

Electrical and Computer Engineering  
Graduate Student Manual

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# Chapter 1

## General Graduate Course Requirements

### 1.1 Course Requirements for all graduate programs

All graduate courses must meet the following requirements:

1. Minimum of 4k level-A maximum of 2 4k level classes can be counted towards a graduate degree, the rest must be 5k or above.
2. Taught by a PhD - required by SACS accreditation.
3. Listed in the graduate catalog - Baylor requirement.
4. Not a core course in the ECE undergraduate major - The courses that are core to our undergraduate degree are in the graduate catalog for students who need remediation. If they weren't in the catalog then they couldn't take them and get tuition waivers.

The “v” courses 5v99, 6v00, 6v10, 6v99 are only allowed to count towards a graduate degree as explicitly outlined in the catalog, i.e. 6 units of 5v99 towards a MS thesis, and 24 units of 6v99 towards a PhD dissertation. All other “v” courses only permit students to have full time status without taking 9 units, and such cannot count towards course work. Similarly 5397 can only be used for a MS project, or in a PhD to grant an MS on the way to a PhD. 5397 cannot count as course work.

## Chapter 2

# Program: Electrical and Computer Engineering, Ph.D.

### 2.1 Overall

All applicants accepted into the ECE doctoral program must have received a Bachelor of Science or Master of Science degree in electrical or computer engineering, or closely related fields such as computer science, mechanical engineering, mathematics or the physical sciences. The GRE exam is required of all applicants. The program requirements include a minimum of 60 semester hours of approved coursework and research hours beyond the bachelor's degree.

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.

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. 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.

The PhD has two parts,

1. A course work portion of 36 semester hours, typically 12 courses - No variable unit 'V' courses may be included, such as 6V00 or 6V10, or other research courses such as 5397;
2. A research portion of 24 semester hours - 1 hour can make you full time, so this covers up to 8 years of spring, summer, fall semesters, though you should plan on 3-4 years.

### 2.2 Baylor Doctoral Degrees, General Degree Requirements

The following general requirements apply to all doctoral programs administered by the Graduate School.

#### 2.2.1 Transfer Credit

The majority of all course work toward completion of any degree must be taken at Baylor. For doctoral degrees, the accepted number of transfer credits will be determined by the individual academic departments within the following general guidelines:

- course work must be from an accredited university and appear on a graduate transcript, and
- course work must have been taken within five years immediately prior to matriculation, and
- course work must carry a grade of “B” or better (cannot accept P/F, CR/NC or certificates of completion), and
- none of the transfer course work consists of extension, workshop courses, or master’s thesis or doctoral dissertation credits

### 2.2.2 Time Limitation

The maximum time limit for the doctoral degree is eight years from the time the student first matriculates into the doctoral program. After this time the student may request a one-year extension. Once a student’s time limit expires, any incompletes with the exception of dissertation or thesis hours will change to an “F”. Any student wishing to return to complete their degree after a one year absence, must reapply for admission to Graduate School. If admitted, the student would enter under the current catalog and the appropriate course work for degree completion may be revalidated or not, according to the policy of the individual program in consultation with the Graduate School. Coursework where incompletes have been changed to an “F” may not count in the new program.

### 2.2.3 Graduation Eligibility

To qualify for a doctoral degree, students must have a minimum overall grade point average of 3.0 and must have satisfied all course work, practica, dissertation, or other academic/professional efforts associated with the degree sought. No member of the Baylor University faculty above the rank of Lecturer may be admitted to candidacy for a graduate degree at the University. Candidates are not allowed to continue in the doctoral program after ten years has elapsed from the semester of enrollment.

### 2.2.4 Dissertation Examining Committee Composition

The dissertation examining committee will include a minimum of four members. At least two members, including the chairperson, will be Baylor Graduate Faculty from the degree-granting program. At least one member must be a member of Baylor’s Graduate Faculty whose primary appointment is from a program other than the one conferring the degree. This non-program member helps to ensure a consistent level of quality, rigor, and fairness across all graduate programs at Baylor University. The committee may also include one member from outside of Baylor with approval of the candidate’s Graduate Program Director. Non-Baylor committee members are not eligible to serve as the dissertation chairperson. The Graduate Program Director is responsible for ensuring the relevant expertise of the non-Baylor committee member and notifying the Graduate School through the Announcement of Doctoral Oral Examination form. The candidate’s dissertation director will serve as the chairperson of the committee and ensure that formal announcement of the examination is made, that the exam is conducted fairly, and that it is open to the faculty. The committee may include additional members beyond the required minimum of four. Preferably, the student and the examiners will be present in person, but in certain cases (e.g., online degree programs, extenuating circumstances, etc.) this may not be logistically possible. A Graduate Program Director may approve alternative formats for examination, including virtual, video-conferenced participation of one or more examiner(s). Such approval needs to be accompanied with justification to the Graduate School.

