

Revised CS Qualifying Examination

22 February 2011

This document represents a proposal approved by the CS faculty.

Executive Summary

At the faculty meeting on 10/5/09, a general concept was approved for a new PhD qualifying process based on coursework to satisfy breadth requirements and a research project and associated oral exam to evaluate research capabilities. An ad hoc committee was charged with resolving the details of this new system, and this document describes the resulting proposal that is being put before the faculty for approval. The main points of this new system are summarized first, followed by a full description. These requirements will apply to *all* Ph.D. students beginning with class entering in fall 2009. Other students will be able to choose, in consultation with their advisor, which system to follow.

Areas:

- Computer Systems (Architecture, OS, Networks)
- Software Systems (PL, Compilers, Software Engineering)
- Application Systems (Graphics, DB, AI, etc.)
- Theory (Theory, Algorithms, Security)

Breadth requirements:

- Complete 6 courses
- At least one from each of four main areas
- At most one undergraduate course in each area (from approved list)
- No universally required courses (eg. 6354)
- Plan of study approved by quals supervisory committee.
- For the six chosen depth courses only:
 - * Minimum cumulative GPA: 3.6 (strict majority of A's)
 - * Minimum grade: B (not B minus, but B or better)
- Must be completed by end of 4th semester for students entering with a bachelor's degree, by end of the 3rd semester for those entering with a master's degree
- Students entering the program with a prior masters must meet the same breadth requirements through a combination of their prior coursework and any UVA courses that their committee deems necessary.

Depth requirements:

- Committee size: 3 CS faculty plus advisor; 2 from primary area list, 1 from a second area list
- Depth exam requirements: proposal, student-created committee-finalized reading list, final paper, defense; research should be primarily individual work and project should be commensurate with a 3-credit course.
- Depth exam outcomes: fail, pass, fail and try again (with at most two total attempts)
- MCS students will register for CS 895/7995, MS students will fulfill this requirement using CS 898/8999, students not obtaining a masters degree will use CS 999/9999.
- Fill out form G-105 to formally appoint the committee (“ME” = “MCS”)
- Oral depth exam must be publicly announced to faculty in advance

Timeline:

- Form committee by end of 1st month of 2nd semester
- Proposal deadline: end of second semester
- Final report deadline: 2 weeks before defense
- Deadline for first defense: end of 3rd semester
- Deadline for second try: one month after first
- Complete coursework by end of 4th semester

Qualifying Examination Revision Committee (as of Spring 2010):

- Jack Davidson, Chair
- Jason Lawrence
- Kevin Skadron
- Westley Weimer (current document maintainer)
- William Wulf

Preamble

At the faculty retreat on 13 February 2009, an ad hoc committee was charged with developing a new qualifying exam process that would evaluate students' abilities to pursue Ph.D. research. In subsequent discussions with the faculty, several desired goals for the new process were enumerated. These were:

- quality decisions (high confidence, consistency, fairness, etc)
- better alignment of quals with research activity in order to better identify research capabilities and minimize impact on student research productivity
- reduced faculty effort and increased faculty enthusiasm
- timely decisions (early in student's career, preferably within 2 years)

The faculty has concluded that an explicit evaluation of a student's ability to perform and defend research at a quality commensurate with PhD candidacy is an important aspect of a qualifying process that meets the above criteria. This helps make research a top priority from the very beginning of graduate studies, and can be easily integrated with the current masters curriculum in the form of CS 895/7995 or CS 898/8999. In conjunction with this "depth" exam, satisfactory completion of an approved course of study with per-course grade and overall GPA requirements will ensure that students have an appropriate "breadth" of background knowledge for Ph.D.-level research. Using these two mechanisms, a decision about whether to recommend that a student continue towards a Ph.D. degree would be made no later than student's second year of study (a hard deadline) and usually should be possible within 1 - 1.5 years for students entering with a prior masters degree.

The new qualifying process distinguishes between four main areas into which research and courses are divided: Computer Systems, Software Systems, Application Systems, and Theory. The appendix lists the topics, courses, and faculty in each of these areas

The rest of this document describes the rules for the new depth and breadth qualifying processes in further detail.

