Master's Programs in Engineering

The Frank H. Dotterweich College of Engineering offers the Master of Science degree with a major in Engineering, Industrial Management or Computer Science. The engineering majors include Chemical, Civil, Electrical, Environmental, Industrial, Mechanical, Mechatronics, and Natural Gas Engineering. The college also offers the Master of Engineering degree, which is further explained below. The Master of Science degree is a Thesis, Research Project or Courses Only Option requiring the completion of 30 to 36 semester hours of graduate work including the thesis on the Thesis Option. The Thesis Option degree is recommended for those interested in research or those wishing to work toward a doctoral degree. Detailed requirements for each of the plans are described in the general section of this catalog. Specifics of the Master of Engineering degree are explained below.

Master of Engineering

The Master of Engineering degree is a special program intended to prepare students for professional careers in engineering and to provide the opportunity for advanced studies to practicing engineers. Students who intend to continue academic work toward a doctoral degree are urged to see the Master of Science degree with a major in engineering. The Master of Engineering degree requires the completion of 36 semester hours of approved graduate work. Registration as a Professional Engineer in the State of Texas may qualify a person to complete this degree in 30 semester hours.

Twenty-one hours of course work must be in the field of engineering; 6 of those hours must be in the candidate's field of engineering practice. The remaining 15 hours may be chosen from the fields of engineering, mathematics, science and business administration. All of the hours must be at the 5000 or above level.

The candidate's course work requirements will be approved through consensus of the candidate and the Master of Engineering guidance committee. With the approval of the guidance committee, a candidate may be allowed to transfer, for degree credit, college course credits usable for graduate studies, not to exceed 15 semester hours. Additional course work above the 36 semester hours requisite for the degree may be required by the guidance committee to ensure that students have sufficient background for the courses in their degree plans. The committee will consist of one representative from each of the professional degree areas presently offered by the Frank H. Dotterweich College of Engineering.

A research or design project and report will be required. This is defined as a research paper or design project produced as a major assignment in a 3 hour graduate 5000 level course or by completing 3 hours of 5305 Research. A comprehensive examination shall be passed by the candidate, consisting of an oral defense of the candidate's design or research project and related areas.

Before the granting of this degree the candidate will have spent a minimum of four years of full-time professional activity of an engineering nature and quality acceptable to the guidance committee.

Admission to any of the graduate programs in the Frank H. Dotterweich College of Engineering requires a baccalaureate degree and adequate course work in the field of interest and a satisfactory score on the GRE Aptitude test.

Master's Programs in Chemical Engineering

Master's Program in Chemical Engineering- Thesis Option I

Code	Title	Semester Credit Hours
Core Requirements		**15**
CHEN 5303	Advance Topics in Chem Eng	1-3
CHEN 5308	Transport Processes	3
CHEN 5309	Separation Process	3
CHEN 5333	Chem and Catalytic Reaction En	3
CHEN 5371	Adv Chem Eng Thermodynamics	3
In addition to the above		
CHEN 5306	Thesis *	3
Elective Courses		**9**
TOTAL		**30 credits**

* Must take Thesis- CHEN 5306 **twice** for a total of six (6) semester credit hours.

Master's Program in Chemical Engineering- Project Option II

Code	Title	Semester Credit Hours
Core Requirements		**15**
CHEN 5303	Advance Topics in Chem Eng	1-3
CHEN 5308	Transport Processes	3
CHEN 5309	Separation Process	3
CHEN 5333	Chem and Catalytic Reaction En	3
CHEN 5371	Adv Chem Eng Thermodynamics	3
CHEN 5305	Graduate Research Project	3
Elective Courses		**18**
TOTAL		**36 Credits**

Code	Title	Semester Credit Hours
Elective Courses		
CHEN 5331	Simulatn and Analy of Chem Eng	3
CHEN 5334	Biochemical Engineering	3
CHEN 5401	Advance Probs in Chem Eng	1-4
CHEN 5336	Rheology	3
CHEN 5360	Advanced Nat Gas Processes	3
CHEN 5361	Advd Proc Dynamics and Control	3

Master's Programs in Natural Gas Engineering

Master's Program in Natural Gas Engineering- Thesis Option I

Code	Title	Semester Credit Hours
Core Requirements		**15**
NGEN 5325	Nat Gas Prod and Distribution	3
NGEN 5327	Nat Gas Drilling Engineering	3
NGEN 5336	Rheology	3
NGEN 5360	Advanced Nat Gas Processes	3
NGEN 5363	Advanced Reservoir Engineering	3
In addition to the above:		
NGEN 5306	Thesis *	3
Elective Courses		**9**
TOTAL		**30 credits**

* Must take Thesis- CHEN 5306 **two** (2) times for a total of 6 semester credit hours.

