; Biology; Biomedical Engineering; and Electrical and Computer Engineering. In addition, courses are offered by the Department of Physiology and the Division of Biostatistics at Medical College of Wisconsin. The program meets the needs of recent undergraduates seeking an advanced degree as well as employed professionals interested in opportunities for career advancement.

Students may pursue the degree on a full-time or part-time basis. Many courses are offered evenings.

## General Information

Students interested in applying to the program should consult the program website (<https://www.marquette.edu/grad/programs-bioinformatics.php>) for a list of currently approved courses and scheduled course offerings for the next term.

Special registration for this program is required, as courses are taken at both institutions. Students must register for BIIN 6947 Medical College of Wisconsin/BIIN-Joint Degree through Marquette University and for the matching MCW course through Medical College of Wisconsin.

## Bioinformatics Master of Science

Students are admitted to the program under Plan B (non-thesis option), although with the co-directors' approval, students may elect to transfer to Plan A (thesis option). In both options below, courses taken for credit in this program must be from the list of courses approved by the Steering Committee. Exceptions must be approved by the Steering Committee.

### PLAN B OPTION (33 CREDITS)

Students must complete 33 credit hours of course work, of which at least 18 hours must be earned in 6000-level courses and above. Plan B Option students must take at least 18 credits at Marquette University.

Code	Title	Hours
BIOL 5201	Genomics and Bioinformatics	3
BIIN 6000	Introduction to Bioinformatics	3
COSC 6050	Elements of Software Development	3
BIIN 6980	Practicum in Bioinformatics	3
3 credits of approved computer science courses		3
3 credits of approved biological science courses		3
3 credits of approved statistical science courses		3
12 credits of approved electives		12
<b>Total Credit Hours:</b>		<b>33</b>

### PLAN A OPTION (30 CREDITS)

Students must complete 24 credit hours of course work, of which at least 18 credit hours must be earned in 6000-level courses and above. Plan A Option students must take at least 15 credits at Marquette University. Students must also complete a master's thesis for 6 credit hours and pass an oral examination concentrated on the thesis.

Code	Title	Hours
BIOL 5201	Genomics and Bioinformatics	3
BIIN 6000	Introduction to Bioinformatics	3

COSC 6050	Elements of Software Development	3
BIIN 6980	Practicum in Bioinformatics	3
3 credits of approved computer science courses		3
3 credits of approved biological science courses		3
3 credits of approved statistical science courses		3
3 credits of approved electives		3
BIIN 6999	Master's Thesis	6
<b>Total Credit Hours:</b>		<b>30</b>

## University Policies

- Academic Censure - Graduate School (<https://bulletin.marquette.edu/policies/academic-censure/graduate/>)
- Academic Integrity (<https://bulletin.marquette.edu/policies/academic-integrity/>)
- Academic Misconduct (<https://bulletin.marquette.edu/policies/academic-misconduct-policy/>)
- Academic Program Definitions (<https://bulletin.marquette.edu/policies/academic-programs-defined/>)
- Accelerated Degree Programs (<https://bulletin.marquette.edu/policies/accelerated-degree-programs/>)
- Attendance - Graduate School (<https://bulletin.marquette.edu/policies/attendance/graduate/>)
- Awarding Diplomas and Certificates (<https://bulletin.marquette.edu/policies/awarding-diplomas-certificates/>)
- Background Checks, Drug Testing (<https://bulletin.marquette.edu/policies/background-checks-drug-testing/>)
- Class Rank (<https://bulletin.marquette.edu/policies/class-rank/>)
- Commencement (<https://bulletin.marquette.edu/policies/commencement/>)
- Conferral of Degrees and Certificates (<https://bulletin.marquette.edu/policies/conferral-degrees-certificates/>)
- Course Levels (<https://bulletin.marquette.edu/policies/course-levels/>)
- Credit Hour (<https://bulletin.marquette.edu/policies/credit/>)
- Credit Load - Graduate School (<https://bulletin.marquette.edu/policies/credit-load/graduate/>)
- Faculty Grading (<https://bulletin.marquette.edu/policies/faculty-grading/>)
- Family Education Rights and Privacy Act-FERPA (<https://bulletin.marquette.edu/policies/ferpa/>)
- Grade Appeals (<https://bulletin.marquette.edu/policies/grade-appeals/>)
- Grading System - Graduate School and Graduate School of Management (<https://bulletin.marquette.edu/policies/grading-system/graduate-management/>)
- Graduation - Graduate School (<https://bulletin.marquette.edu/policies/graduation/graduate/>)
- Immunization and Tuberculosis Screening Requirements (<https://bulletin.marquette.edu/policies/immunization-and-tuberculosis-screening/>)
- Last Date of Attendance/Activity (<https://bulletin.marquette.edu/policies/last-dateof-attendance-activity/>)
- Military Call to Active Duty or Training (<https://bulletin.marquette.edu/policies/militarycall-active-duty-training/>)
- Registration - Graduate School (<https://bulletin.marquette.edu/policies/registration/graduate/>)
- Repeated Courses - Graduate School (<https://bulletin.marquette.edu/policies/repeated-courses/graduate/>)
- Student Data Use and Privacy (<https://bulletin.marquette.edu/policies/student-data-use-privacy/>)
- Transcripts-Official (<https://bulletin.marquette.edu/policies/transcripts-official/>)
- Transfer Course Credit - Graduate School (<https://bulletin.marquette.edu/policies/transfer-course-credit-policy/graduate/>)
- Withdrawal - Graduate School (<https://bulletin.marquette.edu/policies/withdrawals/graduate/>)

