Computational Methods Concentration, Data Science (MS)

Course Requirements

Introductory Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Quarter Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT 403</td>
<td>STATISTICS AND DATA ANALYSIS</td>
<td>4</td>
</tr>
<tr>
<td>CSC 412</td>
<td>TOOLS AND TECHNIQUES FOR COMPUTATIONAL ANALYSIS</td>
<td>4</td>
</tr>
<tr>
<td>CSC 401</td>
<td>INTRODUCTION TO PROGRAMMING</td>
<td>4</td>
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Foundation Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
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<tbody>
<tr>
<td>DSC 450</td>
<td>DATABASE PROCESSING FOR LARGE-SCALE ANALYTICS (FORMERLY CSC 455)</td>
<td>4</td>
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<tr>
<td>DSC 423</td>
<td>DATA ANALYSIS AND REGRESSION (FORMERLY CSC 423)</td>
<td>4</td>
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<tr>
<td>DSC 424</td>
<td>ADVANCED DATA ANALYSIS (FORMERLY CSC 424)</td>
<td>4</td>
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<tr>
<td>DSC 430</td>
<td>PYTHON PROGRAMMING</td>
<td>4</td>
</tr>
<tr>
<td>DSC 441</td>
<td>FUNDAMENTALS OF DATA SCIENCE (FORMERLY IS 467)</td>
<td>4</td>
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</tbody>
</table>

Select one of the following applied analytics courses:

- DSC 465 | DATA VISUALIZATION (FORMERLY CSC 465) | 4
- DSC 480 | SOCIAL NETWORK ANALYSIS (FORMERLY CSC 495) | 4
- DSC 484 | WEB DATA MINING (FORMERLY ECT 584) | 4

Advanced Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Quarter Hours</th>
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</thead>
<tbody>
<tr>
<td>DSC 478</td>
<td>PROGRAMMING MACHINE LEARNING APPLICATIONS (FORMERLY CSC 478)</td>
<td>4</td>
</tr>
<tr>
<td>CSC 555</td>
<td>MINING BIG DATA</td>
<td>4</td>
</tr>
<tr>
<td>DSC 540</td>
<td>ADVANCED MACHINE LEARNING (FORMERLY CSC 529)</td>
<td>4</td>
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</tbody>
</table>

Select one of the following:

- CSC 521 | MONTE CARLO ALGORITHMS | 4
- CSC 575 | INTELLIGENT INFORMATION RETRIEVAL | 4
- CSC 578 | NEURAL NETWORKS AND DEEP LEARNING | 4

Elective Courses

Students must take two (2) graduate-level elective courses in the areas of statistical modeling, data mining or database technologies. Students must choose electives from the following list of courses:

- DSC 425 | TIME SERIES ANALYSIS AND FORECASTING (FORMERLY CSC 425) | 8
- DSC 433 | SCRIPTING FOR DATA ANALYSIS (FORMERLY CSC 433) | 4
- CSC 452 | DATABASE PROGRAMMING | 4
- DSC 465 | DATA VISUALIZATION (FORMERLY CSC 465) | 4
- DSC 478 | PROGRAMMING MACHINE LEARNING APPLICATIONS (FORMERLY CSC 478) | 4
- CSC 481 | INTRODUCTION TO IMAGE PROCESSING | 4
- CSC 482 | APPLIED IMAGE ANALYSIS | 4
- DSC 480 | SOCIAL NETWORK ANALYSIS (FORMERLY CSC 495) | 4
- CSC 521 | MONTE CARLO ALGORITHMS | 4
- CSC 528 | COMPUTER VISION | 4
- DSC 540 | ADVANCED MACHINE LEARNING (FORMERLY CSC 529) | 4
- CSC 543 | SPATIAL DATABASES & GEOGRAPHIC INFORMATION SYSTEMS | 4
- CSC 555 | MINING BIG DATA | 4
- CSC 575 | INTELLIGENT INFORMATION RETRIEVAL | 4
- CSC 576 | COMPUTATIONAL ADVERTISING | 4
- CSC 577 | RECOMMENDER SYSTEMS | 4
- CSC 578 | NEURAL NETWORKS AND DEEP LEARNING | 4
- CSC 594 | TOPICS IN ARTIFICIAL INTELLIGENCE | 4
- CSC 598 | TOPICS IN DATA ANALYSIS | 4
- DSC 484 | WEB DATA MINING (FORMERLY ECT 584) | 4
- GEO 441 | GEOGRAPHIC INFORMATION SYSTEMS (GIS) FOR COMMUNITY DEVELOPMENT | 4
- GEO 442 | GEOGRAPHICAL INFORMATION SYSTEMS (GIS) FOR SUSTAINABLE URBAN DEVELOPMENT | 4
- GPH 565 | DESIGNING FOR VISUALIZATION | 4
- HCI 512 | INFORMATION VISUALIZATION AND INFOGRAPHICS | 4
- IPD 451 | BIG DATA AND NOSQL PROGRAM | 4
- IS 549 | DATA WAREHOUSING | 4
- IS 550 | ENTERPRISE DATA MANAGEMENT | 4
- IS 574 | BUSINESS INTELLIGENCE AND ANALYTICS SYSTEMS | 4
- IS 578 | INFORMATION TECHNOLOGY CONSULTING | 4
- MGT 559 | HEALTH SECTOR MANAGEMENT | 4
- MGT 798 | SPECIAL TOPICS (Managerial & Marketing Epidemiology) | 4
- MKT 555 | DECISIONS IN MARKETING MANAGEMENT | 4
- MKT 530 | CUSTOMER RELATIONSHIP MANAGEMENT | 4
- MKT 534 | ANALYTICAL TOOLS FOR MARKETERS | 4
- MKT 570 | SERVICE DESIGN AND PATIENT EXPERIENCE | 4
- MKT 595 | INTERNET AND INTERACTIVE MARKETING | 4
Capstone Options

Students have the option of completing a real world Data Analytics Project, or completing the Predictive Analytics Capstone course, or participating in a Data Analytics Internship or completing a Master's Thesis to fulfill their Capstone requirement.

• Data Analytics Project
  • The real data analytics project is for students who are interested in working in a small team on a research project under the supervision of a CDM faculty. A list of available projects is published on the dampa center website (http://dampa.cdm.depaul.edu). Students who are interested in proposing their own data analytics project are encouraged to contact a CDM faculty member teaching analytics courses as soon as possible. Students must enroll in CSC 695 for a total of 4 credit hours taken in two consecutive quarters (2 credit hours for 2 quarters) to satisfy the capstone requirement. The faculty who supervises the project will initiate enrollment in the CSC 695 course.

• Predictive Analytics Capstone course
  • DSC 672 course offers the opportunity of working on an analytics project in a more structured class format. Students enrolled in the courses will be working in teams on a data analytics project under the supervision of the course instructor.

• Analytics Internship
  • An internship offers students the opportunity to integrate their academic experience with on-the-job training in an analytics related field. Students must enroll in CSC 697 for 4 credit hours to satisfy the practicum requirement. These are the steps:
    i. Secure an internship with focus in analytics.
    ii. International Students must obtain the appropriate practical training form and meet with an advisor in the CDM Academic Center for approval. (http://oiss.depaul.edu/Requests/Forms/index.asp)
    iii. Login to MyCDM and click the “MyInternships” link on the left to start the course enrollment process.

• Master’s Thesis
  • A student who has made an original contribution to the area (typically, through work done by CSC 695 may choose to complete a Master’s Thesis. The student and the student's research advisor should form a Master’s Thesis Committee of 3 faculty. The student will need to submit to the committee a thesis detailing the results of the research project. After a public defense, the committee will decide whether to accept the thesis. In that case, the student will be allowed to register for the 0 credit hour course CSC 698 and the transcript will show the thesis title as the course topic.