September 2006 Memorandum 3805 (revised)

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Department of Electrical Engineering and Computer Science
Graduate Office, Room 38-444

THE TECHNICAL QUALIFYING EXAMINATION

The first component of the General Examination for the doctorate is the Technical Qualifying Examination (TQE). The purpose of this examination is to assure that students in the doctoral program have the technical background that will enable them to carry out their research effectively. The examination is not intended to rank order students or to eliminate them from the program. This memorandum describes the procedures and schedule that must be followed in the academic year 2006-2007 by new students in the doctoral program.

A student completes the TQE by demonstrating competence in four technical topic areas, each of which is associated with a specific subject offered by the Department. Basic topic areas are associated with undergraduate subjects; advanced topic areas are associated with graduate subjects. Competence in basic topic areas is demonstrated by performance on a written examination given at the end of the spring term. Competence in an advanced topic area is demonstrated by performance in the corresponding graduate subject.

Each student, in consultation with the Graduate Counselor, chooses the four topic areas that will constitute the TQE, subject to a set of constraints that depend on the student's research area. The constraints on selection of topic areas are explicitly listed at the end of this memorandum together with the list of approved topic areas. Students with an unusual educational background may petition for the substitution of an equivalent advanced subject for one of the approved advanced subjects. Please note that some graduate subjects are not offered every year and your plan should take this into account.

Each new graduate student must submit a plan for completing the TQE Forms are included with this memorandum and are available on line at http://www.eecs.mit.edu/grad/TQE_CSform.pdf or http://www.eecs.mit.edu/grad/TQE_EEform.pdf. Students in Area II should submit a TQE plan using https://area2.csail.mit.edu/students. New students who expect to leave after completing an S.M. degree should also use this form to state their intentions. The form must be submitted to the Graduate Office before Registration Day of the spring term.

Each written examination is two hours in length and all written examinations will be taken in a single afternoon on Wednesday, May 30, 2007. Arrangements to take the examinations at another time will be made only in unusual situations. Examinations are graded as Satisfactory, Marginal or Unsatisfactory. Examples of previous examination questions are available in the Graduate Office.

Earning the grade of A+, A or A- in an advanced subject is regarded as satisfactory performance in that topic area. The grade of B+, B, or B- is usually interpreted as marginal performance and a grade of C+ or lower is unsatisfactory. When the student has completed the four topic areas that were specified in the student's plan, the TQE Committee will determine if the overall performance is satisfactory. Satisfactory performance in all four areas or satisfactory performance in three areas and marginal performance in the fourth area constitutes overall satisfactory performance at this stage.

If the overall performance is judged to be unsatisfactory, the student will need to supply further evidence of competence in **all** of the topic areas where performance was marginal or unsatisfactory. This evidence normally takes the form of an oral examination in the following term. Students whose only deficiency was unsatisfactory performance in a single written examination may petition to substitute performance in a related advanced subject for the oral examination.

The oral examination is conducted by a committee of two faculty members and focuses on material from all of the topic areas in which performance was marginal or unsatisfactory. The committee reports its conclusions to the Committee on Graduate Students. If performance on the oral examination is judged to be unsatisfactory, the Committee on Graduate Students will ask the student’s Area Chair to consult with the oral examination committee, the student’s Graduate Counselor and research supervisor. The Area Chair will advise the student on steps to take before having a second oral examination. If performance in the second oral examination is not satisfactory, the Committee on Graduate Students will normally require that the student leave the doctoral program.

Students who have not satisfactorily completed the TQE by the end of the fourth regular term may continue in the doctoral program only with the explicit approval of the Committee on Graduate Students.

The normal schedule for completing the TQE is summarized below:

Fall term (Sept. 2006):

Prepare plan for TQE.
Take one or more advanced subjects to satisfy TQE.

End of fall term:

Submit TQE plan by end of IAP

Spring term (Feb. 2007):

Take additional advanced subjects. Students should have completed at least one advanced subject by the end of the spring term and most will have completed more. TQE written examinations will be held on Wednesday, May 30, 2007.

Fall term (Sept. 2007):

Students who have completed all four topics and whose overall performance is not satisfactory will take an oral examination or otherwise provide evidence of competence. Students should complete all of their advanced subjects by the end of the fall term.

IAP (Jan. 2008) or spring term (Feb. 2008):

Students who have completed all four topics and whose overall performance is not satisfactory will take an oral examination or otherwise provide evidence of competence.

End of fourth regular term:

Students who have not completed the TQE can continue in the doctoral program only with the explicit permission of the Committee on Graduate Students.

Constraints on selection of topic areas:

Area II (see p. 4 for the detailed list of topic areas):

The topic areas are arranged in three groups: Systems, Theory, and Artificial Intelligence. Each group contains three advanced topic areas. Students in Area II must choose one topic area from each group; the fourth topic area may be in any group. There are no basic topic areas in Area II; students will normally take four graduate subjects to complete the TQE. Some advanced subjects are listed as alternatives and a student may choose only one from the list. For example, 6.840 and 6.875 are alternative ways to satisfy the advanced topic area of complexity and a student may choose only one of these.

An Area II student may change the TQE plan at any time up until Drop Date of the fourth regular term. The change is made by submitting a new form to the Graduate Office.

Areas I, III, IV, V, VII (see p. 6 for the detailed list of topic areas):

Each student must choose two basic topic areas and will be expected to take two written examinations in May 2007. Each student must also choose two advanced topic areas and take the corresponding advanced graduate subjects. Some advanced topic areas are listed as alternatives and a student may choose only one, i.e. a student may not choose both 6.631 and 6.632.

It is expected that a student will complete the plan as submitted. Changes in the choice of basic topic areas after Feb. 9, 2007 and changes in the choice of advanced topic areas after March 9, 2007 require a petition to the Committee on Graduate Students.

For students in Area II

		GROUP I: SYSTEMS
Programming Languages:	6.821	Programming Languages (FT; not offered 2006-2007)
		or
	6.827	Multithreaded Languages and Compilers (FT; not offered 2007-2008)
Systems Software:	6.824	Distributed Computer Systems Engineering (ST)
		or
	6.829	Computer Networks (FT)
		or
	6.830	Database Systems (FT)
Architecture:	6.823	Computer System Architecture (FT)
		0r
	6.375	Complex Digital System Design (ST)
		GROUP II: THEORY
Complexity:	6.840	Theory of Computation (FT)
		or
	6.875	Cryptography and Cryptanalysis (FT)
Algorithms:	6.852	Distributed Algorithms (FT; not offered 2006-2007)
	6.854	Advanced Algorithms (FT)
		or
	6.856	Randomized Algorithms (ST; not offered 2007-2008)
		GROUP III: ARTIFICIAL INTELLIGENCE
Robotics/ Vision	6.345	Automatic Speech Recognition (ST; not offered 2007-2008)
		or
	6.863	Natural Language & Computer Representation of Knowledge (ST)
		or
	6.864	Advanced Natural Language Processing (FT)
		or
	6.866	Machine Vision (FT)
		or
	6.869	Advances in Computer Vision (ST)
Learning/Language	6.825	Techniques in Artificial Intelligence (FT)
		or
	6.867	Machine Learning (FT)
		or
	6.437	Inference and Information (ST)
		or
	6.438	Algorithms for Estimation and Inference (Offered as 6.972, FT06)
Computer Graphics	6.839	Advanced Computer Graphics (ST; may be chosen as a second subject in Group III but not as the only subject in Group III.)