The purpose of the Preliminary Examinations (Prelims) is to provide an opportunity for PhD-track students to demonstrate *at least* undergraduate-level competency in the core discipline(s) of Mechanical Engineering most relevant to their respective intended research program. Each student must pass the Preliminary Examinations in order to remain in the PhD program.

At present, Rowan's Mechanical Engineering Department recognizes three distinct Options for students to pass Prelims, pursuant to the details appearing below. Each student must submit the Preliminary Examinations application form found below to elect one of these Options by shortly after her/his second consecutive academic term following matriculation to the PhD program.

Preliminary Examinations (Prelims) Options

a) **Coursework Option -** Within the first two academic terms following matriculation to the PhD program, a student may satisfy the Prelims requirement by obtaining minimum grades of A- in each of two related "major" courses, as well as one "minor" course. These courses shall be at the 500 level or greater, although certain undergraduate courses may also substitute, provided prior departmental approval is obtained.

   Each student works with her/his primary research advisor to select major and minor subjects. Distinction between major and minor subjects reflects differing subject material found among traditional foundational subdisciplines of mechanical engineering, including

   1. Materials, Mechanics, and Manufacturing (MMM)
   2. Thermal-Fluid Sciences (TFS)
   3. Dynamics, Control, and Mechatronics (DCM)
   4. Applied Physics and Mathematics (APM)

   A partial course listing with subdiscipline designations follows below.

b) **Engineering Fundamentals Exam Option -** Within two consecutive academic terms following matriculation to the PhD program, a student may present an official score report indicating s(he) has obtained a passing score on the NCEES Fundamentals of Engineering (FE) Exam (or its Canadian equivalent) for the *Mechanical Engineering* discipline (other disciplines require prior departmental approval).

c) **Written Exam Option -** Immediately following the first two consecutive academic terms following matriculation to the PhD program, a student may elect to take a series of written Preliminary Examinations in which (s)he seeks to demonstrate competence in both a major and minor subject as previously defined.

   The student will take three separate exams: two in the chosen major subject and one in the chosen minor subject. Each exam of up to three hours in duration will be written and graded by a unique examiner designated by the Department. Each examiner will be a subject matter expert belonging to the Mechanical Engineering faculty (substitutes permitted by departmental approval), exclusive of the student's primary research advisor. Examiners will pre-approve specific resources (e.g., textbooks, calculators, etc.) that students are permitted to use on each of the respective examinations.

   Individual exams may be taken on different days provided all exams are taken within the same five day, departmentally-designated examination window. This exam date window will be announced at least one semester in advance to permit ample time for preparation. Exam scheduling details beyond those discussed here will be handled by the Graduate Program Chair.

Alternative Timelines

From time to time, situations may arise to frustrate the completion of Prelims during a student's second or third consecutive semesters after matriculation on the PhD track. In such cases, the Department's Graduate Committee may approve an alternative timeline for completion of Prelims.

Performance Outcomes

1. Passing – By construction, both the Coursework and Engineering Fundamentals Exam Options described above permit only a single successful attempt. Satisfactory (passing) performance for either of these Options obviates the need to attempt the Written Exam Option and permits a student remain in the PhD program.

   Similarly, the outcome for a student who successfully passes the Written Exam Option on either the first or second attempt is that s/he will remain in the PhD program.

2. First Failure – A student who does not pass the Written Exams on his/her first attempt may elect to attempt the Written Exams again during the examination window of the academic term immediately following the first attempt. The three examiners, in consultation with the student's primary research advisor, will decide whether to re-examine the student comprehensively or only in the major or minor subject.

3. Program Reassignment – if a student does not obtain a passing result after the second attempt at the Written Exam Option, s/he will be transferred from the PhD program into the MS program; particular choice of Track (Track I – Thesis, Track II – Non-thesis) is at the discretion of the student's primary research advisor.

Course Listing for Major/Minor Subjects

Listing last updated and approved by Graduate Committee in Spring 2020.