1. Depth Requirement

To demonstrate research potential commensurate with Ph.D. candidacy, students will be required to present and defend an independent research project and relate their work to prior art and fundamental concepts in the field. This requires a student to show *early* leadership in conducting research, show competence in technical writing, and make research a top priority from the beginning of graduate studies.

1.1. Components of the Depth Requirement

For Ph.D. candidates, the evaluation will be conducted by an advisory committee of *three CS faculty plus the advisor*. The exam will be based on a set of proposal documents and a public defense. The proposal documents include a description of the intended research project and a student-proposed reading list. At or after the proposal meeting, the committee will finalize the reading list. The public defense includes a final report document, a presentation, and an oral examination regarding the project as well as the agreed-upon set of background topics and materials from the finalized reading list. The depth qualifying process will consist of these artifacts:

- (1) Committee selection using Form G-105
- (2) A written project proposal (two to five pages)
- (3) A proposal presentation (~15 minutes)
- (4) A student-created, committee-finalized reading list
- (5) A final written project report (10 to 12 pages)
- (6) A project defense presentation (~30 minutes) and oral examination (no time limit) and completion of the appropriate forms
- (7) A passing grade in CS 7995 (the default: students obtaining an MCS), 8999 (students obtaining an MS) or 9999 (students with a prior masters)

Thus there are typically two meetings with the full committee: the first meeting at which the student gives the proposal presentation, and the second at which the student gives the project defense presentation.

Students who have already completed significant research at the time they begin the qualifying process may petition their committee to have the written project proposal waived. The entire depth process is expected to consist of work commensurate with a 3-credit course.

This exam will be integrated into the course requirements for CS 895/7995 for MCS students, for 3 credit hours of CS 898/8999 for MS students, and for

3 credit hours of CS 999/9999 for students entering with a prior masters. This process will *replace* the current structure of CS 895/7995 for MCS students planning to continue to a Ph.D. (in which individual advisors administered CS 895/7995 for their students and the student simply gave a public presentation with at least one other faculty member present). MS students must both pass the depth requirement and write a thesis as per the SEAS rules; most students obtain an MCS degree instead. CS 6190 is not related to the qualifying examination process (it is, however, required for all entering students).

We expect that all students will complete the requirements on time. At the period review of all graduate students, the faculty will note any missed deadlines related to the qualifying examination and communicate them to the student in the official progress letter. In the worst case, students who fall too far behind will be asked to leave the program.

1.2. Depth Requirement Deadlines

The student will appoint a qualifying-exam advisory committee by the end of the first month of their second semester, submit a project proposal and initial reading list two weeks before the end of their second semester, and then meet with the advisory committee before the end of the second semester to finalize expectations. The oral exam will then take place by the end of the 3rd semester. A final project report will be due two weeks before the final oral exam.

- (1) End of first month of second semester: appoint advisory committee using Form G-105. (Note: our “MCS” degree is equivalent to the Engineering school “ME” degree.)
- (2) Before end of second semester: meet with committee to discuss project proposal and finalize reading list. (Some students, such as those entering with a masters, may skip this step with committee approval.)
 1. Two weeks before proposal meeting: submit written project proposal (two to five pages) and initial reading list to committee.
- (3) By third semester: sign up for and complete CS 7995 (the default: students obtaining an MCS), 8999 (students obtaining an MS) or 9999 (students with a prior masters)
- (4) Before end of third semester: take project defense and oral examination for the first time.
 1. One week before project defense meeting: submit written final project report to committee.

2. One week before project defense meeting: public announcement of defense (visit administrative staff).
- (5) First month of fourth semester: students who did not pass the depth examination the first time but were granted a second chance must complete it.

It is expected that *all* CS students take CS 7995 (or equivalent) and complete the course within three semesters. Making a decision at this point as to whether the student should pursue a Ph.D. degree satisfies the early decision requirement and it comes at a natural point in the student's studies, when they should in any case be completing their first major research project.

