MS IN COMPUTING: DATA MANAGEMENT & ANALYSIS

A student may pursue an MS with a (1) thesis option, or (2) a project option, or (3) a course-only option. The minimum number of credits for any of the three options is 30 from graduate level classes. A maximum of 6 project hours or 9 thesis hours is allowed to be included in the program of study for students in the project or the thesis option. A minimum of 6 hours of thesis research is required for the thesis option.

TRACK FACULTY

Tom Fletcher, Lajos Horvath (Math), Chris Johnson, Sneha Kumar Kasera, Mike Kirby, Feifei Li, Miriah Meyer, Braxton Osting (Math), Valerio Pascucci, **Jeff Phillips (Track Director)**, Vivek Srikumar, Hari Sundar, Suresh Venkatasubramanian

DATA MANAGEMENT & ANALYSIS OPTION

CORE CLASSES Must take 4 core classes, at least one from each line.	
CS 6140	Data Mining /or/ CS 6350 Machine Learning
CS 6150	Advanced Algorithms
CS 6530	Database Systems
CS 6630	Visualization

A average grade of B or greater is required for core classes.

ELECTIVES: Three courses from the following list are required: (or CS 6140/CS 6350 if not counted above, or appropriate classes by track faculty)

ALGORITHMICS

CS 6160	Computational Geometry
CS 6170	Computational Topology
CS 7960	Models of Computation for Massive Data

ANALYTICS

CS 6190	Probabilistic Modeling
CS 6210	Advanced Scientific Computing
CS 6300	Artificial Intelligence
CS 6340	Natural Language Processing
CS 6640	Image Processing

MANAGEMENT

CS 6230	High-Performance Computing and Parallelization
CS 6235	Parallel Programming for GPUs/Many Course/Multi-Cores
CS 6480	Advanced Computer Networks
CS 6490	Network Security

Students may substitute other SoC graduate-level courses for elective requirements with approval of the Track Director (especially those taught by track faculty). With approval of the supervisory committee, a student may take two elective courses (6 credit hours) at the graduate level or higher from other departments, excluding independent study, seminars and research credit. Students may place out of the above requirements by substituting or transferring courses from other institutions at the discretion of the Track Director.

In all three options, seminar hours cannot be included to fulfill the 30 graduate level credits requirement. Independent study credit hours can only be used on the Program of Study for students who pursue the project based degree. However, once a student enters the project or the thesis option, his/her prior independent study or thesis research hours can be converted into project or thesis hours whichever is applicable, if the student's advisor deems these hours relevant to the student's project or thesis.

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A student may pursue an MS with a (1) thesis option, or (2) a project option, or (3) a course-only option. The minimum number of credits for any of the three options is 30 from graduate level classes. A maximum of 6 project hours or 9 thesis hours is allowed to be included in the program of study for students in the project or the thesis option. A minimum of 6 hours of thesis research is required for the thesis option.

DATA SCIENCE OPTION

CORE CLASSES	
CS 5530	Database Systems /or/ CS 6965 Big Data Computer Systems
CS 6140	Data Mining
CS 6190	Probabilistic Learning
CS 6350	Machine Learning
CS 6630	Visualization
MATH 5080	Statistical Inference I
MATH 6010	Linear Models

A average grade of B or greater is required for core classes.

Students may place out of the above requirements by substituting or transferring courses from other institutions at the discretion of the Track Director. Students may complete the required 30 credits with SoC graduate-level courses or Math graduate-level courses, or from other departments with approval of the Track Director.

In all three options, seminar hours cannot be included to fulfill the 30 graduate level credits requirement. Independent study credit hours can only be used on the Program of Study for students who pursue the project based degree. However, once a student enters the project or the thesis option, his/her prior independent study or thesis research hours can be converted into project or thesis hours whichever is applicable, if the student's advisor deems these hours relevant to the student's project or thesis.

PHD IN COMPUTING:
DATA MANAGEMENT & ANALYSIS

Course work listed on the approved Program of Study form must comprise at least 50 semester hours of graduate course work and dissertation research, exclusive of independent study. At least 14 semester hours of dissertation research (CS 7970) and 24 semester hours of graduate course work must be included. Up to 12 hours of graduate level course work already applied to other degrees may be used in the program of study as approved by the track director. Students may place out of the following requirements by substituting or transferring courses from other institutions at the discretion of the track director.

TRACK FACULTY

Tom Fletcher, Chris Johnson, Sneha Kumar Kasera, Mike Kirby, Feifei Li, Miriah Meyer, Valerio Pascucci, **Jeff Phillips (Track Director),** Vivek Srikumar, Hari Sundar, Suresh Venkatasubramanian

CORE CLASSES Must take 4 core classes, at least one from each line.		
CS 6140	Data Mining /or/ CS 6350 Machine Learning	
CS 6150	Advanced Algorithms	
CS 6530	Database Systems	
CS 6630	Visualization	

A student must take four elective courses (twelve hours) which involve the areas related to data, or are directly applicable to the student's dissertation research. Up to three courses (nine hours) may be taken from other departments at the University of Utah. All elective courses on the Program of Study must be taught at the graduate level. For those classes taken within the School of Computing, the students needs to take 6000 level courses and above when available/appropriate. In addition to the following electives, other 6000 level and above classes taught by track faculty are also typically allowed as electives. All courses taken by a track student to fulfill the elective requirements must be approved by the student's committee and the track director.

ELECTIVES Three courses from the following list are required: (or CS 6140/CS 6350 if not counted above, or appropriate classes by track faculty)

ALGORITHMICS

CS 6160	Computational Geometry
CS 6170	Computational Topology
CS 7960	Models of Computation for Massive Data

ANALYTICS

CS 6210	Advanced Scientific Computing
CS 6300	Artificial Intelligence
CS 6340	Natural Language Processing
CS 6390	Probabilistic Modeling
CS 6640	Image Processing

MANAGEMENT

CS 6230	High-Performance Computing and Parallelization
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CS 6480	Advanced Computer Networks
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PHD IN COMPUTING:
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POTENTIAL OUT-OF-DEPARTMENT ELECTIVES

- MATH 5080 Statistical Inference I
- MATH 5090 Statistical Inference II
- MATH 5250 Matrix Analysis
- MATH 6010 Linear Models
- MATH 6020 Multilinear Models
- MATH 6070 Mathematical Statistics
- MATH 6210 Real Analysis

- MATH 7870 Methods of Optimization
- ECE 5510 Random Processes
- ECE 6540 Estimation Theory
- ECE 6520 Information Theory and Coding
- BMI 6020 Foundations of Bioinformatics
- BMI 6105 Statistics for Biomedical Informatics
- BMI 6470 Biomedical Infomation Retrieval