MMM	TFS	DCM	APM	
✓				CEE 08573: Advanced Structural Analysis
✓				CEE 08574: Advanced Structural Mechanics
✓				CEE 08575: Advanced Fatigue and Fracture
✓				CEE 08675: Fracture Mechanics
	✓			CHE 06506: Process Heat Transfer
	✓			CHE 06512: Safety in the Process Industries
	✓			CHE 06514: Transport Phenomena for Engineers
✓	✓			CHE 06518: Polymer Engineering
✓	✓			CHE 06528: Fluid Flow Applications in Processing and Manufacturing
✓	✓			CHE 06530: Experimental Methods in Chemical Engineering
	✓			CHE 06572: Biomedical Process Engineering
	✓			CHE 06586: Advanced Engineering Thermodynamics
			✓	CHE 06587: Process Optimization
✓				CHEM 07575: Polymer Chemistry
			✓	ECE 09551: Advanced Digital Signal Processing
			✓	ECE 09554: Theory and Engineering Application of Wavelets
		✓	✓	ECE 09651: Estimation and Detection Theory
✓	✓			ENGR 01510: Finite Element Analysis
✓		✓	✓	ENGR 01511: Engineering Optimization
✓				ENGR 01512: Principles of Nanotechnology
✓				ENGR 10513: Renewable Energy: Photovoltaics and Energy Harvesting
✓	✓			ENGR 01580: Advanced Viscoelasticity
✓				ME 10501: Computer Integrated Manufacturing and Automation
✓‡	✓‡	✓‡	✓‡	ME 10505: Special Topics in Mechanical Engineering
✓				ME 10506: Computational Materials Science
	✓			ME 10511: Combustion
	✓			ME 10512: Rocket Propulsion
	✓			ME 10513: Principles in Advanced Heat and Mass Transfer
	✓			ME 10514: Energy Conversion Systems
	✓			ME 10521: Gas Dynamics
✓	✓			ME 10522: Computational Fluid Dynamics
✓				ME 10540: Advanced Manufacturing
✓		✓		ME 10541: Advanced Mechanism Design
✓		✓		ME 10542: Advanced Mechatronics
	✓			ME 10544: Automotive Engineering
✓				ME 10550: Advanced Solid Mechanics
✓				ME 10551: Mechanics of Continuous Media
	✓			ME 10552: Structural Acoustics
		✓		ME 10553: Analytical Dynamics
✓				ME 10554: Elastic Stability of Structures
✓				ME 10570: Principles in Biomechanics
	✓			ME 10571: Principles in Biotransport
✓				ME 10572: Principles in Biomaterials
✓				ME 10576: Principles in Orthopaedic Biomechanics
✓‡	✓‡	✓‡	✓‡	ME 10705: Special Topics in Mechanical Engineering for Doctoral Students

‡ Particular Special Topic will determine subdisciplinary designation(s); consult with Graduate Program Chair.

Rowan Mechanical Engineering Department -- Prelims Application Form

Name_____

Banner ID_____

Term Matriculated into PhD Program_____

Current Date_____

* * * * * * * *

Option Selection (check selection)

☐ **Coursework Option (Option A)**

Major Subject (circle): MMM TFS DCM APM

Major Course 1 _____ Course Grade__

Major Course 2 _____ Course Grade__

Minor Subject (circle): MMM TFS DCM APM

Minor Course _____ Course Grade__

Grad Chair Verification ☐ _____ signature/date

☐ **Engineering Fundamentals Exam Option (Option B)**

Attach relevant documentation and submit to the Graduate Chair.

Grad Chair Verification ☐ _____ signature/date

☐ **Written Exam**

Major Subject (circle): MMM TFS DCM APM

Minor Subject (circle): MMM TFS DCM APM

Submit selections of major and minor subjects to Graduate Chair to initiate scheduling.

Grad Chair Receipt ☐ _____ signature/date