## 2.3 Baylor Doctor of Philosophy (PhD) Specific Degree Requirements

The degree of Doctor of Philosophy is awarded to those who attain a high level of scholarship in a selected field, as well as the ability to conduct research.

### 2.3.1 Admission

Students not only must meet the general requirements for admission to graduate study, but also must have demonstrated in their undergraduate courses, and in all work beyond the baccalaureate level, scholarly potential and notable intellectual ability. Admission will require the concurrence of the graduate program director and the Graduate School. A standardized appropriate measure is required and specified by all departments. Some departments specify additional skill, performance, or aptitude requirements.

### 2.3.2 Program Requirements

#### Period of Study

The equivalent of three academic years of full-time study beyond the bachelor's degree and the completion typically of twelve semester hours of dissertation research constitute the minimum requirements for degree completion. The majority of all course work toward completion of the Ph.D. degree must be taken at Baylor. The doctorate is not based on a number of courses or time units, but rather on the demonstrated ability to be a contributing scholar. Consequently, an individual may spend more than the minimum time earning the degree. Students may not use a course to meet more than one degree requirement.

#### Foreign Language Requirement

Not required.

### 2.3.3 English Requirements

The graduate school's policy for international teaching assistants is:

to be eligible for graduate school stipend as a teaching assistant (TA), international students must satisfy one of the following:

- English speaking score > 25 on TOEFL
- English speaking score > 7.5 on IELTS
- English speaking score > 125 on duolingo
- Pass a speaking evaluation by [Tanya\\_Vernon@baylor.edu](mailto:Tanya_Vernon@baylor.edu)
- Pass or be concurrently enrolled in the GBL 5201 course

#### General Requirements

**Career Development** You must engage in at least one career development activity sponsored by the ECS career development office (Tom Brooks) or BUGS each semester. Participation will be verified in order to renew your tuition remission for the following term.

**ELC 5001 (eBEARS)** Required for all students on any level of scholarship (tuition and/or assistantship). Exceptions if you have moved away – contact Dr. Marks

### 2.3.4 Major and Minor

A student's major field of study is determined by the program to which a student is admitted. At the option of the department, students may be required to select one or two minor fields in a department(s) other than the major. Should the department not require a minor, the student may declare a minor with the consent of the departments involved.



### **2.3.5 Departmental Supervision**

Graduate Program Directors are entrusted with the responsibility for the initial supervision for the student's program of study. A research professor or committee, with the approval of the Graduate Program Director, assumes responsibility for supervising the student's academic performance until the time of the preliminary examination.

### **2.3.6 Preliminary Examination**

This examination is designed to test the student's knowledge in the discipline or field(s) of study. It is either a written examination, or a combination of written and oral parts, and is given under the direction of both the graduate program director and a committee designated by the director. Incomplete grades must be removed prior to the preliminary examination. If the student does not pass the preliminary examination, a second one may be given no sooner than four months after the first examination. After two failures, no further examination is permitted.

### **2.3.7 Admission to Candidacy**

Students are recognized as candidates for a doctoral degree only after they have met the foreign language requirement (if required), passed the preliminary examination(s), completed all departmental requirements including all coursework (except the dissertation), and received approval by the Graduate School of their formal application for admission to candidacy. An application for admission to candidacy form must be filed with the Graduate School upon successful completion of the above requirements, and prior to a student registering for dissertation hours.

### **2.3.8 Dissertation Supervision**

This committee is appointed by the major department typically no later than the student's third semester of graduate study. The committee is entrusted with the responsibility of general supervision of the student's program of study, research, and dissertation. The committee will consist of three Graduate Faculty members: the chairperson who mentors the research and dissertation, and at least two others.

### **2.3.9 Dissertation**

Candidates for the Doctor of Philosophy degree must present an acceptable dissertation on a problem in the field of their major subject. 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.

