

MASTER OF ENGINEERING IN ENGINEERING AND DOCTOR OF MEDICINE COMBINED DEGREE PROGRAM

Engineering Medicine (EnMed) is Texas A&M University's innovative engineering plus medicine degree program offered at Houston Methodist Hospital in Houston, Texas. This program invokes a partnership between Texas A&M University's School of Medicine and College of Engineering, and the Houston Methodist Hospital. The program aims to educate a new kind of doctor who will create transformational technology for health care in the ordinary practice of medicine. Students may choose to focus on the development of a device, computer software, medical test, diagnostic process, treatment process, drug development, or any other need that exists in the vast medical and pharmaceutical industries. The EnMed program is an integrated educational and research medical program with a focus on invention, innovation and entrepreneurship. Students who graduate from EnMed will earn their Doctor of Medicine from the School of Medicine and their Master of Engineering in Engineering from the College of Engineering. The length of the program is four years; engineering content is integrated within the School of Medicine courses.

Program Requirements

Master of Engineering in Engineering (p. 2) Doctor of Medicine (p. 1)

Doctor of Medicine

The 4-year curriculum provides the basic science and clinical foundations that will prepare medical students for supervised medical practice in residency and beyond.

First Year

Fall		Semester Credit Hours
PRE-CLERKSHIP PHASE ¹		
MEID 605	Foundations of Medicine I	7
MEID 606	Foundations of Medicine II	5
MEID 607	Medical Gross Anatomy	8
MEID 619	Practice of Medicine I	7
Semester Credit Hours		27
Spring		
MEID 608	Neuroscience	6
MEID 609	Introduction to Disease	9
MEID 616	Cardiovascular	5
MEID 617	Respiratory	3
MEID 618	Medical Student Grand Rounds	2
MEID 620	Practice of Medicine II	6
Semester Credit Hours		31

Second Year

Fall		
MEID 701	Hematology/Oncology	4
MEID 704	Renal Genitourinary	3
MEID 706	Metabolism/Gastrointestinal/Nutrition	3
MEID 707	Endocrinology and Reproductive Sciences	3
MEID 708	Integument-Musculoskeletal	2
MEID 711	Evidence Based Medicine	1
MEID 712	Practice of Medicine III	4
Semester Credit Hours		20

Third Year

Fall		
CLINICAL PHASE ²		
Clerkship ³		
EMED 800	Emergency Medicine Clerkship	4
IMED 800	Internal Medicine Clerkship	8
MEID 685	Directed Studies	8
MEID 821	Practice of Medicine IV	1
MEID 822	Practice of Medicine V	1
MEID 823	Practice of Medicine VI - Interprofessional Social and Ethical Dilemmas in Healthcare	1
MFCM 800	Family Medicine Clerkship	6
MPED 800	Pediatrics Clerkship	6
MPSY 800	Psychiatry Clerkship	6
MRAD 800	Radiology Clerkship	2
OBGY 800	Obstetrics and Gynecology Clerkship	6
SURG 800	Surgery Clerkship	8
Semester Credit Hours		57

Fourth Year

Fall		
MEID 985	Special Topic	8
Acting Internship (4 weeks) ⁴		
Select one of the following:		4
IMED 896	Internal Medicine Acting Internship	
MEID 998	Acting Internship - Student Initiated Elective	
MFCM 806	Family Medicine Acting Internship	
MPED 829	Pediatric Acting Internship	
OBGY 809	Obstetrics and Gynecology Acting Internship	
SURG 816	Surgery Acting Internship	
Critical Care Medicine (4 weeks) ⁴		
Select one of the following:		4
IMED 831	Medical Intensive Care Unit	
MEID 997	Critical Care - Student Initiated Elective	
MPED 802	Neonatal Intensive Care Unit	
Semester Credit Hours		16
Spring		
Practice of Medicine (2 weeks)		
MEID 850	Practice of Medicine Capstone	2

Electives ⁵	41
Semester Credit Hours	43
Total Semester Credit Hours	194

¹ Pre-Clerkship Phase

The first 18 months of the curriculum (pre-clerkship portion) focus on the fundamentals of biomedical science and consist of two components, Foundations and Organ Systems administered in consecutive blocks.