All deadlines are advanced by one semester for students entering UVA with a masters degree (hence they must appoint their committee within the first month, submit a project proposal by the end of the first semester, and take the oral exam by the end of their second semester, etc.). Such students should use their temporary advisor to form the advisory committee, since matching occurs at the end of the first semester.

1.3. Depth Requirement Advisory Committee

While the student's research advisor would still provide primary management of the student's research work, a committee (which includes the research advisor) will approve the proposed project, judge whether the project was successfully carried out, and administer the oral exam covering the completed research project and related background material. Throughout this document, we refer to this committee as the *advisory committee*.

To provide consistency over time and across students in a given area, each research area has a standing committee that is responsible for staffing the qualifying exam committees for students whose topics fall in a particular research area. The four areas consist of Computer Systems, Software Systems, Application Systems, and Theory. To further improve consistency, every faculty member will be responsible for serving on committees from two of the four areas. A breakdown of areas, faculty assigned to these areas, and courses in each of these areas is included as an appendix.

Examining committees will consist of four tenure- or research-track CS faculty: A student must pick two members from the group corresponding to the primary research area, one listed under a second group (who may also be listed under the first group), and the advisor is an *ex officio* member. Faculty members can refuse invitations to advisory committees for load balancing purposes. The department chair and the director of graduate studies may be selected as advisory committee members. If the department chair and/or director of graduate studies are not already on an advisory

committee (i.e., not part of the 3+1), they may also choose to serve as additional *ex officio* members.

Standing and overlapping committees provide the high confidence, consistency, and fairness that the faculty desires. Basing the qualifying process on the student's research aligns the objectives and the investment of time with the student's and advisor's research goals. Furthermore, it also exposes the student to faculty members that have research interests that are similar to the student's, making the exam less intimidating and providing the ancillary benefit of making it somewhat easier for a student to switch to a different advisor in the same area (hopefully such switches are infrequent).

Students are allowed to form a special advisory committee with additional members (i.e., more than 3+1) spanning a greater variety of areas if their work that does not naturally fit into one of the standing areas. All committees must be approved by the director of graduate studies. Students should use Form G-105 to officially appoint the committee. The committee should have an official *chair* to keep the meetings moving along procedurally; the chair can be student's advisor.

1.4. Depth Requirement Project Guidelines

The effort should be commensurate with a three-credit MCS project. The project must:

- Include an explicit hypothesis.
- Draw a conclusion regarding the proposed hypothesis and support this conclusion with evidence (e.g., experimentation, formal proof or argument, studies or surveys, etc.).
- Follow sound research practice in accordance with standards in the chosen field.
- Demonstrate novelty with respect to *priori* work. This novelty can be incremental, but the contributions must be related to the current state of the art, including quantitative comparisons when appropriate.

Application development projects, infrastructure development projects, and limit studies are acceptable, subject to the above constraints.

1.5. Depth Requirement Project Proposal

The advisory committee has full control over the handling of the proposal document, and may decide details on a case-by-case basis. The following guidelines serve as the basis from which exceptions can be made.

Each proposal should include an abstract or executive summary, at most one-half of a page in length. The total proposal length should be two to five

pages. This should be sufficient for the committee to make a determination about the worthiness of the project.

The proposal should then address:

- **Motivation:** What is the problem you are solving and why is it important? What is the hypothesis of this research work?
- **Contributions:** What are the main ideas and why do they matter? In what way are they novel?
- **Related work:** What is the relevant prior work and state-of-the-art?
- **Detailed research plan:** What specifically will you do and how will you implement, design or evaluate it? For projects with a significant implementation component, give enough details of the features to be implemented and the experimental setup involved for the committee to judge feasibility. For projects with a significant formal component, give enough details of the formalisms used (e.g., proof goals and structures, logical frameworks) for the committee to judge feasibility.
- **Summary**

The student is required to submit the proposal in writing to the advisory committee in advance. The student should also prepare a draft reading list (see Section 1.6) and submit it with the proposal. Both the proposal itself and also changes or additions to the reading list can then be discussed at the first meeting.