Master's Program in Natural Gas Engineering- Project Option II

Code	Title	Semester Credit Hours
NGEN 5325	Nat Gas Prod and Distribution	3
NGEN 5327	Nat Gas Drilling Engineering	3
NGEN 5336	Rheology	3
NGEN 5360	Advanced Nat Gas Processes	3

NGEN 5363	Advanced Reservoir Engineering	3
In addition to the above:		
NGEN 5305	Graduate Research Project	3
Elective Courses		**18**
TOTAL		**36 Credits**

Elective Courses

Code	Title	Semester Credit Hours
NGEN 5303	Advncd Topics in Nat Gas Engin	1-3
NGEN 5309	Separation Process	3
NGEN 5312	Pressure Transient Analysis	3
NGEN 5387	Quantitative Well Log Analysis	3

Master of Science Program in Civil Engineering

For all M.S. Civil Engineering students, no more than three (3) graduate-level courses (9 credits) from outside Civil Engineering may be applied to degree. The first three (3) graduate-level courses (9 credit total) must be Civil Engineering courses.

Master of Science Program in Civil Engineering- Thesis Option I

Code	Title	Semester Credit Hours
Core Requirements		**12**
Select one course in each of the four civil engineering technical areas		
Geotechnical Engineering		
CEEN 5342	Adv Geotechnical Engineering I	3
CEEN 5320	Foundation Engineering I	3
Structural Engineering		
CEEN 5311	Adv Reinforced Conc Design	3
CEEN 5321	Structural Dynamics	3
Transportation Engineering		
CEEN 5353	Design of Intelligent Tran Sys	3
CEEN 5350	Transportation Eng I	3
Water Resources Engineering		
CEEN 5315	Hydraulics of Open Channels	3
CEEN 5340	Water Resources Engineering	3
In addition to the above, the course below must be taken two times for a total of six (6) semester credit hours.		
CEEN 5306	Thesis	3
Elective Courses		**12**
TOTAL		**30 credits**

Master of Science Program in Civil Engineering- Project Option II

Code	Title	Semester Credit Hours
Core Requirements		
Select one course in each of the four civil engineering technical areas:		
Geotechnical Engineering		
CEEN 5342	Adv Geotechnical Engineering I	3
CEEN 5320	Foundation Engineering I	3
Structural Engineering		

CEEN 5311	Adv Reinforced Conc Design	3
CEEN 5321	Structural Dynamics	3
Transportation Engineering		
CEEN 5353	Design of Intelligent Tran Sys	3
CEEN 5350	Transportation Eng I	3
Water Resources Engineering		
CEEN 5315	Hydraulics of Open Channels	3
CEEN 5340	Water Resources Engineering	3
In addition to the above:		
CEEN 5305	Graduate Research Project	3
Elective Courses		**21**
TOTAL		**36 Credits**

Master of Science Program in Civil Engineering- Course Option III

Code	Title	Semester Credit Hours
Core Requirements		**12**
Select one course in each of the four civil engineering technical areas		
Geotechnical Engineering		
CEEN 5320	Foundation Engineering I	3
CEEN 5342	Adv Geotechnical Engineering I	3
Structural Engineering		
CEEN 5311	Adv Reinforced Conc Design	3
CEEN 5321	Structural Dynamics	3
Transportation Engineering		
CEEN 5353	Design of Intelligent Tran Sys	3
CEEN 5350	Transportation Eng I	3
Water Resources Engineering		
CEEN 5315	Hydraulics of Open Channels	3
CEEN 5340	Water Resources Engineering	3
Elective Courses		**24**
TOTAL		**36 Credits**

