School of Natural Sciences and Mathematics

Department of Mathematical Sciences

Master of Science in Bioinformatics and Computational Biology

36 semester credit hours minimum

Mathematics Faculty

FACG> nsm-bioinformatics-and-computational-biology-ms-math

Professors: Swati Biswas, Min Chen, Pankaj Choudhary, Baris Coskunuzer, Mieczyslaw Dabkowski, Vladimir Dragovic, Sam Efromovich, Yulia Gel, Wieslaw Krawcewicz, Susan Minkoff, L. Felipe Pereira, Dmitry Rachinskiy, Viswanath Ramakrishna, Janos Turi, John Zweck

Associate Professors: Maxim Arnold, Yan Cao, Liang Hong, Oleg Makarenkov, Tomoki Ohsawa, Anh Tran

Assistant Professors: Carlos Arreche, Noirrit Chandra, Ronan Conlon, Rizwanur Khan, Qiwei Li, Stephen McKeown, Chuan-Fa Tang, Jiayi Wang, Nathan Williams, Nan Wu, Yunan Wu

Professors Emeriti: Larry Ammann, Ali Hooshyar, Patrick Odell, John Van Ness

Clinical Professor: Natalia Humphreys

Clinical Associate Professor: Mohammad Akbar

Clinical Assistant Professor: Wenyi Lu

Professors of Instruction: Anatoly Eydelzon, Manjula Foley, Bentley Garrett, Yuly Koshevnik

Associate Professors of Instruction: Mohammad Ahsan, Kelly Aman, Malgorzata Dabkowski, Rabin Dahal, Derege Mussa, My Linh Nguyen, Jigarkumar Patel, Julie Sutton

Assistant Professors of Instruction: Anani Komla Adabrah, Iris Alvarado, Saikat Biswas, Hui Ding, Adannah Duruoha, Kemelli Estacio-Hiroms, Huizhen Guo, Shengjie Jiang, Joselle Kehoe, Runzhou Liu, Neha Makhijani, Irina Martynova, Diarisoa Mihaja Rakotomalala, Adrian Murza, Ajaya Paudel, Octavious Smiley, Nasrin Sultana, Che-Yu Wu

Mathematics Faculty With Research Interests in Bioinformatics and Computational Biology: Swati Biswas, Yan Cao, and Min Chen

Biology Faculty

FACG> nsm-bioinformatics-and-computational-biology-ms-biol

Professors: Juan E. González, Kelli Palmer, Lawrence J. Reitzer, Stephen Spiro, Li Zhang, Michael Qiwei Zhang

Associate Professors: Heng Du, Tae Hoon Kim, Faruck Morcos, Duane D. Winkler, Zhenyu Xuan

Assistant Professors: Nicole De Nisco, Nikki Delk, Nicholas Dillon, Purna Joshi, Darshan Sapkota

Professors Emeriti: Lee A. Bulla, Donald M. Gray

Associate Professors Emeriti: Gail A. M. Breen, Dennis L. Miller

Clinical Professor: David Murchison

Research Assistant Professors: Li Liu, Ru-Hung Wang

Professors of Instruction: Scott A. Rippel, Uma Srikanth

Associate Professors of Instruction: Wen Lin, Elizabeth Pickett, Ilya Sapozhnikov

Assistant Professors of Instruction: Ida Klang, Meenakshi Maitra, Caitlin Maynard, Iti Mehta, Ramesh Padmanabhan, Jing Pan, Ruben Ramirez, Eva Sadat, Subha Sarcar, Michelle Wilson, Zhuoru Wu

Senior Lecturer: Wen-Ho Yu

UT Dallas Affiliated Faculty: Leonidas Bleris, Sheena D'Arcy, Stephen D. Levene

Biological Sciences Faculty With Research Interests in Bioinformatics and Computational Biology: Faruck Morcos, Zhenyu Xuan, Hyuntae Yoo, and Michael Q. Zhang

Program Objective

The Master of Science program in Bioinformatics and Computational Biology is an interdisciplinary program offered jointly by the Departments of Mathematical Sciences and Biological Sciences, with the former serving as the administrative unit. By combining coursework from the disciplines of Biology, Computer Science, Mathematics, and Statistics, it caters to the growing demand of a new breed of scientists who have expertise in all these disciplines. In addition to coursework, the program also provides opportunities to gain practical experience by getting involved in research

with faculty members.

A successful applicant to the program is expected to have a Bachelor's degree in Biology, Mathematics, Statistics, or in another science/engineering discipline, and must have completed at least one semester of Calculus. Additional coursework in one or more of the disciplines of Biology, Computer Science, Mathematics, and Statistics is desirable but is not required.

Degree Requirements

The University's general degree requirements are discussed on the [Graduate Policies and Procedures](#) page.

The MS program in Bioinformatics and Computational Biology requires completion of at least 36 semester credit hours. The program offers a choice between two tracks. Track 1 is designed for students with a general background in science/engineering, whereas Track 2 is designed for students with a strong background in biology. To build further expertise, both tracks offer a choice of three elective groups, namely, Computer Science oriented, Statistics oriented, and Biology oriented elective groups. Both also offer opportunities for research. Students are expected to choose a track and an elective group based on their backgrounds and interests in consultation with the Graduate Advisor for the program.

