

# Ph.D. QUALIFYING EXAM – Spring 2019

## Announcement and Policies

Department of Mechanical Engineering  
Virginia Tech

The Mechanical Engineering Ph.D. Qualifying Examination is required for students entering the Ph.D. program. The exam is offered twice each year. Students may request to take the exam by submitting Form A attached to this document.

### Important Dates for Spring 2019 Qualifying Exam

Exam Dates: Friday, March 29, and Saturday, March 30, 2019.

Time: <u>FRIDAY:</u>	<u>SATURDAY:</u>
8:00 am – 10:00 am <i>Thermodynamics</i>	8:00 am – 10:00 am <i>Fluid Mechanics</i>
10:15 am – 12:15 pm <i>Heat Transfer</i>	10:15 am – 12:15 pm <i>Mathematics</i>
12:45 pm – 2:45pm <i>Control Theory</i>	12:45 pm – 2:45pm <i>Vibrations &amp; Dynamics</i>
3:00 pm – 5:00 pm <i>Machine Design</i>	

Times for *Special Problems* will be arranged with students individually.

Place: <u>FRIDAY:</u>	<u>SATURDAY:</u>
440 Goodwin Hall	440 Goodwin Hall
635 Prices Fork Road	635 Prices Fork Road
Blacksburg, VA 24061	Blacksburg, VA 24061

### Important Dates and Deadlines

Event	Deadline
Request to take the exam .....	March 15, 2019
Changing problem area selection .....	March 15, 2019
Revoking a request to take the exam* .....	March 22, 2019
Announcement of exam results .....	April 22, 2019
Request to take the exam with a special problem .....	February 22, 2019
Decision of Qualifying Exam Committee on special problem requests .....	March 1, 2019
Submit a request for re-scoring .....	May 2, 2019
Decision of faculty on re-scoring requests by .....	June 6, 2019

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\* Except for a medical excuse or in other special circumstances

## Departmental Policy on the Ph.D. Qualifying Examination

1. **Purpose.** The purpose of the examination is to apply departmental standards to obtain a measure of the student's potential as a Ph.D. student. It will act as a filter to maintain quality. The exam will evaluate both knowledge and problem-solving ability.
2. **Level.** The material covered by the exam is at the senior undergraduate level.
3. **Frequency.** Provided there are candidates wishing to take the examination, the examination is administered twice per year, usually on the last Fridays in October and March and on the Saturdays following.

### 4. **Completion Requirements**

- a. Each graduate student has two chances to pass the qualifying examination.
- b. Students entering the Mechanical Engineering graduate program with M.S. degree from another institution must pass the exam in their first three semesters in the program (discounting any periods of approved leave of absence).\*
- c. Students entering the Mechanical Engineering graduate program with B.S. degrees must pass the exam in their first four semesters, irrespective of their intentions to directly pursue a Ph.D. or obtain a M.S. degree and then enter into the Ph.D. program\*.

Students who are unable to take the qualifier because of a conflict with a professional meeting may, on request, have their allowed time to take the test extended.

- d. In each exam, two problems will be offered in each of seven problem areas. The areas are: *Mathematics, Dynamics and Vibrations, Control Theory, Machine Design, Thermodynamics, Fluid Mechanics, and Heat Transfer.*

On applying to take the exam for the first time, a student must select three areas on which to be examined. The student will attend only the exam sessions for the selected areas. To pass an exam area the average score of the two problems in that area must be 75% or higher.

On applying to take the exam for the second time, a student must select additional problem areas as necessary to bring the total number of areas passed to three. E.g., if a student passed two areas on the first attempt, one area must be selected for the second. If a student passed one area, two must be selected. The areas selected for the second exam can be any areas not already passed; they need not be the areas failed on the first exam.

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\* Students who are unable to take the qualifier because of a conflict with a professional meeting at which they are presenting a paper or assisting with organization may request additional time in which to pass the qualifier. The request should be made as soon as the student is aware of the conflict, and in no cases later than 5 weeks before the date of the missed qualifier. Requests should include details of proposed activities at the conference. The Qualifying Exam Committee will respond to requests within one week of submission.

For part-time students, any semester in which they register for six or fewer credits will count as one-half semester in determining the deadline for passing the exam.

A student who has achieved a passing score in three areas has passed the exam.

5. **Request for Examination.** Students who wish to take the examination in a given semester should submit Form A no later than two weeks prior to the exam date. Form A includes information on the problem areas to be attempted. Students who wish to change their problem area selection may resubmit Form A at any time up to two weeks before the exam date.

**Special Problems.** In special circumstances, students may request to receive special problems outside the seven regular problem areas. **The special problems are intended for those students who have an undergraduate background that is significantly different from Mechanical Engineering.** Students requesting special problems shall fill out Form B (attached to this document) and return it together with Form A five (5) weeks prior to the exam date.

The request for special problems will be reviewed by a committee consisting of the Chair of the Ph.D. Qualifying Exam, Chair of the Graduate Program Committee, and the Head of the Mechanical Engineering Department or a faculty member designated by the Head. The Committee will evaluate the student's request based on the reasons documented in Form B and issue a decision no later than four weeks prior to the date of the exam, in writing, to the student.

