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

This program aims to educate a new kind of doctor who will create transformational technology for health care in the ordinary practice of medicine.

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 College of Medicine, the College of Engineering, and the Houston Methodist Hospital.

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 College 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 College of Medicine courses.

Program Requirements

Master of Engineering in Engineering (p. 1)

Doctor of Medicine (p. 3)

Master of Engineering in Engineering

The curriculum for the Master of Engineering (MEN) in Engineering degree within the Engineering Medicine (EnMed) combination program is a tailored program of study that meets all MEN 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.

Program Requirements

Student's Advisory Committee

On-Campus and Distance Education Degree Programs

After receiving admission to graduate studies, students will consult with the graduate program concerning selection of a chair and members (if applicable) for an advisory committee representative of the student's field(s) of study and research.

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 they are willing to serve.

Only members of the Graduate Committee Faculty located on Texas A&M University campuses may serve as chair of a student's advisory committee. Other members of the Graduate Committee Faculty – including those located outside the university or off-campus (if permitted by program, department, and college/school policy) – may serve as a co-chair or member.

The advisory committee as a group – and as individual members – are responsible for advising the student on academic matters. The duties include responsibility for approving the student's proposed degree plan; research proposal (if applicable); thesis, dissertation, or record of study (if applicable); and conducting examinations (if required). The advisory committee members' approval of a degree plan indicates 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. Additionally, in the case of academic deficiency, the advisory committee is responsible for initiating recommendations to the Graduate and Professional School.

The chair of the advisory committee, who usually has immediate supervision of the student's degree program, has the responsibility for calling meetings at any time considered desirable.

If the chair of the student's advisory committee is unavailable for an extended period of time in any academic period during which the student is involved in activities relating to an internship, thesis or professional paper – and is registered for courses such as 684, 691, 692, or 693 – the Department Head or intercollegiate faculty Chair may appoint an alternate advisory committee chair during the interim period.

If the chair of a student's advisory committee is on an approved leave of absence – and the student is near completion of the degree and wants the chair to continue to serve in this role – a written request must be submitted to the Associate Provost and Dean of the Graduate and Professional School, by the Department Head or intercollegiate faculty Chair, that the faculty member who is on an approved leave of absence be allowed to continue to serve as chair of the advisory committee – without a co-chair – for up to one year. The request must confirm that the faculty member is able to engage in the required duties as chair during the leave of absence. Extensions beyond the one-year period (if necessary) may be granted with additional approval of the Associate Provost and Dean of the Graduate and Professional School.

If the chair of a student's advisory committee voluntarily separates from the university, and the student is nearing completion of the degree, the chair may continue to serve in this role – at the student's request – for up to one year. Two options are available:

- The chair may continue, with a co-chair, without additional approval by the Graduate and Professional School. The student must select a current member of the Graduate Committee Faculty – from the student's academic program and located near the Texas A&M University campus site – to serve as co-chair of the advisory committee.

- The chair may continue, without a co-chair, with approval by the Graduate and Professional School. A written request must be submitted to the Associate Provost and Dean of the Graduate and Professional School by the Department Head or intercollegiate faculty Chair to allow the faculty member to continue as chair, without a co-chair, of the advisory committee.

For both options, extensions beyond the one-year period (if necessary) may be granted with approval of the Associate Provost and Dean of the Graduate and Professional School.

Although individual advisory committee members may be replaced by petition for valid reasons, all members of a student committee cannot resign *en masse.*

Degree Plan

On-Campus and Distance Education Degree Programs

Students, in consultation with the advisory committee, will develop a proposed degree plan. The degree plan must be created, submitted, and approved through the online Document Processing Submission System (http://ogsdpss.tamu.edu/) (DPSS). The degree plan must be submitted prior to the deadline imposed by the student's college or school and approved by the Graduate and Professional School no later than 90 days prior to the date of the final oral examination or thesis defense. Students must select the appropriate program option when submitting a proposed degree plan.

Additional coursework may be added to the approved degree plan by petition through DPSS, if 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 Final Examination Request or Final Examination Exemption Request is approved by the Graduate and Professional School.

Coursework included on the degree plan is subject to the requirements and restrictions detailed in the Credit Requirements and Limitations on Credits and Coursework sections in each degree program page.

