Computational Data Science

1. University Requirements: (23-24)
   Writing, Rhetoric and American Cultures (WRA) 4
   Integrative Studies in Humanities (IAH) 8
   IAH 201-210 and IAH 211 or >
   Integrative Studies in Social Sciences (ISS) 8
   ISS 2XX and ISS 3XX
   Bioscience (See 3A Below)

2. College Requirements: (28)
   *EGR 100 Introduction to Engineering Design 2
   *CMSE 202 Computational Modeling Tools & Techniques 4
   *MTH 132 Calculus I 3
   *MTH 133 Calculus II 4
   MTH 234 Multivariable Calculus 4
   MTH 235 Differential Equations 3
   *PHY 183 Physics for Scientists & Engineers I 4
   PHY 184 Physics for Scientists & Engineers II 4
   *College Admission Requirement

3. Major Requirements: (59-62)
   a. Bioscience: (4-6)
   Select one course from Group 1 and one course from Group 2.

   Group 1
   **BS 161 Cell and Molecular Biology 3
   ENT 205 Pests, Society, & the Environment 3
   IBIO 150 Integrating Biology: From DNA to Populations 3
   MMG 141 Introductory Human Genetics 3
   MMG 201 Fundamentals of Microbiology 3
   PLB 105 Plant Biology 3
   PSL 250 Introductory Physiology 4

   Group 2
   BS 171 Cell and Molecular Biology Laboratory 2
   **CEM 161 Chemistry Laboratory I 1
   CEM 162 Chemistry Laboratory II 1
   PHY 191 Physics Laboratory for Scientists I 1
   PHY 192 Physics Laboratory for Scientists II 1
   PLB 106 Plant Biology Laboratory 1

**These courses may have prerequisites, which are not otherwise required in the program. Students should check course descriptions to ensure they are aware of prerequisites.

b. All of the following courses: (44)
   CMSE 201 Intro to Computational Modeling & Data Analysis 4
   CMSE 381 Fundamentals of Data Sci Methods 4
   CMSE 382 Optimization Methods in Data Sci 4
   CMSE 495 Experiential Learning in Data Sci (W) 4
   CSE 232 Introduction to Programming II 4
   CSE 300 Social, Ethical, and Professional Issues in Computer Science 1
   CSE 331 Algorithms and Data Structures 3
   CSE 404 Intro to Machine Learning 3
   CSE 482 Big Data Analysis 3
   CSE 480 Database Systems 3
   MTH 314 Matrix Algebra w/ Comp Applications 3
   STT 180 Introduction to Data Science 4
   STT 380 Probability and Stats for Data Sci 4

c. Two of the following courses: (6)
   CSE 402 Biometrics and Pattern Recognition 3
   ***CSE 415 Introduction to Parallel Computing 3
   CSE 431 Algorithm Engineering 3
   CSE 440 Introduction to Artificial Intelligence 3

d. Two of the following courses: (6-7)
   ***CMSE 401 Methods for Parallel Computing 4
   CMSE 402 Visualization of Scientific Datasets 3
   CSE 402 Biometrics and Pattern Recognition 3
   ***CSE 415 Introduction to Parallel Computing 3
   CSE 431 Algorithm Engineering 3
   CSE 440 Introduction to Artificial Intelligence 3
   CSE 471 Media Processing and Multimedia Computing 3
   CSE 472 Computer Graphics 3
   MTH 451 Numerical Analysis I 3
   MTH 468 Predictive Analysis 3
   STT 464 Statistics for Biologists 3
   STT 465 Bayesian Statistical Methods 3

*** Both CSE 415 and CMSE 401 may not be used to fulfill requirements c and d

Other Electives (Variable)

Total Credits Required for Degree 120

The requirements listed above apply to students admitted to the major of Computational Data Science in the Department of Computer Science and Engineering beginning Fall 2020. The Department of Computer Science and Engineering (CSE) constantly reviews program requirements and reserves the right to make changes as necessary. Consequently, each student is strongly encouraged to consult with their advisor to obtain assistance in planning an appropriate schedule of courses. Students who have questions about Computational Data Science should contact the Computer Science and Engineering Department Advising Office, 3201 Engineering Building, phone (517) 353-5455.
Computational Data Science
Sample Program

<table>
<thead>
<tr>
<th>Freshman Year</th>
<th>Sophomore Year</th>
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<tr>
<td><strong>Fall</strong></td>
<td><strong>Spring</strong></td>
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<tr>
<td>MTH 132</td>
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<tr>
<td>ISS 2XX</td>
<td>CMSE 201</td>
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<th><strong>Junior Year</strong></th>
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<td><strong>Total</strong></td>
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Program Objectives

A graduate of the MSU Computational Data Science is prepared to be

- successful in a computing-related profession, or
- successful in graduate study.

To achieve these objectives the department prepares students in the application of fundamental computing principles and software development skills. This preparation includes the design and implementation of systems that solve complex problems. Our graduates will be trained in teamwork, effective communication, professionalism, ethics, and the engagement of learning and applying new ideas and technologies as the field evolves.

Last revised April 2021