Track 1 (MS)

I. Core: 15 semester credit hours

BMEN 6374 Genes, Proteins and Cell Biology for Engineers

BIOL 5385 Computational Molecular Evolution

CS 5303 Computer Science I

MATH 5303 Advanced Calculus and Linear Algebra

STAT 5351 Probability and Statistics I (for Elective Group 2)

or STAT 5353 Probability and Statistics for Data Science and Bioinformatics (for Elective Groups 1 and 3)

II. Elective Groups (Choose one elective group)

Elective Group 1 (Computer Science Oriented): 15 semester credit hours

CS 5343 Algorithm Analysis and Data Structures[1]

MATH 6312 Combinatorics and Graph Theory

MATH 6341 Bioinformatics

or BIOL 5376 Applied Bioinformatics

MATH 6346 Medical Image Analysis

AND one of the following:

CS 6307 Introduction to Big Data Management and Analytics for non CS-Majors

CS 6314 Web Programming Languages

CS 6360 Database Design

CS 6375 Machine Learning

Elective Group 2 (Statistics Oriented): 18 semester credit hours

STAT 5352 Probability and Statistics II

STAT 6337 Advanced Statistical Methods I

STAT 6338 Advanced Statistical Methods II

STAT 6340 Statistical and Machine Learning

MATH 6341 Bioinformatics

or BIOL 5376 Applied Bioinformatics

MATH 6346 Medical Image Analysis

Elective Group 3 (Biology oriented): 15 semester credit hours

MATH 6341 Bioinformatics

or BIOL 5376 Applied Bioinformatics

MATH 6345 Mathematical Methods in Medicine and Biology

MATH 6346 Medical Image Analysis

AND two of the following:

BIOL 5375 Genes to Genomes

BIOL 5381 Genomics

BIOL 6315 Epigenetics

BIOL 6373 Proteomics

BIOL 6385 Computational Biology

or BMEN 6389 Computational Biology

or MATH 6343 Computational Biology

III. Research or Elective(s) or a Combination Thereof

- Elective Group 1: 6 semester credit hours
- Elective Group 2: 3 semester credit hours
- Elective Group 3: 6 semester credit hours

Track 2 (MS)

I. Core: 14 semester credit hours

BIOL 5410 Biochemistry

BIOL 5420 Molecular Biology

STAT 5351 Probability and Statistics I (for Elective Group 2)

or STAT 5353 Probability and Statistics for Data Science and Bioinformatics (for Elective Groups 1 and 3)

MATH 5303 Advanced Calculus and Linear Algebra

II. Elective Groups (Choose one elective group)

Elective Group 1 (Computer Science oriented): 18 semester credit hours

CS 5303 Computer Science I

CS 5343 Algorithm Analysis and Data Structures[1]

MATH 6312 Combinatorics and Graph Theory

MATH 6341 Bioinformatics

or BIOL 5376 Applied Bioinformatics

MATH 6346 Medical Image Analysis

AND one of the following:

[CS 6307](#) Introduction to Big Data Management and Analytics for non CS-Majors

[CS 6314](#) Web Programming Languages

[CS 6360](#) Database Design

[CS 6375](#) Machine Learning

Elective Group 2 (Statistics oriented): 18 semester credit hours

[STAT 5352](#) Probability and Statistics II

[STAT 6337](#) Advanced Statistical Methods I

[STAT 6338](#) Advanced Statistical Methods II

[STAT 6340](#) Statistical and Machine Learning

[MATH 6341](#) Bioinformatics

or [BIOL 5376](#) Applied Bioinformatics

[MATH 6346](#) Medical Image Analysis

Elective Group 3 (Biology oriented): At least 18 semester credit hours

[MATH 6341](#) Bioinformatics

or [BIOL 5376](#) Applied Bioinformatics

[MATH 6346](#) Medical Image Analysis

[MATH 6345](#) Mathematical Methods in Medicine and Biology

3 semester credit hour Elective Course

AND two of the following:

[BIOL 5375](#) Genes to Genomes

[BIOL 5381](#) Genomics

[BIOL 6315](#) Epigenetics

[BIOL 6373](#) Proteomics

[BIOL 6385](#) Computational Biology

or [BMEN 6389](#) Computational Biology

or [MATH 6343](#) Computational Biology

[BIOL 5385](#) Computational Molecular Evolution

[BIOL 5312](#) Programming in the Biological Sciences for Graduate Students

III. Research or Elective(s) or a Combination Thereof

All Elective Groups: 4 semester credit hours

Other Requirements

- For a PhD bound student in the Department of Biological Sciences, [BIOL 5440](#) Cell Biology and [BIOL 5460](#) Quantitative Biology (or an equivalent) are required. This requirement can be fulfilled by taking these courses as 'electives' in the Bioinformatics and Computational Biology program.
- Electives must be approved by the Graduate Advisor of the program.
- Substitutions for required courses may be made if approved by the Graduate Advisor of the program and the Head of the Mathematical Sciences Department.
- A student may choose to write an MS thesis under the supervision of a faculty member. The thesis project can count for 3 to 6 semester credit hours of electives towards the required 36 hours, in accordance with University policies. The thesis must be approved by the Head of the Mathematical Sciences Department. Once the thesis project is completed, the student must successfully defend it before his/her thesis committee.

1. Students who have not taken the CS 5333 Discrete Structures prerequisite for CS 5343 Algorithm Analysis and Data Structures should consult with their Graduate Advisor from the Mathematical Sciences Department to determine eligibility.

Updated: 2024-05-13 14:01:42 v4.9d71dc