

SCHOOL OF ENGINEERING AND COMPUTER SCIENCE

The School comprises three departments, which offer five masters and two doctoral degrees. The Department of Computer Science offers a Master of Science in computer science. The Department of Electrical and Computer Engineering offers a Master of Science in Electrical and Computer Engineering and a Doctor of Philosophy. The Department of Mechanical Engineering offers a Master of Science in Mechanical Engineering and a Doctor of Philosophy. The School of Engineering and Computer Science also offers additional graduate engineering degrees, which are described below in the Interdisciplinary Degrees section and are administered jointly between the engineering departments. These degrees include a Master of Science in Biomedical Engineering, a Master of Engineering, joint undergraduate/graduate degrees, and a joint Master of Business Administration/Master of Engineering.

DEPARTMENT OF COMPUTER SCIENCE

Chairperson: Gregory D. Speegle

Graduate Program Director: Gregory J. Hamerly

MASTER OF SCIENCE

The GRE General Test is required. A bachelor's degree equivalent to the B.S. in computer science at Baylor or the B.A. in computer science at Baylor with calculus II and linear algebra is the standard requirement for admission. For those applying with less than the standard preparation, the quality and adequacy of the admissions record will be evaluated by the Graduate Affairs Committee of the Department of Computer Science after reviewing the application for admission. Requirements which must be met before admission will be determined by that committee. These requirements will be in addition to requirements for the M.S. degree.

At least fifteen semester hours are required at the 5000 level excluding 5V92, 5V96, and 5V99. All work presented to meet the requirements for this degree must be approved by the student's Advisory Committee or thesis Committee.

The Graduate Committee will appoint a graduate Advisory Committee for each student to monitor the progress of the student. The Master of Science program in computer science has two options, a thesis option and a project option.

Thesis Option

The thesis option is designed for students who are interested in eventually obtaining a Ph.D. in computer science or for well-qualified students who wish to complete a master's degree in the shortest time possible.

Required Courses 6 sem. hrs.

CSI 5010 Graduate Seminar

CSI 5V92 Master's Research (3 hours)

CSI 5V99 Thesis (3 hours)

Area Courses 21 sem. hrs.

Area course requirements are designed to provide students with sufficient breadth of knowledge for a Master of Science degree. It is expected for students to take courses of interest for their research as part of this requirement.

Students must take at least two theory courses, one software engineering course, two system courses and two application courses. A student may petition for a course taught for graduate credit within the Computer Science department but not listed to count as a course towards a specific area requirement. One course may not be counted towards more than one area.

Theory courses:

CSI 4336 Introduction to Computation Theory

CSI 5350 Advanced Algorithms

Software Engineering courses:

CSI 5324 Software Engineering

CSI 5342 Software Specification and Design

Systems courses:

CSI 5321 Advanced Data Communications

CSI 5335 Advanced Database

CSI 5337 Advanced Operating Systems

CSI 5338 Advanced Computer Organization

CSI 5345 Parallel Systems

Application courses:

CSI 4341 Computer Graphics

CSI 4352 Introduction to Data Mining

CSI 5325 Introduction to Machine Learning

CSI 5330 Advanced Computational Biology
CSI 5353 Multimedia Systems

Electives 9 sem. hrs.

A student's undergraduate preparation will normally include courses in Data Communications and Operating Systems. For students without prior coursework in these areas, one of the following two courses may be taken for graduate credit, but only one of these courses may count toward the master's degree requirements.

CSI 4321 Data Communications
CSI 4337 Introduction to Operating Systems

With the approval of the advisory committee, the student may take one 5000-level course from outside the department. No more than one course from outside the department may count toward the master's degree requirements.

Except as mentioned above, any CSI course that is offered for graduate credit may be taken as an elective. A total of 9 semester hours of electives are required.

Total 36 sem. hrs.

Project Option

The project option is designed for students interested in a terminal master's degree. It is also appropriate for students who continue to work while obtaining the degree. This option is designed for a fall entry. The program is intended to be completed in two years by a full-time student, but it is structured so that additional time may be taken to complete the degree.