Foundations blocks emphasize the basic structure of the human body and basic principles of other medical science disciplines, i.e., gross anatomy, histology, basic principles of biochemistry, genetics, pharmacology, and cell physiology. Students take integrated courses which cover medical humanities, ethics, leadership, important professional development topics, and Introduction to Clinical Skills, which includes patient history-taking and doctor-patient communication skills and physical diagnosis.

By mid-April of the first year, students transition into the **Organ Systems** blocks. The Organ Systems blocks cover normal function, pathophysiology and disease-related aspects of the specific organ systems including the basic therapeutic approach to disease. The disciplines covered in Organ Systems blocks include organ-based physiology, organ system/disease-related biochemistry and genetics, pathology, microbiology, immunology, pharmacology, introductory pediatrics and introductory internal medicine. During the Organ Systems blocks, students continue to build skills in integrated humanities and clinical skills.

² Clinical Phase

During the **Clinical** portion of the curriculum, students rotate on clinical service in required clerkships and have opportunities for elective rotations in areas of interest. During this time, students have the opportunity to experience clinical training in several different patient care venues and locations, including private-practice, academic, and governmental institutions in Austin, Bryan-College Station, Corpus Christi, Dallas, Houston, Round Rock and Temple.

³ 18 month curriculum: Courses may be taken beginning with the Spring of Year 2 through the end of Spring of Year 3.

⁴ Required rotations/courses. These courses are available all year.

⁵ Electives are offered on all COM campuses. Students may choose from predetermined electives, design custom learning experiences, or participate in offerings at other medical colleges on a limited basis.

- Selective Courses: Within the elective time provided to students, 15 credit hours must follow the specialty specific recommendations.

The selective courses were created to help students maximize opportunities and focus training that is complementary to their career goals. Selectives are based on career specialty choice.

- Elective Courses: The Texas A&M College of Medicine electives have been developed to accommodate the diverse educational needs of our students. Students must obtain 24.5 credit hours of electives. The electives provide students the opportunity to further develop their medical knowledge, skills and attitudes. In addition to the electives that have been developed by the college, students may develop student-initiated electives. Student Initiated Electives (SIEs) allow students in good standing great latitude in designing unique elective experiences. All other electives rules/guidelines must also be followed.
- EnMed students may apply up to 12 credit hours of engineering courses as credit by exam.

Requirements for Graduation for MD Degree

The Doctor of Medicine degree is awarded at the completion of the four-year program to those students who have attained at least a grade of P or S (or higher) in all courses and clerkships in the medical curriculum, who are not on probation, and who have satisfactorily demonstrated to the faculty the personal and professional qualities essential to the practice of medicine. Students are expected to complete requirements for the MD degree within six (6) years, not counting time away on leave of absence or pursuit of advanced degrees, such as an MD/PhD.

- A passing grade in all required courses and clerkships must be achieved in order to receive the Doctor of Medicine (MD) degree.
- The student must obtain at least 194 credit hours to qualify for graduation.
- Passage of USMLE Step 1 and Step 2-CK is required for graduation.
 - Student must pass USMLE Step 1 for promotion to the 4th year.

COM students who qualify for the MD degree and who attain a GPA of 3.50 or above in their professional medical curricula, are awarded a degree "With Honors." Students who enter the curriculum with advanced standing are not eligible to be named honor graduates.

Commencement for COM students who have earned the MD degree takes place at the end of the spring semester.

Master of Engineering in Engineering

The curriculum for the Master of Engineering in Engineering (MENG) degree within the EnMed collaborative program is a tailored program of study that meets all MENG program requirements utilizing didactic, blended, and experiential learning in concert with MD coursework. The plan of study is taken concurrently with the MD plan of study shown above.