The proposal presentation should be 15 minutes long. Some leeway is acceptable; a 10- or 20-minute presentation should be fine.

The proposal document is not binding in either direction. However, students should discuss any major deviations with their advisory committees. The proposal document is intended to assist the student in the formalization of the research project and to ensure that the student has not chosen too much or too little work. If the committee is unhappy with the proposal it may request amendments or changes and set an appropriate due date (see Section 1.2) as desired. Typically, however, the committee will indicate weaknesses in the proposal that must be addressed in the final report and presentation for the student to pass the depth requirement.

1.6. Depth Requirement Reading List

As part of the project approval process, the student will propose a reading list of material that the student should be prepared to discuss during the exam. The reading list consists of focus papers and background readings (see below). The reading list would typically include some seminal papers in

each area, as well as one single overarching textbook, with additional material tailored to the student's research project.

The reading list is proposed by the student and edited and finalized by the committee. The advisory committee has full control over the handling of the reading list and the level of mastery for expected for any element of it, and may decide details on a case-by-case basis. The following general guidelines serve as the basis from which exceptions can be made:

Every paper in the student's report bibliography is fair game for questioning. In particular, the student should be able to explain why any citation was included, what the main idea of that paper is, and what its relevance is. On the other hand, a more mature work might have a longer bibliography, and some papers might be more peripherally related. It is unreasonable to expect a student to have in-depth, detailed knowledge of every aspect of every paper on the bibliography. The advisory committee should use its discretion.

The student and committee should identify a small number of *focus papers* (typically two to three) that represent the state of the art in the area. These papers will be the focus for deep questioning. The papers may or may not come from the student's bibliography. The student and advisory committee should single out these focus papers. The student will be held to a higher standard for depth of understanding regarding the focus papers compared to any arbitrary paper from the bibliography.

The student and committee should also identify a number of *background readings* that cover important related concepts. These might be entire textbooks, chapters, or survey papers. The number of such items on the reading list should be a function of how long each is; a student should not be expected to read multiple textbooks. Two to three readings of this type are appropriate if one is a textbook; four to five may be more appropriate if each is a book chapter or paper. The student will be expected to have a firm command of the background readings, as shown through general understanding and an ability to place the work in context, but will not be questioned about them as closely as on the focus papers.

The student and advisory committee are responsible for finalizing the selection of the focus papers and the background readings, based on the student's initial proposed reading list. This takes place at or after the first advisory committee meeting and requires the simple consent of all committee members. Typically each member adds readings specific to a given research area, and the committee as a whole may prune the list if it is too large. There is no core reading list.

1.7. Depth Requirement Final Report

The structure of the final report is left to the student and the advisory committee. The student is required to submit the final report in writing to the advisory committee at least one week in advance. It should include:

- A presentation of the work's motivation, hypothesis and contributions.
- A placement of the work in the context of prior art.
- An explanation of how the proposed work was carried out, and, if applicable, provide enough information for the reader to replicate the results.
- A drawn conclusion from the work and a discussion of future research directions that the project suggests.

The final project report should be 10 to 12 pages long and can use any ACM conference format (e.g., <http://www.acm.org/sigs/publications/proceedings-templates>) or similar format used in the relevant subfield.

1.8. Depth Requirement Oral Defense and Questioning

The student's final presentation is public. The student must arrange for the administrative staff to publicize the time and date of the final presentation (as if it were an MCS examination). The announcement must go out at least one week in advance. The student's presentation should be 30 minutes long. Some leeway is acceptable; a 25- or 35-minute presentation is fine.

Students should be prepared to answer questions about their depth area in general and their research project in particular. In addition:

- Students should be able to explain the main idea, main conclusion, and relevance of any paper in their report's bibliography. Students are not expected to be completely familiar with every detail of every paper.
- Students should be an expert on the focus papers from their reading lists. These papers represent the start of the art in the area, and the student will be held to a higher standard for these papers and deep questioning regarding them is expected.
- Students should be familiar with the major concepts from the background readings in the reading lists. The student will be expected to have a firm command of the background readings, as shown through general understanding and an ability to place the work in context, but will not be questioned about them as closely as on the focus papers.