Required Courses 6 sem. hrs.

CSI 5010 Graduate Seminar
CSI 5V92 Master's Research (3 hours)
CSI 5V96 Project (3 hours)

Area Courses 21 sem. hrs.

Area course requirements are designed to provide students with sufficient breadth of knowledge for a Master of Science degree. It is expected for students to take courses of interest for their research as part of this requirement.
Engineering and Computer Science

Students must take at least two theory courses, one software engineering course, two system courses and two application courses. A student may petition for a course taught for graduate credit within the Computer Science department but not listed to count as a course towards a specific area requirement. One course may not be counted towards more than one area.

Theory courses:

CSI 4336 Introduction to Computation Theory
CSI 5350 Advanced Algorithms

Software Engineering courses:

CSI 5324 Software Engineering
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Systems courses:

CSI 5321 Advanced Data Communications
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CSI 5337 Advanced Operating Systems
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Application courses:

CSI 4341 Computer Graphics
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Electives 9 sem. hrs.

A student's undergraduate preparation will normally include courses in Data Communications and Operating Systems. For students without prior coursework in these areas, one of the following two courses may be taken for graduate credit, but only one of these courses may count toward the master's degree requirements.

CSI 4321 Data Communications
CSI 4337 Introduction to Operating Systems

With the approval of the advisory committee, the student may take one 5000-level course from outside the department. No more than one course from outside the department may count toward the master's degree requirements.

Except as mentioned above, any CSI course that is offered for graduate credit may be taken as an elective. A total of 9 semester hours of electives are required.

Total 36 sem. hrs.

An oral examination will be required of every student in either option. There is no foreign language requirement for graduation.

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

Chairperson: Kwang Y. Lee

Graduate Program Director: Michael W. Thompson

MASTER OF SCIENCE

The Department of Electrical and Computer Engineering offers a Master of Science in Electrical and Computer Engineering (M.S.E.C.E.). This program is designed for students who are interested in engineering careers that require education beyond the baccalaureate degree. Examples of those include engineers performing industrial research and development or students who plan to pursue a doctoral degree.

Admission and Financial Aid

Admission is based on undergraduate academic record, the Graduate Record Examination (GRE), and letters of recommendation for the candidate. Tuition waivers and stipends are available on a competitive basis.

Requirements

Semester Hours

Course Work*	24
Thesis (discovery oriented)	<u>6</u>
Total	30

*Courses will be selected in consultation with the student's advisor. Courses in the departments of Mechanical Engineering, Mathematics, Statistics, Physics, Chemistry, Biology or Environmental Science may be included in this total with consent of the advisor.

Thesis Requirements

A discovery-oriented thesis is required in accordance with the criteria listed in the graduate catalog general requirements.

DOCTOR OF PHILOSOPHY

All applicants accepted into the Electrical and Computer Engineering (ECE) doctoral program must have received a Bachelor of Science or Master of Science degree in electrical or computer engineering, or closely related fields. The GRE exam is required of all applicants.

The program requirements include a minimum of sixty (60) semester hours of approved coursework and research hours beyond the bachelor's degree. The sixty (60) semester hours must meet the following minimums or maximums:

1. Forty-eight (48) semester hours of coursework including:
 - a minimum of twelve (12) semester hours of ECE coursework,
 - a maximum of six (6) hours of 4000 level ECE,
 - a minimum of six (6) semester hours outside ECE (see note 1 below),
 - three (3) semester hours of ELC 5388 -Design Methodology,
 - a minimum of twelve (12) semester hours of coursework at the 5000 level or above.
2. Twelve (12) semester hours of dissertation.