Elective Courses

Code	Title	Semester Credit Hours
CEEN 5303	Advance Topics in Civil Eng	1-3
CEEN 5304	Internship in Civil Eng	1-3
CEEN 5310	Theory of Elasticity	3
CEEN 5311	Adv Reinforced Conc Design	3
CEEN 5312	Eng Reinforced Conc Slabs	3
CEEN 5313	Numerical Methods in Civil Eng	3
CEEN 5314	Finite Element Methods in Engi	3
CEEN 5315	Hydraulics of Open Channels	3
CEEN 5316	Eng Mechncs of Fiber Composits	3
CEEN 5320	Foundation Engineering I	3
CEEN 5321	Structural Dynamics	3
CEEN 5322	Foundation Engineering II	3
CEEN 5326	Adv Construction Management	3

CEEN 5332	Structural Wood Design	3
CEEN 5333	Advanced Strength of Materials	3
CEEN 5335	Prestressed Concrete	3
CEEN 5337	Advanced Structural Analysis	3
CEEN 5340	Water Resources Engineering	3
CEEN 5342	Adv Geotechnical Engineering I	3
CEEN 5350	Transportation Eng I	3
CEEN 5352	Design of Asphalt Pavements	3
CEEN 5353	Design of Intelligent Tran Sys	3
CEEN 5354	Pavement Management Systems	3
CEEN 5355	Groundwater Hydrology	3
CEEN 5356	Physchem Treat Wtr and Wstwtr	3
CEEN 5360	Adv Structural Engineering	3
CEEN 5361	Adv Structural Steel Design	3

Master of Science (M.S.) in Computer Science

Master of Science in Computer Science- Thesis Option I

Code	Title	Semester Credit Hours
Core Requirements		**15**
CSEN 5304	Adv Computer Architecture	3
CSEN 5314	Database Systems	3
CSEN 5322	Operating systems	3
CSEN 5323	Computer Comm Networks	3
CSEN 5336	Analysis of Algorithms	3
In addition to the above, the course below must be taken twice for a total of six (6) semester credit hours		**6**
CSEN 5306	Thesis	
Elective Courses		**9**
TOTAL		**30 credits**

Master of Science in Computer Science- Project Option II

Code	Title	Semester Credit Hours
Core Requirements		**15**
CSEN 5304	Adv Computer Architecture	3
CSEN 5314	Database Systems	3
CSEN 5322	Operating systems	3
CSEN 5323	Computer Comm Networks	3
CSEN 5336	Analysis of Algorithms	3
In addition to the above		
CSEN 5306	Thesis	3
Elective Courses		**18**
TOTAL		**36**

Master of Science in Computer Science- Course Option III

Code	Title	Semester Credit Hours
Core Requirements		**15**
CSEN 5304	Adv Computer Architecture	3

CSEN 5314	Database Systems	3
CSEN 5322	Operating systems	3
CSEN 5323	Computer Comm Networks	3
CSEN 5336	Analysis of Algorithms	3
In addition to the above		
CSEN 5305	Graduate Research Project	3
Elective Courses		**18**
TOTAL		**36 Credits**

Areas of specialization and their Courses

Specialization in the following areas is in great demand. Students can also specialize in additional areas, including High Performance Computing, Bio-Informatics, Computer Vision and Pattern Recognition, and Internet of Things.

Code	Title	Semester Credit Hours
Area 1: Data Science		

Master of Science (M.S.) in Electrical Engineering

Master of Science in Electrical Engineering- Thesis Option I

Code	Title	Semester Credit Hours
Electrical Engineering Electives		**24**
In addition to the above, the course below must be taken twice for a total of six (6) semester credit hours		
EEEN 5306	Thesis	3
TOTAL		**30 credits**

Master of Science in Electrical Engineering- Project Option II

Code	Title	Semester Credit Hours
Electrical Engineering Electives		**33**
In addition to the above		
CSEN 5305	Graduate Research Project	3
TOTAL		**36 Credits**

Master of Science in Electrical Engineering- Course Option III

Code	Title	Semester Credit Hours
Electrical Engineering Electives		**33**
In addition to the above		
EEEN 5303	Advanced Topics in Elec Eng	1-3
TOTAL		**36 Credits**