Based on the student's final project report and oral exam, the advisory committee will determine if the student passed this depth portion of the examination. If the committee feels that the student's performance is not acceptable but that a second attempt is warranted, a second try may be

permitted, in which case the exam must be re-taken within one month. A total of at most two attempts are allowed.

For students seeking an MS degree, the advisory committee can decide to use the Depth portion of the Qualifying Exam as the oral MS Defense. The MS Thesis is handled separately.

The oral depth exam can be counted as the presentation portion of an MCS degree.

Terminal masters students will follow the same process but their examination will only evaluate whether the project work meets the criteria for a masters degree as opposed to the criteria for Ph.D. Qualification. Thus, a “toned-down” depth exam can serve as part of the masters process for a terminal masters student. Students will register for the appropriate course in the semester of their qualifying exam (generally no later than the 3rd semester for Ph.D. Candidates; hard deadline of fourth semester).

Grading in CS 895/7995 (or equivalent) will be assigned by the instructor of record for that section. This is typically the student's advisor. The advisor will receive input from the committee, but is responsible for assigning the overall grade. In general, the course grade will relate to the exam outcome, and *should be commensurate with what would be required in a three-credit graduate course*. However, a student could receive a “B” in the course yet still fail the quals. Similarly, but more rarely, a student could get an “A” in the course but fail the quals. In cases where the student must retake the exam, an incomplete will be assigned until the exam is retaken (which must occur within one month of the original exam, unless otherwise agreed upon by the committee).

2. Breadth Requirement

To ensure that PhD students achieve sufficient breadth to be prepared for effective Ph.D.-level research, the ad hoc committee recommends relying solely on coursework but with stringent performance requirements. Coursework allows an accurate assessment of the student’s overall capabilities by virtue of the long-term interaction between the student and instructor and availability of diverse evaluation tools. A course-based breadth process also boosts the incentive to master advanced material outside a student’s core area.

To meet the breadth requirement, students must achieve a minimum GPA of 3.6 and a minimum per-course grade of a B (not B-) across a set of 6 courses selected from a menu approved for this purpose. This coursework must be completed within 4 semesters for students entering with a bachelors degree and within 3 semesters for students entering with a masters. *The plan of study must be approved by the student's qualifier supervisory committee*. At least one course must be chosen from each of four areas: Computer

Systems, Programming Systems, Application Systems, and Theory. The remaining two courses can be from any areas of the student's choice. Note that we will no longer require any universal courses that all students must take, e.g. CS 6354.

Seminar courses can be counted toward breadth requirements at the discretion of the student's advisory committee. A non-exhaustive list of such seminar courses appears at the end of this document.

Independent study courses may only be counted for the breadth requirement if taken under a professor who is *not* the student's advisor. Independent study with one's own advisor is assumed to represent standard degree research depth in one's area of specialty, not breadth.

Select courses from other departments, such as ECE, MATH or SYSTEMS, may count for the Theory breadth requirement. A course used for the Theory breadth requirement cannot also satisfy the Math requirement.

The per-course minimum and the overall high GPA ensure that students can only meet the breadth requirement if they show mastery in a diverse set of areas in computer science. This is a more stringent requirement than our current breadth mechanism, in which students currently only have to pass a majority of the six questions in each area. The somewhat less stringent minimum grade for each course ensures that only competent work will count toward the breadth requirement.

One of the breadth courses in each area can be an undergraduate course. This gives students greater flexibility and is particularly appropriate for students from non-traditional backgrounds or students working in non-traditional areas. Note that undergraduate coursework does not count toward the SEAS requirements, so students are only likely to pursue this option when it is appropriate.

The advisory committee may allow a student to bypass a normally-required course. For example, the committee may deem a student who passes the final examination in the course, or has demonstrably learned the material through some other mechanism, to have satisfied the requirement. This flexibility is particularly important in the case of students entering with a masters degree.