Note 1: Engineering is inherently cross-disciplinary; students may select courses from non-ECE disciplines to broaden their understanding of particular application or knowledge domains. Supportive graduate course hours outside of ECE can be selected from mechanical or biomedical engineering, computer science, mathematics, statistics, the physical sciences, the social sciences, education or business. Engineering is also a value-based discipline that benefits from Christian worldview and faith perspectives; students can also select supportive courses from religion, theology or philosophy. Course selection is broadly specified to provide flexibility and to accommodate a wide-range of student interest. The selection of specific courses must be approved by the student's graduate committee.

The minimal requirements may be expanded based on the student's background, research area and recommendations from the student's graduate committee. Students entering the program with graduate-level work or a master's degree in electrical or computer engineering, or a closely related field may apply up to twenty-nine (29) semester hours of approved courses toward the Ph.D. A break-down of the course requirements for non-ECE MS degree students is detailed as follows: a maximum of 30 semester credit hours of approved Master's level coursework with at most 6 hours of 4000 level courses, ELC 5388 Design Methodology, a minimum of 9 semester hours of approved advanced level ECE coursework, and a minimum of 6 approved non-ECE courses (See Note 1 above).

Doctoral Candidates with Master's Degree Backgrounds

Students with a master's degree in a field other than electrical or computer engineering (or an equivalent) will be able to enter the ECE doctoral program. Each such student will be required to pass qualifying exams in appropriate areas or sub-disciplines of electrical or computer engineering and one sub-discipline or area of their background field.

Student's Graduate Committee

The Graduate Committee for a Ph.D. candidate shall consist of at least five graduate faculty members, at least three from ECE and at least one from outside of ECE. The chairperson of the Committee must be a tenured/tenure-track ECE graduate faculty. If deemed appropriate, a graduate faculty member outside of ECE can supervise and mentor the student, in the capacity of a co-chair of the Committee. The Committee's activities and structure will otherwise be governed by the appropriate sections of the Graduate Catalog.

Foreign Language Requirement

The ECE doctoral program does not have a foreign language requirement; however, competency in the use of technical tools and techniques such as computer programming, Matlab, Mathematica, VHDL, Verilog and CST is strongly encouraged.

Qualifying and Preliminary Examinations

Students must pass qualifying exams and a preliminary exam to be admitted to candidacy. The written and oral qualifying exams will cover three of the principle sub-disciplines of ECE such as signals and systems, digital systems, linear systems and controls, electronics and circuits, and communication systems. An exam in a sub-discipline of the student's background may be substituted for one of the required ECE sub-disciplines for students with non-ECE backgrounds. The qualifying exams are normally administered after a student has 32 hours of graduate work beyond the bachelor's degree. The student is required to form their graduate (dissertation) committee and take the preliminary exam within one year after passing the qualifying exam. The preliminary exam is administered prior to the student beginning dissertation research. The exam is administered by the student's Graduate Committee with a focus on the student's research area.

Dissertation

Candidates for the Ph.D. in Electrical and Computer Engineering degree must complete an acceptable dissertation on a research topic in the ECE discipline or closely related field. The dissertation must give evidence that the candidate has pursued a program of research, the results of which reveal scholarly competence and a significant contribution to knowledge.

DEPARTMENT OF MECHANICAL ENGINEERING

Chairperson: William M. Jordan

Graduate Program Director: Carolyn Skurla

MASTER OF SCIENCE IN MECHANICAL ENGINEERING

The Master of Science in Mechanical Engineering (M.S.M.E.) is designed for students who are interested in engineering careers that require education beyond the baccalaureate degree. Examples of those include engineers performing industrial research and development or students who plan to pursue a doctoral degree.

Admission and Financial Aid

Admission is based on undergraduate academic record, the Graduate Record Examination (GRE), and letters of recommendation for the candidate. Tuition waivers and stipends are available on a competitive basis.

Requirements

Semester Hours

Course Work*	24
Thesis (discovery oriented)	<u>6</u>
Total	30

*Courses will be selected in consultation with the student's advisor. Courses in the departments of Electrical and Computer Engineering, Mathematics, Statistics, Physics, Chemistry, Biology or Environmental Science may be included in this total with consent of the advisor.

