I. Areas of Study
The Department of Mechanical Engineering offers advanced coursework integrated with research leading to the Doctor of Philosophy degree in Mechanical Engineering. The program has three concentrations: Thermal and Fluid Systems, Design and Manufacturing Systems, and Mechanics and Materials. The Ph.D. in Mechanical Engineering will be awarded to candidates who have displayed an in-depth understanding of the subject matter and demonstrated the ability to make an original contribution to knowledge in their field of specialty.

II. Program Administration
The Doctor of Philosophy degree in Mechanical Engineering resides within the Department of Mechanical Engineering. The Mechanical Engineering Graduate Program Committee administers it. The Graduate Program Committee is responsible for curriculum enhancement, program development and promotion, student recruitment, admission, and on-going program review and provides input to the Chair and the graduate faculty of the department.

The Graduate Advisor of Record (GAR) is appointed by the department Chair and is responsible for the routine administration of the program, advising students, maintaining records, and representing the Department in matters related to the program. Questions about degree requirements and academic policies should be directed to the Graduate Advisor of Record.

III. Admission Requirements
The minimum requirements for admission to the Doctor of Philosophy in Mechanical Engineering degree program are as follows:
- Must meet the university admission requirements as outlined in the graduate catalog.
- Students whose native language is not English must achieve a minimum score of 550 on TOEFL (Test of English as a Foreign Language) or 6.5 on IELTS (International English Language Testing System).
- Satisfactory GRE (Graduate Record Examination) scores, as evaluated by the Graduate Program Committee of the Department of Mechanical Engineering, are required in combination with other criteria for admission to the Doctor of Philosophy in Mechanical Engineering degree program at UTSA.
- Normally, a student must hold a Master's degree in mechanical engineering or in a related field with a GPA of 3.2 or better in both his/her undergraduate and graduate studies for admission to the Doctor of Philosophy in Mechanical Engineering degree program at UTSA. Such applicants may transfer a maximum of thirty (30) semester credit hours previously earned toward their doctoral degree. Each student’s transcript will be evaluated by the Graduate Program Committee and the credit transferring will be approved on a course-by-course basis to satisfy the formal coursework requirements of the degree.
• Outstanding students, who do not hold a Master's degree, may enter the Doctor of Philosophy program on provisional status directly upon receiving a bachelor's degree in mechanical engineering or a closely related field, with the approval of the Graduate Studies Committee. Such applicants must have a GPA of 3.5 or better in the last sixty (60) semester credit hours of undergraduate coursework in mechanical engineering or a closely related field. A student with provisional status must satisfy the provisional requirements within the first two (2) years of study in order to proceed towards their Ph.D. degree.

• The Graduate Program Committee will evaluate each applicant, approve the necessary requirements, and recommend corrective actions and admission on a case-by-case basis.

IV. Fellowships
All full-time students without outside employment, who apply to the program, are automatically considered for a doctoral student fellowship provided by the department, which is determined on a competitive basis. This fellowship is for one year, during which students are expected to seek funding with their advisors for the remainder of their PhD program. The fellowship amount is determined on a competitive basis and ranges between $20,000 and $25,000 for twelve months. Students supported through the fellowship may apply for other scholarships and may be required to fulfill academic duties, such as being a teaching assistant or lab assistant, and conducting seminars. Medical benefits are not covered by the doctoral student fellowship.

There are two main types of graduate assistantships: Teaching Assistantships (TAs) and Research Assistantships (RAs). Typical appointments are “half-time” and require no more than 20 hours of service per week. The financial support for RAs is usually provided by individual faculty members from their research grants, while supports for TAs are provided by the department. Applicants are encouraged to contact faculty members to seek RA positions. Doctoral students who are not eligible to receive state-paid medical insurance will be personally responsible for paying the premiums for required insurance coverage.

V. Degree Requirements and Program of Study
The degree requires 90 credit hours of course and research work beyond the bachelor’s degree or 60 credits beyond the master’s degree, and passing of Qualifying Examinations, Dissertation Proposal, and Dissertation Defense and acceptance of the Ph.D. dissertation.