Graduate Courses in Electrical Engineering

Code	Title	Semester Credit Hours
EEEN 5303	Advanced Topics in Elec Eng	1-3
EEEN 5304	Adv Computer Architecture	3
EEEN 5305	Graduate Research Project	3
EEEN 5306	Thesis	3
EEEN 5321	Digital Computer Design	3
EEEN 5324	Control System Synthesis	3
EEEN 5326	Dynamic Systems I	3
EEEN 5330	Rapid Prototypng and ASIC Dsgn	3
EEEN 5331	Digital Signal Processing	3
EEEN 5333	Prin of VLSI Circuit Design	3
EEEN 5337	Digital Image Processing	3
EEEN 5338	Digital and DSP Based Control	3
EEEN 5339	Embedded System Design	3
EEEN 5340	Speech Processing	3
EEEN 5341	Advancd Digital Integratd Ckts	3
EEEN 5350	Application of Neural Networks	3
EEEN 5401	Advanced Probs in Elec Eng	1-4

Master of Science (M.S.) in Environmental Engineering

Master of Science in Environmental Engineering- Thesis Option I

Code	Title	Semester Credit Hours
Core Requirements		**16**
EVEN 6354	Enviromental Regs&Policy	3
EVEN 6319	Chem Prin of Envir Eng Design	3
EVEN 6102	Grad Sem in Environmental Engr	1
Choose at least two courses from the following:		**6**
EVEN 6308	Fundmnls Solid Hazardous Waste	
EVEN 6309	Fund Air Qual and Polutn Contr	
EVEN 6316	Fundamentls of Environ Biotech	
EVEN 6325	Physical-Chem Water Treatment	
Choose at least one environmental modeling or data course:		**3**
EVEN 6318	Enviro System Modeling *	
EVEN 6332	Environmental Data Analysis	
In addition to the above, the course below must be taken twice for a total of six (6) semester credit hours.		**6**
EVEN 5306	Thesis	
Elective Courses		**9**
TOTAL		**31 credits**

* Choose any EVEN **modeling** course.

Master of Science in Environmental Engineering- Project Option II

Code	Title	Semester Credit Hours
Core Requirements		**16**
EVEN 6354	Enviromental Regs&Policy	3
EVEN 6319	Chem Prin of Envir Eng Design	3
EVEN 6102	Grad Sem in Environmental Engr	1
Choose at least two (2) courses from the following:		6
EVEN 6308	Fundmnls Solid Hazardous Waste	
EVEN 6309	Fund Air Qual and Polutn Contr	
EVEN 6316	Fundamentls of Environ Biotech	
EVEN 6325	Physical-Chem Water Treatment	
Choose at least one (1) environmental modeling or data course:		3
EVEN 6318	Enviro System Modeling	
EVEN 6332	Environmental Data Analysis	
Elective Courses		**21**
TOTAL		**37 Credits**

Master of Science in Environmental Engineering- Course Option III

Code	Title	Semester Credit Hours
Core Requirements		**16**
EVEN 6354	Enviromental Regs&Policy	3
EVEN 6319	Chem Prin of Envir Eng Design	3
EVEN 6102	Grad Sem in Environmental Engr	1
Choose at least two (2) courses from the following:		
EVEN 6308	Fundmnls Solid Hazardous Waste	
EVEN 6309	Fund Air Qual and Polutn Contr	
EVEN 6316	Fundamentls of Environ Biotech	
EVEN 6325	Physical-Chem Water Treatment	
Choose at least one (1) environmental modeling or data course:		
EVEN 6318	Enviro System Modeling	
EVEN 6332	Environmental Data Analysis	
Elective Courses		**21**
TOTAL		**37 Credits**

Elective Courses

Code	Title	Semester Credit Hours
EVEN 6304	Internship in Environ Enginrng *	1-3
EVEN 6311	Air Quality Modeling	3
EVEN 6312	Sur Water Quality Modeling	3
EVEN 6313	Ground Water Contaminant	3
EVEN 6329	Environ Monitor and Measurmnts	3
EVEN 6340	Decision Sci for Environ Systm	3
EVEN 6341	Enviromental Informatics	3

EVEN 6356	Spec Top in Environ Enginerng	3
EVEN 5303	Advance Topics in Envir Eng *	1-3

* M.S. Students receiving funding from any active research grant or project can take internship/Co-Op using either EVEN 6304 or EVEN 5303 only once during their study after three semesters enrolled in the M.S. program with the approval of their research advisor and the Department Chair.