There will be three types of instruction used for the engineering courses which include blended engineering, engineering didactic, and experiential engineering. Within the MENG program, there will be 10 credit hours of blended instruction where the engineering content will be taught concomitantly with medicine to develop knowledge or solve a challenge at the intersection of the two fields (with distinct courses and assessments). An additional 8 credit hours will be didactic courses where only engineering will be covered. Then in the last part of the program, the credit hours will be experiential learning and project focused. As mentioned before, the student may apply up to 12 credit hours of the experiential engineering coursework to the MD program as elective credit using a credit by exam process.

Program Requirements

- Student's Advisory Committee (p. 2)
- Degree Plan (p. 3)
- Credit Requirement (p. 3)
- Transfer of Credit (p. 3)
- Limitations on the Use of Transfer, Extension and Certain Other Courses (p. 3)
- Final Examination (p. 4)

Student's Advisory Committee

On-Campus and Distance Education Degree Programs

After receiving admission to graduate studies and enrolling for coursework, the student will consult with the head of the department or the department head's designee (e.g., departmental graduate advisor)

concerning appointment of the chair of his or her advisory committee. The student's advisory committee for the Master of Engineering will consist of at least one member of the graduate faculty. Typically this member may be the departmental graduate advisor and will serve as the student's committee chair or, the departmental graduate advisor may appoint/approve another departmental faculty member to serve as the appropriate chair of the student's advisory committee. Depending on the departmental policy, additional committee members may be required. If additional committee members are deemed necessary by the department, the chair, in consultation with the student, will select the remainder of the advisory committee. The student will interview each prospective committee member to determine whether he or she is willing to serve. Only graduate faculty members located on Texas A&M University campuses may serve as chair of a student's advisory committee. Other graduate faculty members located off-campus may serve as a member or co-chair (but not chair), with a member as the chair. The chair of the committee, who usually has immediate supervision of the student's degree program, has the responsibility for calling meetings at any other time considered desirable.

If the chair of a student's advisory committee voluntarily leaves the University and the student is near completion of the degree and wants the chair to continue to serve in this role, the student is responsible for securing a current member of the University Graduate Faculty, from the student's academic program and located near the Texas A&M University campus site, to serve as the co-chair of the committee. The Department Head or Chair of Intercollegiate faculty may request in writing to the Associate Provost and Dean of the Graduate and Professional School that a faculty member who is on an approved leave of absence or has voluntarily separated from the university, be allowed to continue to serve in the role of chair of a student's advisory committee without a co-chair for up to one year. The students should be near completion of the degree. Extensions beyond the one year period can be granted with additional approval of the Dean.

If the chair of the student's advisory committee is unavailable for an extended time in any academic period during which the student is involved in activities relating to an internship or professional paper and is registered for courses such as 684, 692 or 693, the student may request, in writing, that the department head appoint an alternate advisory committee chair during the interim period.

The duties of the committee include responsibility for the proposed degree plan, any professional study or project, and the final examination. In addition, the committee, as a group and as individual members, is responsible for counseling the student on academic matters, and, in the case of academic deficiency, initiating recommendations to the Graduate and Professional School.

The committee members' approval on the degree plan indicate their willingness to accept the responsibility for guiding and directing the entire academic program of the student and for initiating all academic actions concerning the student. Although individual committee members may be replaced by petition for valid reasons, a committee cannot resign *en masse*.

Degree Plan

On-Campus and Distance Education Degree Programs

The student's advisory committee, in consultation with the student, will develop the proposed degree plan. The degree plan must be completed and filed with the Graduate and Professional School prior to the deadline

imposed by the student's college, and no later than 90 days prior to the date of the final oral examination. No exceptions are allowed.

