Data Management and Analysis Track at the University of Utah

August 17, 2012

1 Mission Statement
To provide advanced graduate training in all aspects of the management and analysis of large data sets. These include data management and integration, algorithms for processing large data sets, and analysis and visualization techniques for interacting with and discerning patterns in data.

2 Track Administration
The Data Management and Analysis Track within the Computing Degree Program will be administered by the Track Committee Faculty (TCF). The TCF will elect each year a Chair from among its members. The Chair of the TCF will oversee and coordinate all track administrative issues.

2.1 Track Committee Faculty (TCF)
The current TCF consists of the following School of Computing faculty:

- Tom Fletcher
- Mike Kirby
- Feifei Li (Chair)
- Miriah Meyer
- Valerio Pascucci
- Jeff M. Phillips
- Suresh Venkatasubramanian

3 Track Admissions
3.1 Admissions Procedure
The TCF will work in conjunction with the School of Computing graduate admissions committee to review track admissions. The means by which this will occur will be determined yearly between the TCF Chair, the School of Computing Director, and the Director of Graduate Admissions.
3.2 Prerequisite Requirements

The nature and importance of information spans many fields. For this reason, students having a Bachelor’s degree in any science or engineering discipline will be considered for entry into the program. Competency as determined by the TCF Chair in material spanning the following topics will be required:

- Undergraduate Math Series (Linear algebra, Discrete mathematics)
- Coding Proficiency
- Undergraduate-level Algorithms and Data Structures

Students may be admitted to the program with probationary status contingent upon taking courses as determined by the TCF Chair which eliminate prerequisite material deficiencies.

4 Course Requirements

Students must take 4 required courses and 3 elective courses.

Required courses (4):
- CS 6630 Scientific Visualization (to be substituted by Introduction to Visualization when it becomes available).
- CS 6150 Algorithms
- CS 6350 Machine Learning / CS 6955 Data Mining / CS 6960 Non-Parametric Statistics
- CS 6530 Database System

A minimum of a B or greater is required for any of the required courses.

Elective courses from the following list (3):
- CS 6210 Advanced Scientific Computing I
- CS 6210 Advanced Scientific Computing II
- CS 6300 Artificial Intelligence
- CS 6640 Image Processing
- CS 6340 Natural Language Processing
- CS 6230 High Performance Parallel Computing
- CS 6964 Applications of NLP
- CS 6963 Parallel Programming for GPUs/Many Cores/Multi-Cores
- CS 5610 Interactive Computer Graphics / 6610 Advanced Computer Graphics 1

In addition to the list above, students may take any graduate-level courses taught by any track committee faculty members to fulfill the elective requirements. With approval of the supervisory committee, a student may take two elective courses 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 TCF Chair.
5 MS in Computing: Data Management and Analysis

A student may pursue an M.S. with a (1) course-only option, or (2) a project option, or (3) a thesis option. The minimum number of credits for either option is 30 graduate level classes (this includes 5000 and 6000 level courses as designated by departments). A minimum of 6 hours of thesis research is required for the thesis option. 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. There is no minimum number of project or thesis hours required in either option. In all three options, neither directed independent study (DIS) nor seminar hours can be included to fulfill the 30 graduate level credits requirement. However, once a student enters the project or the thesis option, his/her prior DIS hours can be converted into project or thesis hours if the student’s advisor deems these DIS hours relevant to the project or the thesis the student will be working on.

6 PhD in Computing: Data Management and Analysis

6.1 Program of Study

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 TCF Chair.

6.1.1 Comprehensive Exam

Ph.D. students must demonstrate core knowledge in the area of data management by passing three specified courses, prior to the start of their fifth semester of study, with grades of B or better in each of the courses and an overall GPA in the specified courses of at least 3.5. This requirement constitutes the Comprehensive Exam. The specific courses consist of any 3 of the required courses in Section 4. Students may place out of this requirement by substituting or transferring courses from other institutions at the discretion of the TCF Chair.

6.1.2 Elective Courses

A student must take at least five elective courses (fifteen hours) which involve the areas related to data management, or are directly applicable to the student’s dissertation research. Up to two courses (six 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, students must take at least 3 courses from the elective courses as specified in Section 4. For additional elective courses taken within the School of Computing, it is advised that students take 6000 level courses and above when available/appropriate. All courses taken by a track student to fulfill the elective requirements must be approved by the student’s committee and the TCF Chair.