Candidates should acquire the Guidelines for Preparing the Dissertation and Thesis and other necessary materials at the beginning of the semester in which graduation is expected. The most recent edition of Guidelines is available on the Baylor homepage [www.baylor.edu/graduate/degree](http://www.baylor.edu/graduate/degree). Additional degree completion instructions are provided to students when they file for graduation. The Guidelines contain the directions for the procedure to complete the dissertation, an explanation of forms necessary, the semester calendar, and an explanation of fees associated with the process.

### **2.3.10 Final Examination**

This oral examination is conducted by an examining body appointed by the Graduate School upon the recommendation of the graduate program director only after all courses, research, and dissertation requirements have been fulfilled. The dissertation research committee is an integral part of the examining committee.

See Dissertation Examining Committee Composition for additional information.

Candidates who fail this examination may take a second one only upon the recommendation of the graduate program director and the approval of the Graduate School. In no case will this examination be given until an interval of at least four months has elapsed. After two failures, no further examination is permitted.

No longer than ten days after the oral examination, but no later than the “last day” deadline posted in the Graduate School Academic Calendar for the semester of graduation, an electronic pdf copy of the dissertation in its final departmentally approved form should be submitted to the Graduate School. With the dissertation copy, the student should also submit the appropriate forms required, as stated in the Guidelines. A student is certified for graduation once the pdf copy of the dissertation is submitted electronically and approved, and all remaining steps, as stated in the Guidelines, have been completed.

## 2.4 ECE Department PhD Program Requirements

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

1. Thirty-six (36) semester hours of coursework including:
  - Minimum of fifteen (15) semester hours of ECE course work,
  - Maximum of six (6) semester hours of 4000 level ECE,
  - Minimum of six (6) semester hours outside ECE (see note 1 below), and
  - Minimum of twelve (12) semester hours of course work taken at Baylor.
2. Twenty-four (24) semester hours of dissertation (ELC 6V99 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 world view 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 course work with at most 6 hours of 4000 level courses,
- a minimum of 12 semester hours of approved advanced level ECE course work, and
- a minimum of 6 approved non-ECE courses (See Note 1 above).

### 2.4.1 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 preliminary exams in appropriate areas or sub-disciplines of electrical or computer engineering and one sub-discipline or area of their background field.

### 2.4.2 Student’s Graduate Committee

The Graduate Committee for a Ph.D. candidate shall consist of at least four 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.

### 2.4.3 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.

### 2.4.4 Preliminary Examination and Research Proposal

Students must pass a preliminary examination to be admitted to candidacy. The written and oral preliminary exam will cover three of the principle sub-disciplines of ECE such as signals and systems, digital systems, linear systems and controls, electronics and circuits, electromagnetics, and communications 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 preliminary exams are normally not administered until after a student has completed at least 36 hours of graduate course work beyond the bachelor's degree, with at least one year of work at Baylor. The student is further expected to present a research proposal to the ECE faculty, as approved by their graduate (dissertation) committee, within one year of passing the preliminary exam. Exams are administered each fall, and if a student needs to retake parts of it they must do so the following spring.

The preliminary exam, as mentioned, has a written and oral portion, which will be taken on three classes each from a different area. The exams are written and proctored by a faculty member who is an expert in the area, but in the case of the oral exam it cannot include the student's advisor. The written exam is designed to test the fundamental skill and understanding of the area, and the ability to solve problems. The oral exam is on the same courses and concentrates on the ability to explain the key ideas and think outside the box. Particulars of the exams in a course can be obtained from the faculty writing the exam. Learn more about the exam policy for the Doctor of Philosophy in Electrical and Computer Engineering in the exam policy on the following pages.

## **Ph.D. Preliminary Exam Policy Electrical and Computer Engineering**

The Ph.D. degree is awarded by the graduate faculty of the Electrical & Computer Engineering Department at Baylor University to candidates who have achieved an appropriate level of scholarly proficiency across the discipline. The candidate will have made substantive original research contributions in the field of electrical and computer engineering. These contributions must be clearly and effectively communicated both orally and in writing. In concert with the charter and heritage of Baylor University, ECE Ph.D.'s will be men and women of strong character.

Towards achieving these goals, the following procedures have been approved by the ECE graduate faculty.

### **Dissertation Committee**

The student is to form a Ph.D. committee according to graduate school rules, which are stated below:

**Dissertation Examining Committee Composition** The dissertation examining committee will include five members of the Baylor Graduate Faculty: the committee chairperson, two other Graduate Faculty members from the student's home department, and one additional Graduate Faculty member, either from the home department or outside, and a fifth member or "outside" member. The outside member must be a Graduate Faculty member whose primary faculty appointment is from a department other than the one conferring the student's degree. The student's mentor will serve as the chairperson of the committee and ensure that formal announcement of the examination is made, that the exam is conducted fairly, and that it is open to the faculty. The "official outside" member helps to ensure a consistent level of quality, rigor, and fairness across all graduate programs at Baylor University and may or may not be actively involved in the dissertation. The committee may include additional members (who are not necessarily members of the Graduate Faculty) beyond the minimum required number.