This proposed degree plan should be submitted through the online Document Processing Submission System located on the website <https://ogsdpss.tamu.edu>.

Additional coursework may be added to the approved degree plan by petition if it is deemed necessary by the advisory committee to correct deficiencies in the student's academic preparation. No changes can be made to the degree plan once the student's Request for Final Examination or Request for Exemption from Final Examination is approved by the Graduate and Professional School.

Credit Requirement

On-Campus and Distance Education Degree Programs

A minimum of 30 semester credit hours of approved courses is required for the Master of Engineering degree.

Transfer of Credit

On-Campus and Distance Education Degree Programs

A student who has earned 12 hours of graduate credit in residence at Texas A&M University may be authorized to transfer courses in excess of the limits prescribed above upon the advice of the advisory committee and with the approval of the Graduate and Professional School. Courses taken in residence at an accredited U.S. institution or approved international institution with a final grade of B or greater might be considered for transfer credit if, at the time the courses were completed, the courses would be accepted for credit toward a similar degree for a student in degree-seeking status at the host institution. Otherwise, the limitations stated in the preceding section apply. Coursework in which no formal grades are given or in which grades other than letter grades (A or B) are earned (for example, CR, P, S, U, H, etc.) is not accepted for transfer credit. Courses appearing on the degree plan with grades of D, F or U may not be absolved by transfer work. Credit for thesis research or the equivalent is not transferable. Credit for coursework submitted for transfer from any college or university must be shown in semester credit hours or equated to semester credit hours. An official transcript from the university at which the transfer coursework was taken must be sent directly to the Office of Admissions.

Courses used toward a degree at another institution may not be applied for graduate credit. If the course to be transferred was taken prior to the conferral of a degree at the transfer institution, a letter from the registrar at that institution stating that the course was not applied for credit toward the degree must be submitted to the Graduate and Professional School.

Grades for courses completed at other institutions are not included in computing the GPA.

Limitations on the Use of Transfer, Extension and Certain Other Courses

On-Campus and Distance Education Degree Programs

Some departments may have more restrictive requirements for transfer work. If otherwise acceptable, certain courses may be used toward meeting credit-hour requirements for the master's degree under the following limitations.

1. The maximum number of credit hours which may be considered for transfer credit is the greater of 12 hours or one-third (1/3) of the total hours of a degree plan. The following restrictions apply:

- Graduate or upper-level undergraduate courses taken in residence at an accredited U.S. institution, or approved international institution with a final grade of B or greater will be considered for transfer credit if, at the time the courses were completed, the student was in degree-seeking status at Texas A&M University, or the student was in degree-seeking status at the institution at which the courses were taken; and if the courses would be accepted for credit toward a similar degree for a student in degree-seeking status at the host institution.
 - Courses previously used for another degree are not acceptable for degree plan credit.
2. The maximum number of credit hours taken in post-baccalaureate non-degree (G6) classification at Texas A&M University which may be considered for application to the degree plan is 12.
 3. A zero credit 684 and 685 course is only allowed for non-thesis master's students. Other courses, including 691 research hours, are not eligible for zero credit.
 4. Any combination of 684, 685, 690 and 695 may not exceed 25 percent of the total credit hour requirement shown on the individual degree plan:
 - A maximum of 6 hours of 684 (Professional Internship) and/or
 - A maximum of 6 hours of 685 (Directed Studies), and
 - Up to 3 hours of 690 (Theory of Research), and
 - Up to 3 hours of 695 (Frontiers in Research).
 5. A maximum of 2 hours of Seminar (681).
 6. A maximum of 9 hours of advanced undergraduate courses (300- or 400-level).
 7. For graduate courses of three weeks' duration or less, taken at other institutions, up to 1 hour of credit may be obtained for each five-day week of coursework. Each week of coursework must include at least 15 contact hours.
 8. No credit hours of 691 (Research) may be used.
 9. Continuing education courses may not be used for graduate credit.
 10. Extension courses are not acceptable for credit.