Thesis Requirements

A discovery-oriented thesis is required in accordance with the criteria listed in the graduate catalog general requirements.

DOCTOR OF PHILOSOPHY IN MECHANICAL ENGINEERING

The Doctor of Philosophy in Mechanical Engineering (Ph.D.M.E.) is designed for students who are interested in engineering careers that require education beyond the Master of Science degree. Examples of those include engineers performing industrial research, research at national laboratories, or careers in engineering academics.

Admission

All applicants accepted into the Mechanical Engineering (ME) doctoral program must have received a Bachelor of Science *and* a Master of Science degree in mechanical engineering or closely related fields. The GRE exam is required of all applicants.

Course Credit Requirements

The program requirements include a minimum of seventy-eight (78) semester hours of approved coursework and research hours beyond the bachelor's degree. Broad latitude is granted in the selection of courses, but all courses must be approved by the student's graduate committee. The semester hours must meet the following criteria:

1. At least Forty-eight (48) semester hours of coursework including M.S. hours, subject to the following criteria:
 - a minimum of twelve (12) semester hours of 5000 or 6000 level coursework beyond the M.S. degree within ME
 - a minimum of six (6) semester hours of 5000 or 6000 level coursework beyond the M.S. degree outside of ME*
 - a maximum of six (6) semester hours of 4000 level coursework beyond the M.S. degree within ME
 - a minimum of five (5) semester hours of coursework in Ethics, Religion, Philosophy, or related area**
2. Doctoral Research hours:
 - a minimum of twelve (12) semester hours of ME Doctoral Research 6V99 taken after the preliminary exam
 - a maximum of six (6) semester hours of Engineering Research 6V97 taken prior to the preliminary exam

*Engineering is inherently cross-disciplinary, and oftentimes students may benefit from courses in non-ME disciplines to broaden their understanding of particular applications or knowledge domains. Supportive graduate course hours outside of ME can be selected from areas that include, but are not limited to: electrical and computer engineering, biomedical engineering, computer science, mathematics, statistics, the physical sciences, the social sciences, education or business.

**Engineering is a values-based discipline that benefits from Christian worldview and faith perspectives. Therefore, students are required to take select supportive course in areas that touch on these perspectives. Among the courses accepted for this requirement are one-credit-hour seminars taught by ME faculty on Research Ethics, or on Technology and Society.

Foreign Language Requirement

The ME doctoral program does not have a foreign language requirement. However, competency in a collateral field will be cultivated in students through the requirement of coursework outside of ME.

Student's Graduate Committee

The Graduate Committee for a Ph.D. candidate shall consist of at least five members of the Baylor graduate faculty, at least three members from within ME, and at least one member from outside of ME. A researcher from outside of Baylor may serve as a committee member if approved by the ME graduate director and the Baylor members of the committee. The committee chair must be a tenured or tenure-track member of the ME faculty and a member of the Graduate Faculty.

If deemed appropriate, a graduate faculty member outside of ECE may supervise and mentor the student, in the capacity of a co-chair of the committee. The committee's activities and structure will otherwise be governed by the appropriate sections of the Graduate Catalog.

Qualifying Examination

Students must pass a qualifying exam that covers coursework in three subject areas selected by the student's graduate committee from among those offered by the ME department. The qualifying exam format will be at the discretion of the ME graduate faculty. A student may petition the graduate faculty to retake one or more failed subject areas of the qualifying exam, but must pass all three subject areas within six months of the date when the first exam was taken.

Preliminary Examination

Students must pass a preliminary exam (Ph.D. proposal) to be admitted to candidacy, and to enroll in Dissertation Research 6V99. The preliminary exam must be submitted in a semester following the semester during which the qualifying exam was passed. The preliminary exam format will be at the discretion of the student's graduate committee, but may typically include a formal written proposal along with a formal presentation providing the committee an opportunity to ask questions about the scope and nature of the proposed research.