Students entering with a masters degree will have their advisory committee look at their masters degree course work and decide which classes will count toward the breadth requirement. A student with a strong masters degree very likely will not have to take additional courses to meet the breadth requirement. A student with a weaker background (gaps in coverage) will likely be required to take some breadth courses, as determined by the advisory committee. A student with a masters in another non-CS field may have to take the full set of six courses to get the necessary breadth.

3. Advisory Committee Recommendation to the Faculty

Based on the student's performance on both the breadth and depth components of the qualifying examination, the advisory committee would make a recommendation to the faculty as to whether the student has passed or not passed the qualifying examination and is therefore recommended to proceed into the Ph.D. program. The final decision rests with the entire faculty.

Summary

Incorporating a research project into the qualifying exam aligns the qualifying process with development and assessment of research potential, and also aligns the student's qualifying work with the advisor's research program. This should increase research productivity and also boost students' confidence in their qualifying exam. Evaluating breadth based on coursework allows a more diverse and detailed characterization of the student's abilities.

Altogether, these policies allow a more timely decision based on the student's actual research performance. For students entering with a baccalaureate degree, the decision can be made at the end of student's second year. For a student entering with a MS degree, the decision can be made within 1-1.5 years.

Transition plan

As of September 6, 2010, all CS graduate students must use the qualifying examination system outlined in this document.

Appendix

Areas, Associated Faculty, Associated Courses

Faculty members can email the quals committee or the graduate program director to place a course they are teaching in a particular quals category by the second week in a semester. The quals committee or graduate program director will maintain a list (i.e., for which 651/851 courses from which years count for which areas).

Computer Systems [Arch, OS, Networks]

Davidson
Grimshaw
Gurumurthi
Hazelwood
Humphrey
Lawrence
Robins
Skadron
Soffa
Son
Stankovic
Weaver
Whitehouse
Wulf

CS 644/6444 Intro to Parallel Computing
CS 654/6354 Computer Architecture
CS 656/6456 Operating Systems
CS 757/7457 Computer Networks
CS 651/851/seminar Committee's Discretion

CS 586/5487 Real Time Systems
CS 715/6415 Performance and Analysis of Computer Networks

CS 465/4458 Internet Engineering
CS 457/4457 Computer Networks
CS 444/4444 Intro to Parallel Computing
CS 433/4330 Advanced Computer Architecture
CS 414/4414 Operating Systems
CS 6051 (Spring 2011, Stankovic) Cyber-Physical Systems
CS 8501 (Spring 2010, Skadron) Scalable Processor Architectures
CS 8535 (Spring 2011, Skadron) Computer Architecture: Dark Silicon
CS 851 (Fall 2008, Whitehouse) Topics in Wireless Sensor Networks
CS 651 (Fall 2007, Whitehouse) Programming Wireless Embedded Systems

Software Systems [PL, Compilers, Software Engineering]

Cohon
Davidson
Evans
Grimshaw
Hazelwood
Knight
Reynolds
Skadron
Soffa
Sullivan
Whitehouse
Weimer
Wulf

CS 655/6610 Programming Languages (also 615)
CS 671/6620 Compilers
CS 685/6240 Software Engineering
CS 686/???? Dependability
CS 651/851/seminar Committee's Discretion

CS 771/7620 Advanced Compilers

CS 471/4620 Compilers
CS 441/4240 Principles of Software Design
CS 434/4434 Fault-Tolerant Computing
CS 415/4610 Programming Languages

CS 8561 (Spring 2010, Weimer) Topics in Programming Languages

Application Systems [Graphics, DB, AI etc.]