## Graduate School Policies

- Academic Performance (<https://bulletin.marquette.edu/graduate/policies/academic-performance/>)
- Academic Programs Overview (<https://bulletin.marquette.edu/graduate/policies/academic-programs-overview/>)
- Advising (<https://bulletin.marquette.edu/graduate/policies/advising/>)
- Assistantships and Fellowships (<https://bulletin.marquette.edu/graduate/policies/assistantships-andfellowships/>)
- Certificate Concurrent Enrollment (<https://bulletin.marquette.edu/graduate/policies/certificate-concurrent-enrollment/>)
- Conduct (<https://bulletin.marquette.edu/graduate/policies/conduct/>)
- Confidentiality of Proprietary Information (<https://bulletin.marquette.edu/graduate/policies/confidentiality-proprietary-information/>)
- Continuous Enrollment (<https://bulletin.marquette.edu/graduate/policies/continuous-enrollment/>)
- Courses and Prerequisites (<https://bulletin.marquette.edu/graduate/policies/courses-prerequisites/>)
- Cross-listed Courses (<https://bulletin.marquette.edu/graduate/policies/cross-listed-courses/>)
- Deadlines (<https://bulletin.marquette.edu/graduate/policies/deadlines/>)

- Graduate Credit (<https://bulletin.marquette.edu/graduate/policies/graduate-credit/>)
- Graduate School Policies (<https://bulletin.marquette.edu/graduate/policies/>)
- Independent Study (<https://bulletin.marquette.edu/graduate/policies/independent-study/>)
- Intellectual Property (<https://bulletin.marquette.edu/graduate/policies/intellectual-property/>)
- Research Involving Humans, Animals, Radioisotopes or Recombinant DNA/Transgenic Organisms (<https://bulletin.marquette.edu/graduate/policies/research-involving-humans-animals-radioisotopes-recombinant-dnatransgenic-organisms/>)
- Temporary Withdrawal from Graduate Program (<https://bulletin.marquette.edu/graduate/policies/temporary-withdrawal-graduate-program/>)
- Time Limitations (<https://bulletin.marquette.edu/graduate/policies/time-limitations/>)
- Working with Minors (<https://bulletin.marquette.edu/graduate/policies/working-minors/>)

## Bioinformatics Related Programs

- Applied Statistics, MS (<https://bulletin.marquette.edu/graduate/applied-statistics-ms/>)
- Data Science, MS (<https://bulletin.marquette.edu/graduate/data-science-ms/>)

### **BIIN 6000 Introduction to Bioinformatics (3 credits)**

The application of knowledge gained through previous course work in informatics, information systems, mathematics, medical and/or biological research to the design, development, implementation and evaluation of information systems and analysis methods applied to biomedical data.

*Prerequisite:* BIOL 1004 and CHEM 2112 which may be taken concurrently; and COSC 2100; and cons. of dept. ch.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Spring Term, 2021 Spring Term, 2020 Spring Term, 2019 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=BIIN%206000>)

### **BIIN 6931 Topics in Bioinformatics (3 credits)**

Topics vary. Students may enroll more than once as the subject matter changes.

*Prerequisite:* Cons. of dept. ch.

*Level of Study:* Graduate

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=BIIN%206931>)

### **BIIN 6947 Medical College of Wisconsin/BIIN-Joint Degree (1-8 credits)**

Graduate-level course in selected areas of the life sciences offered at Medical College of Wisconsin.

*Prerequisite:* Cons. of dept. ch.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Spring Term, 2021 Fall Term, 2021 Spring Term, 2020 Fall Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=BIIN%206947>)

### **BIIN 6960 Seminar in Bioinformatics (1-3 credits)**

Seminars in research and development tools and applications designed for M.S. in bioinformatics program.

*Level of Study:* Graduate

*Last four terms offered:* 2020 Fall Term, 2020 Spring Term, 2019 Fall Term, 2008 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=BIIN%206960>)

### **BIIN 6980 Practicum in Bioinformatics (3 credits)**

An opportunity to participate in the practice of research and/or development in the area of bioinformatics.

*Prerequisite:* Admitted to BIIN program; BIIN 6000; and cons. of dept. ch.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Summer Term, 2022 Fall Term, 2022 Summer Term, 2022 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=BIIN%206980>)

### **BIIN 6995 Independent Study in Bioinformatics (1-3 credits)**

An in-depth study on a topic or subject matter usually not offered in the established curriculum with faculty and independent of the classroom setting.

*Prerequisite:* Admitted to BIIN program; cons. of dept. ch.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Spring Term, 2021 Fall Term, 2019 Spring Term, 2017 Summer Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=BIIN%206995>)

### **BIIN 6999 Master's Thesis (1-6 credits)**

S/U grade assessment.

*Prerequisite:* Cons. of dept. ch.

*Level of Study:* Graduate

*Last four terms offered:* 2023 Spring Term, 2022 Fall Term, 2021 Summer Term, 2021 Spring Term

Schedule of Classes (<https://bulletin.marquette.edu/class-search/?details&code=BIIN%206999>)