Students can take up to two courses (6 credits) outside the department by consulting with your research/academic advisor.

Master of Science (M.S.) in Industrial Engineering

Master of Science in Industrial Engineering- Thesis Option I

Code	Title	Semester Credit Hours
Core Requirements		**6**
IEEN 5321	Computer Appl of Stats Methods	3
IEEN 5335	Principles of Optimization	3
In addition to the above, the course below must be taken two (2) times for a total of six (6) semester credit hours.		
IEEN 5306	Thesis	3
Elective Courses		**18**
TOTAL		**30 Credits**

Master of Science in Industrial Engineering- Project Option II

Code	Title	Semester Credit Hours
Core Requirements		**6**
IEEN 5321	Computer Appl of Stats Methods	3
IEEN 5335	Principles of Optimization	3
In addition to the above		
IEEN 5305	Graduate Research Project	3
Elective Courses		**27**
TOTAL		**36 Credits**

Master of Science in Industrial Engineering- Course Option III

Code	Title	Semester Credit Hours
Core Requirements		
IEEN 5321	Computer Appl of Stats Methods	3
IEEN 5335	Principles of Optimization	3
Elective Courses		**30**
TOTAL		**36 Credits**

Master of Science (M.S.) in Industrial Management

Master of Science in Industrial Management- Thesis Option I

Code	Title	Semester Credit Hours
Core Requirements		**21 Credits**

IMEN 5301	Industrial Management	3
IMEN 5330	Six Sigma Qual and Improvmnt	3
IMEN 5335	Industrial Safety and Risk Mgt	3
IMEN 5300	Resrch Method & Project Devel	3
IMEN 5344	Lean Production	3
IMEN 5340	Manufacturing System Mgmt	3
In addition to the above, the course below must be taken two (2) times for a total of six (6) semester credit hours.		**6**
IMEN 5306	Thesis	3
Elective Courses		**3**
TOTAL		**30 credits**

Master of Science in Industrial Management- Project Option II

Code	Title	Semester Credit Hours
Core Requirements		**21**
IMEN 5301	Industrial Management	3
IMEN 5330	Six Sigma Qual and Improvmnt	3
IMEN 5335	Industrial Safety and Risk Mgt	3
IMEN 5300	Resrch Method & Project Devel	3
IMEN 5344	Lean Production	3
IMEN 5340	Manufacturing System Mgmt	3
In addition to the above		
IMEN 5305	Graduate Research Project	3
Elective Courses		**12**
TOTAL		**36 Credits**

Master of Science in Industrial Management- Course Option III

Code	Title	Semester Credit Hours
Core Requirements		**21**
IMEN 5301	Industrial Management	3
IMEN 5330	Six Sigma Qual and Improvmnt	3
IMEN 5335	Industrial Safety and Risk Mgt	3
IMEN 5300	Resrch Method & Project Devel	3
IMEN 5344	Lean Production	3
IMEN 5340	Manufacturing System Mgmt	3
Elective Courses		**15**
TOTAL		**36 Credits**

Elective Courses

Code	Title	Semester Credit Hours
IEEN 5329	Advanced Eng Economic Analysis	3
IEEN 5335	Principles of Optimization	3
IMEN 5320	Spec Tops in Industrial Mgmt	1-3
IMEN 5315	Constrnt Mgmt and Mistake Prf	3
IMEN 5333	Hazardous Materials Management	3

Master of Science (M.S.) in Mechanical Engineering

Master of Science in Mechanical Engineering- Thesis Option I

Code	Title	Semester Credit Hours
Core Requirements		**12**
MEEN 5330	Continuum Mechanics	3
MEEN 5321	Advanced Fluid Mechanics	3
MEEN 5318	Advanced Dynamics	3
MEEN 5337	Engin Analysis in Applied Mech	3
In addition to the above, the course below must be taken two (2) times for a total of six (6) semester credit hours.		**6**
MEEN 5306	Thesis	
Elective Courses		**12**
TOTAL		**30 Credits**