The following list contains some of the possible elective courses from outside the School which a student may take to fulfill elective requirements:

- MATH 5010 Introduction to Probability
- MATH 5080 Statistical Inference I
- MATH 5090 Statistical Inference II
• MATH 5250 Matrix Analysis
• MATH 6010 Linear Models
• MATH 6020 Multilinear Models
• MATH 7870 Methods of Optimization
• ECE 5510 Random Processes
• ECE 6520 Information Theory and Coding
• ECE 6540 Estimation Theory
• ECE 6551 Survey of Optimization Techniques
• IS 6481 Data Warehousing
• IS 6482 Data Mining
• BMI 6010 Foundations of Medical Informatics
• BMI 6020 Foundations of Bioinformatics and Genetic Epidemiology
• BMI 6105 Statistics for Biomedical Informatics
• BMI 6300 Medical Decision-Making

6.1.3 Other Requirements

Neither courses CS 6930-CS 6944 (Computer Science Seminars) nor Independent study (CS 6950 and CS 7950) can be included in the Program of Study for the Ph.D. degree.

Students may place out of this requirement by substituting or transferring courses from other institutions at the discretion of the TCF Chair.

One year of study must be spent in full-time residency at the University (i.e., the student must enroll for a minimum of nine hours per semester for two consecutive semesters, summer optionally excluded). After the residency requirement is fulfilled, registration for three semester hours of CS 7970 (Ph.D. Dissertation Research) is considered a full load.

The Program of Study form should be filed with the School of Computing in the second semester of study and with the Graduate School prior to taking the qualifying examination. The Program of Study form must be submitted to the Graduate Records Office no later than the last day of the semester preceding the semester of graduation.

6.2 Student Committee Requirement

Each student forms a supervisory committee whose members guide the student's research program. The committee conducts the student's written qualifying examination, oral qualifying examination, and dissertation defense. A Ph.D. supervisory committee consists of five faculty members. At least three faculty members must be long-term instructional (LTI) faculty in the School of Computing, two of whom must be from the TCF. At least one member must be from outside the School of Computing. Any School of Computing long term instructional faculty member with advising privilege may serve as a supervisory committee chair. Final approval of all supervisory committees is granted by the TCF Chair and the Dean of the Graduate School. Students must form this committee by the end of the second semester of study, although a committee may be revised later by petition to the Graduate Studies Committee.
6.3 Qualifying Examination/Dissertation Proposal

After passing the Comprehensive Examination, all Ph.D. students must pass a Qualifying Examination, as specified by the Graduate School. The Qualifying Exam consists of a written part, to be conducted first, and an oral part.

The written part of the Qualifying Examination will cover the candidate’s general area of specialization in sufficient depth to demonstrate his/her preparation for conducting Ph.D.-level research. Each member of the student’s supervisory committee will contribute one or more questions to this exam. The supervisory committee will provide a written evaluation of this part of the exam, including an indication of whether or not the student will be allowed to proceed to the oral part of the Qualifying Examination.

The oral part comprises the dissertation proposal defense. At the supervisory committee’s option, it may also include follow-up questions relating to the written part of the exam. A majority of the supervisory committee should certify that the proposal is ready to be defended prior to conducting the oral part of the Qualifying Exam. For guidelines on preparing proposals, consult Discussion on Ph.D. Thesis Proposals in Computing Science, by H. C. Lauer. Copies are available from the Graduate Coordinator or from the Thesis Editor. A copy of the dissertation proposal must be in the student’s file.

Students should pass their Qualifying Examination by the end of their sixth semester of study, not counting summer enrollment. The Qualifying Examination must be completed no less than one semester prior to defense of the dissertation.

6.4 Dissertation Defense

The supervisory committee must give preliminary approval of the thesis or dissertation prior to the defense. The defense can be scheduled after this approval. To schedule the defense, contact the Graduate Coordinator. Students are strongly encouraged to schedule the defense during a regular colloquium slot. The student must provide one copy of the thesis or dissertation to the chair of the supervisory committee at least three weeks before the defense, and one copy to each of the other committee members at least two weeks prior to the defense. A complete draft of the thesis or dissertation must be delivered to the Graduate Coordinator one week prior to the announced time of defense. This copy will be made available for public access. Students are encouraged to place an additional copy on the School of Computing web pages at least one week prior to the announced time of defense.

After successfully defending the thesis or dissertation, the student must obtain approval from the Final Reader (typically the supervisory committee chair), School Director and Dean of the Graduate School. A draft of the final thesis or dissertation must then be presented to the Thesis Editor. Successful completion of the defense must be reported to the Graduate School at least four weeks before the last day of examinations in the final semester. Students should also read the document regarding copyright notices provided by the School and declare their intentions regarding granting the School the right to photocopy the dissertation before notifying the Graduate Coordinator of completion of the defense.

The student has one month after the defense to make any revisions prior to submitting the thesis or dissertation to the Graduate School Thesis Editor. There will be at most two additional months to complete any changes required by the Thesis Editor before final acceptance. If either of these deadlines are not met, the candidate must redo the oral defense. The final thesis or dissertation must be filed one week before the end of the semester of graduation. Students are expected to offer each committee member a bound copy of the thesis or dissertation once it is completed. Detailed policies and procedures concerning the thesis or dissertation are contained in “A Handbook for Theses and Dissertations” published by the Graduate School. The Dissertation defense should be held by the end of the seventh year of graduate study.