The preliminary exam will consist of a written and an oral portion. The written preliminary exams will cover three of the sub-disciplines of ECE listed in Table 1. 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.

### **Preliminary Exam Planning Stage**

The Graduate Program Director, in consultation with the faculty and the student, will assign a faculty member to prepare a written exam for each of the sub-disciplines chosen by the student. The selected faculty member in each sub-discipline will provide the student with a list of discipline specific topics from which the exam will be composed. As an option, the student may select two or more courses listed in Table 1 as defining the domain of topics over which the written exam will extend. Table 1 will be amended from time to time as new focus areas are developed within the department and new graduate courses are approved.

The individual examining faculty member will work with the Graduate Program Coordinator to schedule and administer their specific written exam. If more than one

student is being examined, the schedule should provide for all the examinees to take the discipline specific exam at the same time.

If a student has a non-ECE background and chooses to take a preliminary exam over a sub-discipline from their background, the student's advisor will make a recommendation on the content areas to be covered by the written preliminary exam and a plan for implementing the exam. The student's graduate committee must approve the plan.

Students should complete the preliminary exam planning stage and schedule the exam by the time they complete 36 credit hours of course work beyond the bachelors degree. The student should prepare, and submit to the Graduate Program Director, a planning document that lists the three areas for the preliminary exam.

### **Written Preliminary Exam**

The student will be given three hours to complete the area specific exam, with one area specific exam given per day, unless the student agrees to take more than one exam on any given day. The faculty members that make the exams are responsible for grading the exams. The graded exams will be made available to the oral exam committee prior to the administration of the oral exam.

### **Oral Preliminary Exam**

An oral exam committee will be formed by the graduate director in consultation with the student's advisor. However, the student's advisor shall not be on the oral exam committee. The committee will consist of three faculty members, each representing a preliminary exam sub-discipline area. A faculty member in a given area need not be the faculty member administering the written exam for that sub-discipline. Each topic area will be allocated nominally 30 minutes, with an overall oral exam length of approximately 2 hours.

### **Schedule:**

The preliminary exam will be administered each year during the fall semester and at other times as may be required.

### **Results of the Preliminary Exam**

The oral exam committee is responsible for making a recommendation to the faculty about whether the student passed the preliminary exam for each of the areas. The recommendation will be one of three outcomes; pass, pass with remedial requirements, or fail. If a student fails one or more portions of the preliminary exam they will have one opportunity to retake the failed portions of the exam. When a student successfully completes the preliminary exam, they will be formally admitted to candidacy.

### **Dissertation Research Proposal**

Students who successfully complete the preliminary exam should present a dissertation research proposal within six months. The dissertation research proposal will consist of a public presentation of the student's proposed research plan. There will also be a questioning portion of the dissertation research proposal that is open only to ECE faculty and members of the student's committee. To be eligible to submit a dissertation research proposal the student must have submitted a peer reviewed paper (conference or journal) or a research proposal approved through the Baylor Office of Sponsored Programs for submission to an external funding agency. The supervising advisor's name should appear on the submitted document.

### **Results of the Dissertation Research Proposal Presentation**

The student's Ph.D. Committee is responsible for making a recommendation to the graduate faculty about whether the student has presented an acceptable dissertation research proposal. A simple majority vote of the graduate faculty is needed to confirm the results. The recommendation will be one of three outcomes; acceptable, acceptable with remedial requirements, or unacceptable. If a student's proposal is deemed unacceptable they will have a second opportunity to formulate and present an acceptable document.

Any deviation from this policy can be approved by a simple majority vote of the ECE graduate faculty.