6. **Revoking a Request.** Students are allowed to revoke their request to take the exam up to one week prior to the exam date. The request must be in writing and be addressed to the Chair of the Ph.D. Qualifying Exam. Except for medical reasons and family emergencies, failure to take the exam on the assigned date will count as a failing grade in the qualifying exam areas requested on Form A.
7. **Interpretation.** The examination will be administered and collected by the Chair of the Ph.D. Qualifying Exam, or his designate and distributed to the faculty for grading. After grading, the Chair of the Qualifying Exam will compile the results.
8. **Announcement.** The results of the examination process will be announced individually to each examinee two weeks after the date of the examination.
9. **Appeal.** Two types of appeals will be considered: a petition for a waiver of exam rules and a request for re-scoring of problems. All appeals must be in writing.

**Petition for Waiver:** Petitions for waiver of rules are usually either requests that the exam be taken after the time allowed in Section 4 above or requests that the student be allowed to take the exam more times than allowed in Section 4 above, but may be for other waivers. The student should submit a written petition to the Chair of the Ph.D. Qualifying Exam explaining the need for a waiver of the rules. This petition should include a space for the signature of the student's major advisor, signifying consent. The petition will be considered by a committee consisting of the Chair of the Ph.D. Qualifying Exam, the Chair of the Graduate Program Committee, and the Head of the Mechanical Engineering Department. The committee will reply to the petition within 15 days of receipt. Students should consider this delay and the exam deadlines shown in Section 11 below when submitting petitions.

**Request for Re-Scoring:** Students who believe some of their solutions have been incorrectly scored should submit Form C – Request for Re-Scoring and attachments within 17 calendar days of the announcement of exam results. The request must include:

- A completed Form C including signatures of both student and faculty advisor.

For each solution submitted for re-scoring:

- The original scored solution.
- A corresponding correctly worked solution.
- A written justification pointing out differences and similarities between the original solution and the correct solution, and explaining why the original solution should receive a higher score.

The material submitted for each solution should be identified only with the student's examination number, not with a name. Re-scoring requests will be transmitted to the faculty who graded the problem. The results of rescoring requests will be transmitted to the students no later than 45 calendar days after the announcement of exam results.

Requests for re-scoring will not be accepted without a signature indicating the approval of the student's faculty advisor. Re-scoring can result in a higher score, no change in score, or a lower score. Requests for re-scoring will not be accepted from students who pass the exam.

10. **Exam for Students who are not Registered.** The Qualifying Exam is open to all currently registered Mechanical Engineering graduate students, including students in the accelerated undergraduate/graduate degree program who have not yet received their B.S. degree. Others may take the exam under special circumstances. Non-students who wish to take the exam should make a written request explaining these circumstances to the Chair of the Ph.D. Qualifying exam no later than 5 weeks prior to the exam. The request will be considered by a committee consisting of the Chair of the Ph.D. Qualifying Exam, the Chair of the Graduate Affairs Committee, and the Head of the Mechanical Engineering Department. The committee will reply to the student within 15 days of receipt of the request. If the request is granted, the Chair of the Ph.D. Qualifying Exam will arrange for a faculty member to act as advisor to the student for purposes of the exam.

11. **Deadlines.** Students are strongly advised to review the following dates carefully, and plan their actions regarding the Qualifying Exam accordingly.

**Exam Dates**

Fall Semester: Last Friday and Saturday in October

Spring Semester: Last Friday and Saturday in March

In special circumstances, when the above dates have been changed, the Chair of the Qualifying Exam Committee will announce changes to these dates at least sixty (60) days prior to the date of the exam. Other important dates are:

	<b>Deadline (Prior to Exam)</b>
Request to take the Exam and change of exam area selection	2 weeks
Revoking a request to take the Exam, except for a medical excuse or other emergencies	1 week
Announcement of Exam results (Unless the student takes the Exam off campus, in which case the announcement of the results may be slightly delayed due to mailing time.	3 weeks after Exam
Request of a special problem (See Item 5 and Form A)	5 weeks
Issuance of decision by the Special Problem Review Committee (This is intended to give students sufficient time to prepare, in case their request for a special problem is denied	4 weeks
Re-scoring request (See Item 9 and Form C)	17 calendar days after the announcement of results
Announcement of re-scoring results	28 calendar days after the deadline for rescoring requests

12. **Examination Format**

**Friday Session – Four Problem Areas**

*Thermodynamics*  
*Heat Transfer*  
*Control Theory*  
*Machine Design*

**Saturday Session – Three Problem Areas**

*Fluid Mechanics*  
*Mathematics*  
*Vibrations and Dynamics*

There will be a two-hour session for each problem area. Students will be given the pair of problems at the beginning of each session and may allocate the two hours between the problems as they wish. Solutions will be collected at the end of each session. There will be short breaks between problems sessions with a longer break around Noon. Students will attend only those problem sessions for which they have requested the exam. Problem times for *Special Problems* will be scheduled individually.

The Examination will be closed book, closed notes. The tables and formulas deemed necessary for the solution of the Examination questions will be available. Students will be permitted to leave the examination room during the two sessions. If programmable calculators are used, their memories must be cleared prior to the beginning of each exam session. **The University Honor Code applies fully.**

A more detailed description of the examination content is presented in “Ph.D. Qualifying Exam – Description of Areas to be Examined.”

13. **Sample Problems.** Sample Ph.D. Qualifying Examination problems can be viewed at

<http://www.me.vt.edu/graduate-students/phdqualifying-exams/>

You will be given access based on your Virginia Tech PID and password when you turn in your Ph.D. Qualify Exam Request form. If you wish to obtain access before turning in the form, inform the ME Graduate Advisor in an email giving your PID.