French
Gurumurthi
Humphrey
Lawrence
Martin
Reynolds
shelat
Son
Stankovic
Sullivan
Weaver

CS 662/6750 Database Systems
CS 647/???? Image Synthesis
CS 651/851/seminar Committee's Discretion

CS 616/6316 Knowledge-Based Systems
CS 645/6840 Computer Graphics
CS 716/7716 Artificial Intelligence
CS 782/7882 Advanced Computer Vision
CS 882/8254 Topics in Computer Vision

CS 453/4753 Electronic Commerce Technologies
CS 462/4750 Database Systems
CS 445/4810 Intro to Computer Graphics
CS 416/4710 Artificial Intelligence
CS 448/4840 Computer Animation
CS 446/4820 Real-Time Rendering

CS 6051 (Spring 2011, Stankovic) Cyber-Physical Systems
CS 651 (Spring 2008, Stankovic) Cyber-Physical Systems
CS 6501 (Fall 2010, Whitehouse) Apps of Embedded Sensing Sys
CS 4501 (Spring 2011, Lawrence) Introduction to Computer Vision

Theory [Theory, Algorithms, Security]

Cohoon
Evans
French
Knight
Martin
Robins
shelat
Weimer

CS 660/6160 Theory of Computation
CS 661/6161 Design and Analysis of Algorithms
CS 651/851/seminar Committee's Discretion
ECE 7717 Information Theory and Coding (for example)
ECE 6714 Estimation Theory (for example)

CS 587/5787 Security in Information Systems

CS 432/4102 Algorithms
CS 425/4630 Defense Against the Dark Arts

Not Yet Completed

Jack Davidson will check out the relevant evaluation forms. We may want to merge and unify the official forms used to evaluate the quals.

History of Changes

See the main document for official details; this unofficial list is for reference only.

February 22, 2011

- * Indicate time limits for presentations.
- * CS 7995 grades are entered by the instructor of record; feedback may be solicited from the committee.
- * There is no core reading list.
- * Students who miss quals deadlines will be discussed at the periodic evaluation of all graduate students and may ultimately be asked to leave the program.
- * CS 6190 is not related to the quals process.
- * Clarify the grading criteria for CS 7995. The letter grade is separate from the quals pass/fail judgment.
- * Indicate that G-105 is the correct "committee making" form to use. The Engineering School uses "ME Degree" where we use "MCS Degree".
- * The project proposal document should be 2-5 pages. The final project report should be 10-12 pages long using any ACM conference format.
- * Committees should have an official chair. The chair may be the advisor.

December 20, 2010

- * Add in the categories for seminar courses for Spring 2011.

November 1, 2010

- * Note Jason Lawrence's response about computer vision courses: they do count for the Application Systems area.

September 7, 2010

- * Update "Transition Plan" based on September 6 Faculty Meeting.

September 6, 2010

- * Add a reminder that the final depth exam must be announced publicly at least one week in advance, like an MCS exam would be.
- * Add Spring 2010 6501 Apps of Embedded Sensing Sys (Whitehouse) as an "Application Systems" class based on email discussion with Kamin Whitehouse.

April 8, 2010

- * Add requirement that the proposal and final report be submitted at least one week in advance.

- * Add recommendation that student and advisor prepare a draft reading list before the first meeting.

March 8, 2010

- * Move Jason Lawrence to “Compute Systems” from “Theory”.

- * Correct some course titles.

- * Clarify that the quals project should be commensurate (in terms of the amount of work) with an MCS.

- * Indicate that the committee can decide to accept the depth portion of the quals as the MS Defense (for students going for an MS instead of an MCS).

March 5, 2010

- * Added three Subsections to Section 1: Project Guidelines, Final Report Guidelines, and Questioning.

February 15, 2010

- * Indicate that form G-105 should be used to officially form the committee.

- * Add Section 1.1 on Proposal Document structure, based on Kevin Skadron suggestions.

- * Add Section 1.2 on the Reading List for the Depth Exam, based on Kevin Skadron, Jack Stankovic and Sang Son's suggestions. Notably, the reading list is divided up into focus papers and background readings.

February 10, 2010

- * Clarify that students entering with an MS must still fulfill the Breadth requirement. However, their advisory committee may judge that their previous coursework satisfies some or all of the six courses required.

January 29, 2010

- * Clarify that the advisory committee must consist of CS faculty only.

- * Indicate that Independent Study courses can only satisfy the Breadth requirement if taught by someone other than the student's advisor.

- * List a number of past and current 651/851/etc. courses that satisfy various Breadth requirements.