Master of Science in Mechanical Engineering- Project Option II

Code	Title	Semester Credit Hours
Core Requirements		**12**
MEEN 5330	Continuum Mechanics	3
MEEN 5321	Advanced Fluid Mechanics	3
MEEN 5318	Advanced Dynamics	3
MEEN 5337	Engin Analysis in Applied Mech	3
In addition to the above		
MEEN 5305	Graduate Research Project	3
Elective Courses		**21**
TOTAL		**36 Credits**

Master of Science in Mechanical Engineering- Project Option III

Code	Title	Semester Credit Hours
Core Requirements		**12**
MEEN 5330	Continuum Mechanics	3
MEEN 5321	Advanced Fluid Mechanics	3
MEEN 5318	Advanced Dynamics	3
MEEN 5337	Engin Analysis in Applied Mech	3
Elective Courses		**24**
TOTAL		**36 Credits**

Elective Courses

Code	Title	Semester Credit Hours
MEEN 5301	Advanced Probs in Mech Eng	1-4
MEEN 5303	Advanced Topics in Mech Eng	1-3
MEEN 5313	Numerical Methods in Mech Engi	3
MEEN 5314	Finite Element Methods in Engi	3
MEEN 5315	Advanced Mechanism Design	3

MEEN 5316	Mechanics Composite Materials	3
MEEN 5320	Theory of Elasticity	3
MEEN 5322	Turbulent Flow	3
MEEN 5325	Compu Integrated Manuf Syst	3
MEEN 5326	Control Systems Engineering	3
MEEN 5328	Dynamic Systems Engineering	3
MEEN 5331	Advance Materials Science	3
MEEN 5333	Polymer Science	3
MEEN 5335	Advnd Robotics and Automation	3
MEEN 5339	Comp Aided Geometric Design	3
MEEN 5341	Tribology: Friction Wear & Lub	3
MEEN 5345	Cond and Convection Heat Trans	3
MEEN 5347	Advanced Thermodynamics	3
MEEN 5348	Auto. Sys. and Ind. Controls	3
MEEN 5349	Mechanical Vibrations	3
MHEN 5374	Advanced Control Techniques	3

Master of Science (M.S.) in Mechatronics Engineering

Master of Science in Mechatronics Engineering- Thesis Option I

Code	Title	Semester Credit Hours
Core Requirements		**12**
MHEN 5370	Adv Eng Analysis	3
MHEN 5371	Mechatronic Systems	3
MHEN 5372	Sensors & Actuators Mechatron	3
MHEN 5373	Embedded Mechatronic Sys [1]	3
In addition to the above, the course below must be taken two (2) times for a total of six (6) semester credit hours.		**6**
MHEN 5306	Thesis Research	
Elective Courses		**12**
TOTAL		**30 Credits**

[1] MEEN 5373- with the prerequisite of CSEN 2304, MEEN 1320, or equivalent.

Master of Science in Mechatronics Engineering- Project Option II

Code	Title	Semester Credit Hours
Core Requirements		**12**
MHEN 5370	Adv Eng Analysis	3
MHEN 5371	Mechatronic Systems	3
MHEN 5372	Sensors & Actuators Mechatron	3
MHEN 5373	Embedded Mechatronic Sys [1]	3
In addition to the above		
Elective Courses		**21**
TOTAL		**36 Credits**

[1] MEEN 5373- with the prerequisite of CSEN 2304, MEEN 1320, or equivalent.

Prescribed Elective Courses

Code	Title	Semester Credit Hours
MHEN 5374	Advanced Control Techniques	3
CSEN 5323	Computer Comm Networks	3
EEEN 5303	Advanced Topics in Elec Eng	1-3
EEEN 5338	Digital and DSP Based Control	3
MEEN 5328	Dynamic Systems Engineering	3
MEEN 5301	Advanced Probs in Mech Eng	1-4
MEEN 5349	Mechanical Vibrations	3

Other Elective Courses

Code	Title	Semester Credit Hours
CSEN 5333	Real Time Systems	3
EEEN 5329	Adaptive Control	3
EEEN 5342	Wireless Communications	3
EEEN 5331	Digital Signal Processing	3
MEEN 5348	Auto. Sys. and Ind. Controls	3
MEEN 5303	Advanced Topics in Mech Eng	1-3
MEEN 5315	Advanced Mechanism Design	3
MEEN 5314	Finite Element Methods in Engi	3