Required coursework and the timeline for expected progress are given in Tables 1 and 2, respectively. In general, undergraduate courses, general education courses, and prerequisites for graduate courses do not count towards the required number of credit hours.
This course is taught at Southwest Research Institute (SwRI). See the attached map and directions.

If students have taken these or similar courses as part of their master’s degree, with the approval of their advisors they will choose other advanced courses within their major area of study.

### Table 1 Curriculum (60 credit hours A through E)  Credit Hours

**A. Common Core Courses (9 credit hours)**

- EGR 6013 Analytical Techniques in Engineering  3
- ME 6973 Special Problems: Advanced Mathematics in Engineering  3
- ME 6113 Experimental Techniques in Engineering  3

**B. Technical Core Courses (6 credit hours):** Students are required to take two courses from the following list corresponding to their major area of study.

- **Thermal & Fluid Systems**
  - ME 5243 Advanced Thermodynamics  3
  - ME 5613 Advanced Fluid Mechanics  3

- **Design & Manufacturing Systems**
  - ME 5113 Advanced System Dynamics and Controls  3
  - ME 5503 Lean Manufacturing and Lean Enterprises  3

- **Mechanics & Materials**
  - ME 5413 Advanced Solid Mechanics  3
  - ME 5713 Mechanical Behavior of Materials  3

**C. Technical Elective Courses (9 credit hours):** Students are required to take at least three elective courses in consultation with their PhD advisors.

**D. Seminar (3 credit hours taken in three semesters)**

- ME 7991 Research Seminar  1

**E. Doctoral Research (18 credit hours required) and Dissertation (15 credit hours required)**

- ME 7983-6 Doctoral Research  3-6
- ME 7993-6 Doctoral Dissertation  3-6

### Table 2 Timeline of Progress

<table>
<thead>
<tr>
<th>Progress</th>
<th>To be Completed</th>
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<tbody>
<tr>
<td>Select PhD Advisor</td>
<td>Within 9 credit hours</td>
</tr>
<tr>
<td>Pass Written Qualifying Examination</td>
<td>Within 18 credit hours</td>
</tr>
<tr>
<td>Pass Oral Qualifying Examination (admission to candidacy)</td>
<td>Within 6 months after passing the written qualifying examination</td>
</tr>
<tr>
<td>Form Dissertation Committee</td>
<td>Within one month after admission to “candidacy”</td>
</tr>
<tr>
<td>Pass Dissertation Proposal (A written proposal and an oral presentation are required)</td>
<td>After admission to “candidacy”. Time to be determined by the Supervising Professor and the Dissertation Committee [27–45 credit hours].</td>
</tr>
<tr>
<td>Pass Dissertation Defense (Oral Examination)</td>
<td>After passing dissertation proposal. Time to be determined by the Supervising Professor and the Dissertation Committee [&gt; 60 credit hours].</td>
</tr>
</tbody>
</table>

1 This course is taught at Southwest Research Institute (SwRI). See the attached map and directions.

2 If students have taken these or similar courses as part of their master’s degree, with the approval of their advisors they will choose other advanced courses within their major area of study.
VI. PhD Advisor
The entire program of study, as well as the selection of major and minor areas, must be recommended by the student’s PhD Advisor by the end of 9 credit hours of the student’s coursework, approved by the Graduate Studies Committee, and must be submitted to the Dean of the Graduate School for final approval. The courses taken by students are intended to focus and support the individual’s mastery of his/her particular area of specialization. The PhD Advisor must be a tenured or tenure-track faculty member of the Mechanical Engineering Department.

VII. Candidacy: Qualifying Examinations
All students seeking a doctoral degree at UTSA must be admitted to “candidacy” in order to become eligible to continue their research that leads to a PhD degree. The requirement for admission to candidacy is passing a qualifying examination. The qualifying examination of the PhD/ME program comprises two parts: 1) A written examination based on coursework and 2) An oral examination based on the research interest of the student. After passing the qualifying examinations, the student becomes a PhD candidate. No more than two attempts to pass the candidacy exam are permitted.