Degree program time limits apply to courses listed on a degree plan. Details are available on the Time Limits section in each degree program page.

Credit Requirements

On-Campus and Distance Education Degree Programs

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

This program does not offer a thesis option.

Ordinarily, students will devote the major portion of their time on work in one or two closely related fields. Other work will be in supporting fields of interest. There will be three types of instruction used for the engineering courses which include blended engineering, engineering didactic, and experiential engineering. 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. 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.

Limitations on Credits and Coursework

On-Campus and Distance Education Degree Programs

Credit-hour requirements are subject to the following limitations:

1. To receive a graduate degree from Texas A&M University, students must earn one-third or more of the credits through the institution's own direct instruction. These limitations also apply to joint degree programs.
2. Transfer credits may be used toward meeting the credit hour requirements under the following limitations:
   - The maximum number of credit hours which may be considered for transfer credit is the greater of 12 credit hours or one-third (1/3) of the total hours of a degree plan.
   - Graduate and/or upper-level undergraduate courses taken in residence at an accredited United States or international institution (recognized by the Office of Admissions), with a final grade of B or greater, may 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.
   - An official transcript from the institution at which the transfer coursework was taken must be sent directly to the Office of Admissions. Coursework credit submitted for transfer from any institution must be shown in semester credit hours or equated to semester credit hours.
   - Up to 1 hour of credit may be obtained for each five-day week of coursework for graduate courses of three weeks' duration or less taken at other institutions. Each week of coursework must include at least 15 contact hours.
   - Grades for courses completed at other institutions are not included in computing the GPA.
   - Coursework in which no formal grades were given, or in which grades other than A or B were earned (for example, CR, P, S, U, H, etc.), is not accepted for transfer credit.
   - Courses completed at Texas A&M University and appearing on the degree plan with grades of D, F, or U may not be absolved by transfer work.
   - Except for officially approved cooperative doctoral programs, credit for thesis or dissertation research – or the equivalent – is not transferrable.
   - Courses used toward a degree at another institution may not be applied for transferred graduate credit.
     - Courses used toward a certificate, but not applied to an awarded degree, may be considered for transfer.
     - If the course to be transferred was taken for a certificate or 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.
   - A student who has earned 12 credit hours of graduate credit in residence at Texas A&M University may be authorized to transfer courses in excess of the limits upon the advice of the advisory committee and with the approval of the Graduate and Professional School.

3. 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.
4. Only grades of A, B, C, and S are acceptable for graduate credit.
5. Graduate courses on a degree plan may not be taken on an S/U basis except for 681 (Seminar), 684 (Professional Internship), 690 (Theory of Research), 691 (Research), 692 (Professional Study), 693 (Professional Study), 695 (Frontiers in Research), 697 (Methods), 791 (Doctoral Capstone), or SOPH 680 (Public Health Capstone).
6. A student pursuing a non-thesis option Master's degree may not enroll in 691 (Research) courses for any reason.
7. A maximum of 12 credit hours may be used, in any combination, of the following:
   - No more than 6 credit hours of 684.
   - No more than 6 credit hours of 685 (Directed Studies).
   - No more than 3 credit hours of 690 (Theory of Research).
   - No more than 3 credit hours of 695 (Frontiers in Research).
8. A maximum of 6 credit hours may be used toward the non-thesis option Master's degree, in any combination, of the following:
   - No more than 2 credit hours of 681 (Seminar).
   - No more than 6 credit hours of 685 (Directed Studies).
9. Certain zero-credit courses may be allowed for Master's degree programs:
   - A zero-credit 684 (Professional Internship) or 685 (Directed Studies) course is only allowed for non-thesis option Master's programs.
   - A zero-credit 681 (Seminar) course may be used for either thesis or non-thesis option Master's programs.
   - Other courses, including 691 (Research) hours, are not eligible for zero credit.
10. No more than 25 percent of the total credit-hours required on the student's degree plan may be in any combination of 684, 685, 690, 691 (if permitted), and 695.
11. A maximum of 9 hours of advanced undergraduate courses (300- or 400-level) may be considered for application to the degree plan.
12. No more than 50 percent of the non-research coursework required for an in-person degree program may be completed through distance education courses.
13. Continuing education or extension courses may not be used for graduate credit.