Dissertation

Candidates for the Ph.D. in Mechanical Engineering degree must complete an acceptable dissertation on a research topic in the ME discipline or closely related field. The dissertation must provide evidence that the candidate has pursued a program of research, the results of which reveal scholarly competence and a significant contribution to knowledge.

Teaching Opportunities

Doctoral students considering an academic career may benefit from serving as undergraduate course instructors with a title of Teaching Fellow. To be eligible to serve as a Teaching Fellow a student must have passed the qualifying exam, be approved by the ME department chair, and have completed training through the Graduate School. A Baylor ME faculty member will be assigned to supervise and guide each Teaching Fellow.

INTERDISCIPLINARY DEGREES

Graduate Directors: Carolyn Skurla, Michael W. Thompson

The Department of Electrical and Computer Engineering and the Department of Mechanical Engineering jointly administer degrees that are interdisciplinary in nature.

MASTER OF SCIENCE IN BIOMEDICAL ENGINEERING

The Master of Science in Biomedical Engineering (M.S.B.M.E.) is designed for students who are interested in engineering careers at the intersection of engineering, biology, and medicine.

Admission and Financial Aid

Admission is based on undergraduate academic record, the Graduate Record Examination (GRE), and letters of recommendation for the candidate. Tuition waivers and stipends are available on a competitive basis.

Requirements

Semester Hours

Course Work*	24
Thesis (discovery oriented)	<u>6</u>
Total	30

*Courses will be selected in consultation with the student's advisor. Courses in the departments of Electrical and Computer Engineering, Mechanical Engineering, Mathematics, Statistics, Physics, Chemistry, Biology or Environmental Science may be included in this total with consent of the advisor.

Thesis Requirements

A discovery-oriented thesis is required in accordance with the criteria listed in the graduate catalog general requirements.

MASTER OF ENGINEERING

The Master of Engineering (M.E.) is offered for students who are more practice oriented. This program is ideal for students who have an interest in engineering consulting, product development, or appropriate technology for developing countries.

Admission and Financial Aid

Admission is based on undergraduate academic record, the Graduate Record Examination (GRE), and letters of recommendation for the candidate.

Requirements

Semester Hours

Course Work**	33 (3-6 hours may be 5V97 project course with engineering applications)
Total	33

** Courses will be selected in consultation with the student's advisor. Master of Engineering students may take up to 15 hours outside the Department of Engineering in the Master of Business Administration (MBA) program or the departments of Mathematics, Statistics, Biology, Chemistry, or Physics with consent of the advisor. Business courses from the MBA program that can be taken include:

MGT 5320 Manufacturing and Service Operations
ENT 5315 Entrepreneurial Behavior and Skills
ENT 5320 Entrepreneurial Finance

ENGINEERING JOINT DEGREE PROGRAMS

Students who are near completion of their undergraduate engineering degree at Baylor University may enter one of the joint programs in which, by proper planning, up to six semester hours of graduate credit may be applied toward the degree requirements of both the bachelor's and master's degrees. Students will select whether to pursue a Master of Science in one of the engineering disciplines or a Master of Engineering. Both diplomas are awarded at the completion of both degree programs. The eight joint degree programs are:

Electrical and Computer Engineering Joint Program	B.S.E.C.E./M.S.E.C.E.
Electrical and Computer Engineering/Biomedical Engineering	B.S.E.C.E./M.S.B.M.E.
Electrical and Computer Engineering/Master of Engineering	B.S.E.C.E./M.E.
Mechanical Engineering Joint Program	B.S.M.E./M.S.M.E.
Mechanical Engineering/Biomedical Engineering	B.S.M.E./M.S.B.M.E.
Mechanical Engineering/Master of Engineering	B.S.M.E./M.E.
Engineering/Biomedical Engineering	B.S.E./M.S.B.M.E.

Admission and Financial Aid

Admission is based on undergraduate academic record, the Graduate Record Examination (GRE), and letters of recommendation for the candidate. For Master of Science programs, tuition waivers and stipends are available on a competitive basis.