Should a student fail the qualifying exam for a second time, he or she will be dismissed from the doctoral program. The student must follow the standard procedure to petition for reinstatement at the graduate level should he or she wish to return to the doctoral program. At the department's discretion, students may be reinstated to the MS degree. The process for petitioning for reinstatement is as follows:

A student who has been dismissed academically may petition for reinstatement after one long semester (Fall or Spring) has elapsed from the date of dismissal. Under exceptional circumstances, a petition may be considered earlier. Students are required to complete a reinstatement packet along with a letter containing all explanations, recommendations, or doctors’ statements in support of the student’s request for reinstatement and submit them to the Dean of the Graduate School on or before June 15 for Fall Semesters, October 15 for Spring Semesters, or March 15 for Summer Semesters.

The Graduate School prepares the petition for reinstatement and submits it to the Department’s Graduate Program Committee. The Graduate Program Committee will review the petitioner’s letter and academic record and make a recommendation concerning reinstatement to the Dean of the Graduate School. If the Petition for Reinstatement is disapproved, the student may not file another petition until the following semester.
Written Qualifying Examination: The written part of the qualifying examination is given in June of each year. Upon approval by their PhD advisor, students wishing to take the examination must submit their request using the designated form to the Graduate Advisor of Record before March 31. The written examination will be administered the first full week of June in each year. Normally, the written examination is taken by students who have completed the coursework listed under sections A and B of the curriculum in Table 1 and are in good standing. Students who fail the written qualifying examination in their first attempt may petition for a second attempt. No more than two attempts are permitted to pass the written examination.

The purpose of the written qualifying examination is to ensure that students pursuing a doctoral degree in Mechanical Engineering have the essential depth and breadth of knowledge basis. The Department of Mechanical Engineering administers the written qualifying examination in the following four areas with the supporting courses:

1. Common area
   - EGR 6013 Analytical Techniques in Engineering
   - ME 6973 Special Problems: Advanced Mathematics in Engineering

2. Technical areas
   a. Thermal & Fluid Systems (two subjects)
      - ME 5243 Advanced Thermodynamics
      - ME 5613 Advanced Fluid Mechanics
   b. Design & Manufacturing Systems (two subjects)
      - ME 5113 Advanced System Dynamics and Controls
      - ME 5503 Lean Manufacturing and Lean Enterprises
   c. Mechanics & Materials (two subjects)
      - ME 5413 Advanced Solid Mechanics
      - ME 5713 Mechanical Behavior of Materials

Students are required to take the common area as well as a major area and a minor area from the three technical areas (as listed above: a, b, c) of Mechanical Engineering.

The written qualifying examination includes three parts: Part 1-Common Area (this is a mandatory area), Part 2-Major Area (selected by student) and Part 3-Minor Area (selected by student). The three parts of the written exam are given on three different days. The examinations are administered once a year in June. Each part (Common Core, Thermal and Fluid Systems, Design and Manufacturing Systems, Mechanics and Materials) consists of six (6) questions to be answered in three (3) hours. The examinations are typically in the form of closed books and notes. If needed, the faculty member preparing the questions provides a formula sheet.
Minimum (passing) grade for each area in the Common Core, Major, and Minor Areas are 75%, 70%, and 60%, respectively. A graduate student is required to pass all three parts of the examination in order to be eligible to take the oral qualifying examination. Students who do not score the minimum grade only in one of the three areas may pass the exam on a conditional basis with the requirements (conditions) determined by the Graduate Program Committee. The students who pass the written qualifying exam conditionally can take the oral qualifying examination only after having satisfied the conditional requirements.

**Oral Qualifying Examination:** For a student who has passed the written qualifying examination in June, the oral part of the qualifying examination should be given in December of the year or in January of the next year. An oral qualifying examination committee, which includes at least three graduate faculty members, should be assembled by his/her PhD Advisor as the chair of the committee. The timing of the second examination is determined by the oral qualifying examination committee. The student prepares a 20-minute presentation on a topic of research interest, which highlights the research objective, motivation (need for research), literature survey, methodology, expected results, deliverables, and a timeline to complete the research.

The objective of the oral qualifying examination is twofold: (1) to evaluate the student’s skills for understanding the literature and summarizing the “state of the art” in the area of research interest; (2) to form the dissertation committee of the student based on the interest of the faculty attending the oral examination. The oral qualifying examinations are broadly announced and all faculty members are invited to attend, ask questions, and provide feedback. After the oral qualifying examination, the oral qualifying examination committee determines if the student has passed the examination in consultation with Graduate Studies Committee. Students who fail the oral qualifying examination in their first attempt are allowed to make a second attempt. No more than two attempts are permitted to pass the oral examination.