Table 1: Preliminary Exam Areas (Adopted 08/17/2017)

Course	Course Name	Control Systems	Communications	Digital Systems	Software Systems	Image and Signal Proc.	Circuits and Networks	Microwaves, Antennas and Propagation, and Electromagnetics	Power Systems and Renewable Energy	Photonics	Devices, Materials, and Physics
ELC 4315	Electronic Design II						x				
ELC 4318	Avionic System Design			x	x						
ELC 4320	Introduction to Optics									x	x
ELC 4330	Introduction to Robotics	x									
ELC 4332	Automatic Control Systems	x									
ELC 4337	Solar Energy								x		
ELC 4340	Power Systems								x		
ELC 4345	Power Electronics						x		x		
ELC 4350	Principles of Communication		x								
ELC 4351	Digital Signal Processing				x	x					
ELC 4353	Image Formation and Processing					x					
ELC 4360	Software Systems				x						
ELC 4362	Wireless Sensor Networks		x	x			x	x			
ELC 4372	Bioinstrumentation						x				
ELC 4377	Solar Energy								x		
ELC 4381	Antennas and Wireless Propagations							x			
ELC 4383	RF/Microwave Circuits I						x	x			
ELC 4384	RF/Microwave Circuits II						x	x			
ELC 4438	Computer Systems Design			x							
ELC 5311	Advanced Logic Design			x							
ELC 5313	Advanced Computer Architecture			x							
ELC 5316	Real-Time Systems Design			x	x						
ELC 5330	Advanced Robotics	x									
ELC 5336	Advanced Engineering Electromagnetics							x		x	x





### **2.4.5 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.

## Chapter 3

# Master's Programs

### 3.1 Baylor Master's Degrees, General Degree Requirements

The following general requirements apply to all master's programs administered by the Graduate School.

#### 3.1.1 Content of Graduate Program

A minimum of thirty semester hours will be required. A minimum of one-half of the semester hours required for the master's program, exclusive of thesis credits, must be in courses numbered at the 5000 level. Specific graduate programs may require more than the minimum number of hours.

#### 3.1.2 Transfer Credit

The majority of all course work toward completion of any degree must be taken at Baylor. For Master's degrees, the accepted number of transfer credits will be determined by the individual academic departments within the following general guidelines:

- course work must be from an accredited university and appear on a graduate transcript, and
- course work must have been taken within five years immediately prior to matriculation, and
- course work must carry a grade of "B" or better (cannot accept P/F, CR/NC or certificates of completion), and
- none of the transfer course work consists of extension, workshop courses, or master's thesis or doctoral dissertation credits

#### 3.1.3 Time Limitation

The maximum time limit for the master's degree is five years from the time the student first matriculates into the master's program. After this time, the student may request a one-year extension. Once a student's time limit expires, any incompletes with the exception of dissertation or thesis hours will change to an "F". Any student wishing to return to complete their degree after a one year absence, must reapply for admission to graduate school. The student would enter under the current catalog and the appropriate course work for degree completion may be revalidated or not, according to the policy of the individual program in consultation with the Graduate School. Coursework where incompletes have been changed to an "F" may not count in the new program.

### 3.1.4 Graduation Eligibility

To qualify for a master's degree, students must have a minimum overall grade point average of 3.0 and must have satisfied all course work, practica, project, thesis, or other academic/professional efforts associated with the degree sought. No member of the Baylor University faculty above the rank of Lecturer may be admitted to candidacy for a graduate degree at the University.

### 3.1.5 Thesis Examining Committee Composition

The thesis examining committee will include three members of the Baylor Graduate Faculty: the committee chairperson, one other Graduate Faculty member from the student's home department, and a third member, or "outside" member. The outside member must be a Graduate Faculty member whose primary faculty appointment is from a department other than the one conferring the student's degree. The student's mentor will serve as the chairperson of the committee and ensure that formal announcement of the examination is made, that the exam is conducted fairly, and that it is open to the faculty. The "official outside" member helps to ensure a consistent level of quality, rigor, and fairness across all graduate programs at Baylor University and may or may not be actively involved in the thesis. The committee may include additional members (who are not necessarily members of the Graduate Faculty) beyond the minimum required number.

If a candidate fails the comprehensive or oral examination, a second examination may be taken contingent upon the approval of both the department(s) concerned and the Graduate School. No reexamination may be conducted until at least four months has elapsed. (Students in the U.S. Army-Baylor Health Care Administration program are required to take the reexamination within four months from the date of the initial board.) After two failures, no further examination is permitted.

### 3.1.6 Examinations

Candidates in thesis programs who complete the required program of study and a satisfactory thesis will take an oral examination. The format of the examination will be determined by the student's major department.

Candidates in non-thesis programs who complete the required program of study and any other special degree requirements will take a comprehensive oral examination as determined by the major and, if applicable, minor departments. (A written examination may be required in lieu of the oral examination as a matter of policy only with the prior written approval of the Graduate School.) At the option of a school/department, both an oral and a written examination may be required.