Some departments may have additional or more restrictive requirements. 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

A final examination is required for the non-thesis Master of Engineering degree.

A student must pass a final examination by dates announced each semester or summer term in the Graduate and Professional School Calendar (https://grad.tamu.edu/knowledge-center/dates-and-deadlines/dates-and-deadlines/). 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 there must be no unabsolved grades of D, F or U 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. For thesis-option students, an approved thesis proposal must be on file in the Graduate and Professional School according to published deadlines prior to the final examination or submission of the request for exemption from the final examination.

A request to schedule the final examination must be submitted to the Graduate and Professional School *via* ARCS a minimum of 10 working days in advance of the scheduled date for the examination. The Graduate and Professional School will be notified *via* ARCS of any cancellations. 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 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 their exam. A department can have a stricter requirement provided there is consistency within all degree programs within a department.

The student's advisory committee will conduct this examination. The student's department will promptly report the results of the Final Examination to the Graduate and Professional School *via* the Academic Requirements Completion System (ARCS) within 10 working days of completion of the final examination. If an approved committee member substitution (one only) has been made, their approval must be submitted to the Graduate and Professional School *via* ARCS.

Doctor of Medicine

The four-year curriculum provides the basic science and clinical foundations that will prepare medical students for supervised medical practice in residency and beyond. The Doctor of Medicine degree is awarded at the completion of the four-year program to those students who have attained a passing grade in all required courses and clerkships in the curriculum, who are not on probation, who have passed theme Step 1 and Step 2-CK exams, and who have satisfactorily demonstrated to the faculty the personal and professional qualities essential to the practice of medicine. Students are expected to complete the 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.

First Year		**Semester Credit Hours**
Fall		
PRE-CLERKSHIP PHASE		
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	8
	Semester Credit Hours	**28**
Spring		
MEID 608	Neuroscience	6
MEID 609	Introduction to Disease	9
MEID 616	Cardiovascular	5
MEID 618	Medical Student Grand Rounds	2
MEID 620	Practice of Medicine II	8
	Semester Credit Hours	**30**
Second Year		
Fall		
MEID 617	Respiratory	3
MEID 701	Hematology/Oncology	4
MEID 704	Renal Genitourinary	4
MEID 706	Metabolism/Gastrointestinal/Nutrition	5
MEID 708	Integument-Musculoskeletal	2
MEID 712	Practice of Medicine III	6
	Semester Credit Hours	**24**
Spring		
MEID 707	Endocrinology and Reproductive Sciences	5
MEID 711	Evidence Based Medicine	1
MEID 713	Transition to Clerkship	4
	Semester Credit Hours	**10**
Third Year		
CLINICAL PHASE		
Clerkship [1]		
EMED 800	Emergency Medicine Clerkship	4
IMED 800	Internal Medicine Clerkship	8
MEID 685	Directed Studies	7
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
NEXT 800	Neurology Clerkship	4
OBGY 800	Obstetrics and Gynecology Clerkship	6
SURG 800	Surgery Clerkship	8
	Semester Credit Hours	**60**
Fourth Year		
MEID 850	Practice of Medicine Capstone	2
Electives [2]		40
	Semester Credit Hours	**42**
	Total Semester Credit Hours	**194**

1. 12-month curriculum: Courses may be taken in spring of year 2 through the spring of year 3.
2. Electives are offered on all medicine 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, 12 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 28 credit hours of electives to include 4 credit hours of Acting Internship and 4 credit hours of Critical Care. 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 school, 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.

Pre-Clerkship Phase

The first 18 months of the curriculum (pre-clerkship phase) 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 include patient history-taking and doctor-patient communication skills and physical diagnosis.

By mid-semester 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.

The curriculum committee included a 10-week break between first and second year, as students needed time for wellness and to recharge. The break also allows students to participate in research and/or clinical experiences locally and at other medical schools and research entities.

Clinical Phase

During the Clinical phase 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-Downtown, Houston-North, Round Rock, and Temple.

Additional Requirements

Master of Engineering in Engineering

Additional Requirements

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 (https://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 (https://catalog.tamu.edu/graduate/academic-expectations-general-degree-requirements/#degreerequirementstext) section.