**VIII. Dissertation Committee**
A PhD candidate needs to assemble his/her dissertation committee in consultation with his/her PhD Advisor. The dissertation committee members are typically selected by the student in consultation with the PhD advisor and approved by the Graduate Advisor of Record and the Department Chair. This process should start as early as the time when the student has selected a PhD Advisor. The dissertation committee must be finalized no later than one month of passing the oral qualifying examination.

A dissertation committee includes the PhD advisor as the chair of the committee and a minimum of four members. Of the four members, at least two must be Mechanical Engineering graduate faculty members and one must be outside the department or UTSA, whose suitability will be subject
IX. PhD Dissertation Proposal

After admission to candidacy, the student should first consider research topics for his/her dissertation, and then write a dissertation proposal based on preliminary results. Normally, the dissertation proposal is presented to the dissertation committee of the student within one year after admission to candidacy. During this time, students take ME 7983-6 Doctoral Research (Table 1, Section E). The dissertation proposal consists of quantifiable and verifiable objectives, literature survey, methodology, preliminary work, deliverables, and expected contribution.

A written dissertation proposal should be submitted to the student's dissertation committee at least two weeks before the oral presentation. The dissertation proposal should:

- explain the basic idea of the dissertation topic,
- describe why that topic is original, challenging, and important,
- present an overview of the related work in the field,
- state what kind of results are expected, and present preliminary results, if any, and
- make a plausible argument that the study can be completed within a proposed time line.

The student should write the dissertation proposal as soon as he/she can address the issues described above. The dissertation proposal should be typically single spaced and 25-30 pages long. A public presentation of the student's dissertation proposal will be arranged and followed by a closed-door questioning by the dissertation committee.

The oral presentation is typically a 40-minute talk, followed by a question-and-answer session. Following the public presentation, the dissertation committee will conduct a closed-door oral examination based on the proposal and on relevant background from the student's Program of Study. Only the dissertation committee members may attend the closed-door session. After the examination, the student will be asked to leave, and the dissertation committee will discuss the student's performance in the dissertation proposal presentation. The dissertation committee may recommend changes before approving the dissertation proposal. No more than two attempts are permitted for the student to get his/her dissertation proposal approved.

X. Final Oral Dissertation Defense

After the approval of the dissertation proposal, the next steps are writing the dissertation and passing the final oral defense. During this time, students take ME 7993-6 Doctoral Dissertation (Table 1, Section E). The final oral defense is administered and evaluated by the student’s PhD dissertation committee and covers the general field of the dissertation. The final oral defense consists of a public presentation of the dissertation, followed by a closed session with the
members of the dissertation committee. It is expected that the material of the dissertation will be of archival quality and will be published in journals. The dissertation must be approved by a unanimous decision of the Dissertation Committee.

**IMPORTANT LINKS:**
- ME Department: [http://engineering.utsa.edu/~mechanical/](http://engineering.utsa.edu/~mechanical/)
- ME Faculty: [http://engineering.utsa.edu/~mechanical/faculty.html](http://engineering.utsa.edu/~mechanical/faculty.html)
- Graduate School: [http://www.graduateschool.utsa.edu/](http://www.graduateschool.utsa.edu/)
- Graduate Catalog: [http://utsa.edu/gcat/](http://utsa.edu/gcat/)
MAPS AND DIRECTIONS TO SOUTHWEST RESEARCH INSTITUTE
FROM THE AIRPORT:
1) Take Loop 410 West.
2) Go Past I-10, Bandera Road and Ingram Road.
3) Take the Culebra Road EXIT, turn left, under Loop 410.
4) Enter SwRI at the Main Gate guardhouse by turning right at the traffic light (left side road is Oakhill St.)
5) On class days, please park your car in the Cafeteria Parking Lot (Bldg. 161), which is across the street (near the flag poles).
6) Classroom is on the 1st Floor of Building 77. This is the 1st building to the left, after the stop sign.