Exceptions will be permitted only in unusual cases and when petitioned by the student's advisory committee and approved by the Graduate and Professional School.

Final Examination

On-Campus and Distance Education Degree Programs

The candidate must pass a final examination by dates announced each semester or summer term in the Graduate and Professional School Calendar unless the student has been exempted from the examination. The candidate is eligible to petition for an exemption from the final examination with departmental or chair of intercollegiate faculty, if applicable, and committee approval. The approved petition should be submitted to the Graduate and Professional School by the deadline announced for the student's final semester (or semester of graduation) in the Graduate and Professional School Calendar. Please see the Graduate and Professional School website at <http://grad.tamu.edu/>.

To be eligible to take the final examination, a student's GPA must be at least 3.000 for courses on the degree plan and for all courses completed at Texas A&M which are eligible to be applied to a graduate degree, and no unabsolved grades of D, F or U can occur for any course listed on the degree plan. To absolve a deficient grade, the student must repeat the course at Texas A&M University and achieve a grade of C or better.

All coursework on the degree plan must have been completed with the exception of those hours for which the student is registered.

A request to hold and announce the final examination must be submitted to the Graduate and Professional School a minimum of 10 working days in advance of the scheduled date for the examination. The Graduate and Professional School must be notified in writing of any cancellation. A student may be given only one opportunity to repeat the final examination for the master's degree and that must be within a time period that does not extend beyond the end of the next regular semester (summer terms are excluded). The final exam cannot be held prior to the mid point of the semester if questions on the exam are based on courses in which the student is currently enrolled.

The final examination covers all work taken on the degree plan and at the option of the committee may be written or oral or both. The examination is conducted by the student's advisory committee as finally constituted. Persons other than members of the graduate faculty may, with mutual consent of the candidate and the major professor, attend final examinations for advanced degrees. Upon completion of the questioning of the candidate, all visitors must excuse themselves from the proceedings. A positive vote by all members of the graduate committee with at most one dissension is required to pass a student on his or her exam. A department can have a stricter requirement provided there is consistency within all degree programs within a department.

The Report of the Final Examination Form must be submitted with original signatures of only the committee members approved by the Graduate and Professional School. If an approved committee member substitution (1 only) has been made, his/her signature must also be submitted to the Graduate and Professional School. If necessary, multiple copies of the form may be submitted with different committee member original signatures. If an approved committee member substitution (1 only) has been made, his/her signature must be included on the form submitted to the Graduate and Professional School.

Additional Requirements

Additional Requirements

- Residence (p. 4)
- Time Limit (p. 4)
- Foreign Languages (p. 5)
- Internship or Practicum (p. 5)
- Application for Degree (p. 5)

Residence

On-Campus and Distance Education Degree Programs

No residence requirement exists; however, attention is directed to the rules regarding Limitations on the Use of Transfer, Extension and Certain Other Courses.

See Residence Requirements (<http://catalog.tamu.edu/graduate/academic-expectations-general-degree-requirements/#degreerequirementstext>).

Time Limit

On-Campus and Distance Education Degree Programs

All degree requirements must be completed within a period of seven consecutive years for the degree to be granted. A course will be considered valid until seven years after the end of the semester in which

it is taken. Graduate credit for coursework which is more than seven calendar years old at the time of the final examination (oral or written) may not be used to satisfy degree requirements.

Foreign Languages

On-Campus and Distance Education Degree Programs

No specific language requirement exists for the Master of Engineering degree.

Internship or Practicum

On-Campus and Distance Education Degree Programs

The final examination is not to be administered until all other requirements for the degree, including any internship, have been substantially completed.

Application for Degree

On-Campus and Distance Education Degree Programs

For information on applying for your degree, please visit the Graduation (<http://catalog.tamu.edu/graduate/academic-expectations-general-degree-requirements/#degreerequirementstext>) section.