Course Requirements for Master of Science***Semester Hours***

Course Work*	24
Thesis (discovery oriented)	6
Total	30

*Courses will be selected in consultation with the student's advisor. Courses in the departments of Electrical and Computer Engineering, Mechanical Engineering, Mathematics, Statistics, Physics, Chemistry, Biology or Environmental Science may be included in this total with consent of the advisor.

Thesis Requirements for Master of Science

A discovery-oriented thesis is required in accordance with the criteria listed in the graduate catalog general requirements.

Course Requirements for Master of Engineering***Semester Hours***

Course Work**	33 (3-6 hours may be 5V97 project course with engineering applications)
Total	33

** Courses will be selected in consultation with the student's advisor. Master of Engineering students may take up to 15 hours outside the Department of Engineering in the Master of Business Administration (MBA) program or the departments of Mathematics, Statistics, Biology, Chemistry, or Physics with consent of the advisor. Business courses from the MBA program that can be taken include:

MGT 5320	Manufacturing and Service Operations
ENT 5315	Entrepreneurial Behavior and Skills
ENT 5320	Entrepreneurial Finance

**JOINT MASTER OF BUSINESS ADMINISTRATION/
MASTER OF ENGINEERING**

Associate Dean for Graduate Business Programs: Gary R. Carini

Graduate Directors in Engineering: Carolyn Skurla, Michael W. Thompson

Students interested in a career requiring complementary skills in both business and engineering may complete the Master of Engineering and MBA degrees concurrently. By proper selection of courses, students can save up to 21 hours in the joint degree compared to the individual requirements of the two separate degrees. Students should consult with advisors in both engineering and business to determine the best sequence of courses.

Master of Engineering students from industry may, with approval of their advisor, select a project that is relevant to their work responsibilities.

Admission

Students must apply and be accepted separately into both programs. Therefore, both the GMAT and GRE exams are required.

Requirements

Candidates for the joint Master of Engineering/MBA degree must complete all degree requirements for the MBA and the Master of Engineering. By proper selection of electives it may be possible to reduce the requirements of the joint degree by up to 21 hours compared to the normal requirements of the two degrees completed separately. This efficiency is achieved by proper selection of business electives for the 15 business course credits allowed for the Master of Engineering program and by a six-credit reduction of the MBA elective requirements reflecting recognition of the additional graduate work in all requirements in both programs must be completed in order to receive either degree. Students are encouraged to contact appropriate advisors in each program for further details.

I. Required Core Courses **35 sem. hrs.**

BUS 5390	Management Communication
BUS 5395	Focus Firm
MGT 5310	Management of Organizational Behavior
MGT 5385	Strategic Management and Business Policy
MKT 5310	Seminar in Marketing Administration
BUS 5111	Professional Career Development #1

BUS 5112 Professional Career Development #2

Required Integrated Core Courses

ACC 5121 Accounting Planning
ACC 5122 Accounting Implementation
ACC 5123 Accounting in a Changing Environment
ECO 5115 Demand Analysis
ECO 5116 Production and Cost Analysis
ECO 5117 Market Structure Analysis and Estimation
FIN 5161 Corporate Finance – Planning
FIN 5162 Corporate Finance – Implementation
FIN 5163 Financial Control
MGT 5131 Operations Strategy: Concepts and Fundamentals
MGT 5132 Operations Strategy: Structuring the Operating System
MGT 5133 Operations Strategy: Managing Operational Focus
MIS 5151 Technical Foundations of Information Systems
MIS 5152 Aligning IT with the Business Enterprise
MIS 5153 Managing the Info Technology Resource
QBA 5131 Quantitative Methods for Decision Making: Part I
QBA 5132 Quantitative Methods for Decision Making: Part II
QBA 5133 Quantitative Methods for Decision Making: Part III

II. Core Engineering 18 sem. hrs.

III. Required ME Electives 15 sem. hrs.