The following policies should be noted regarding the comprehensive or oral examination:

1. All incomplete grades (except in a thesis or scientific research course) must be removed prior to the final oral or written examination.
2. The examination will be conducted by a minimum of two Graduate Faculty Members in the student's major degree program and one pre-approved "outside" member. The "official outside" member must be a Graduate Faculty member whose primary faculty appointment is from a department other than the one conferring the student's degree. The committee must be approved 10 working days prior to the examination by the Graduate School.
3. The examination should give the candidate the opportunity to defend the intellectual substance of the thesis, including the structure of the argument advanced, the methodology used, and the interpretation offered.
4. The examination should be taken by the published deadline for meeting graduation requirements for any given semester. The candidate should arrange the date of the examination with the chairperson of the examination committee and acquire approval of this date from the Graduate School.

## 3.2 Baylor Master's Degrees, Specific Degree Requirements

The Master of Science degree and Master of Engineering degree, which are offered through facilities in Waco, is offered to students who have earned a bachelor's degree from an accredited university or college.

The requirements for these degrees are:

### 3.2.1 Graduate Hours

Minimally, thirty semester hours is required for graduate programs. Individual degree programs have the option of increasing the required number of semester hours. The programs also set the required minimum thesis credits which typically consist of six semester hours. The minimum number will apply for all students in the program.

### 3.2.2 Approved Major and Minor

Students may have no more than two fields of graduate study. They may earn no fewer than eighteen semester hours in the major field, and no fewer than six semester hours in the minor field. The minor field must be approved by the chairpersons of both the major and minor departments. With the approval of the major professor and the Graduate School, a student may include a limited number of courses from allied fields as part of the major program, or in lieu of a minor. If the degree program offers a sufficient number of graduate courses to satisfy degree completion, the course work can be completed within one department.

### 3.2.3 Thesis

The prerogative of requiring a thesis for the Master's degree rests with the degree program. Should a thesis be required, the following requirements apply:

1. The chairperson of the department and/or the graduate program director approve both the thesis topic and the chairperson of the thesis committee. The thesis committee chairperson must be a member of the Baylor Graduate Faculty.
2. The chairperson of the department or the graduate program director, in consultation with both the candidate and the committee chairperson, will identify the members of the thesis committee. The thesis examining committee will include three members of the Baylor Graduate Faculty: the committee chairperson, one other Graduate Faculty member from the student's home department, and a third member or "outside" member. The outside member must be a Graduate Faculty member whose primary faculty appointment is from a department other than the one conferring the student's degree. The student's mentor will serve as the chairperson of the committee and ensure that formal announcement is made, that the exam is conducted fairly, and that it is open to the faculty. The "official outside" member helps to ensure a consistent level of quality, rigor, and fairness across all graduate programs at Baylor University and may or may not be actively involved in the thesis. The committee may include additional members (who are not necessarily members of the Graduate Faculty) beyond the minimum required number.
3. The thesis committee will approve the general plan of the research project and the topic of the thesis.
4. Candidates are expected to consult with the members of their committee and to acquire the approval of the committee as well as the major department chairperson of the completed draft of the thesis. Candidates should acquire Guidelines for Preparing the Dissertation and Thesis and other necessary materials at the beginning of the semester in which graduation is expected. The most recent edition of the Guidelines is available on the Baylor homepage [www.baylor.edu/graduate/degree](http://www.baylor.edu/graduate/degree).
5. No longer than ten days after the oral examination, but no later than the "last day" deadline posted in the Graduate School Academic Calendar for the semester of graduation, an electronic pdf copy of the thesis in its final departmentally approved form should be submitted to the Graduate School. With the thesis copy, the student should also submit the appropriate forms required, as stated in the Guidelines. A student is certified for graduation once the pdf copy of the thesis is submitted electronically and approved, and all remaining steps, as stated in the Guidelines, have been completed.

### **3.2.4 Examinations**

See Master's Degrees, General Degree Requirements for additional information.

### 3.3 Program: Electrical and Computer Engineering, M.S.E.C.E.

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.

#### 3.3.1 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.

#### 3.3.2 Thesis Option Requirements

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

Code	Title	Hours
Course Work		24
ELC 5V99	Master's Thesis	6
Total Hours		30

#### 3.3.3 Non-Thesis Option Requirements

A 3 credit MS-level project to be completed under the supervision of a ECE graduate faculty member that results in a project report submitted to the Department of Electrical and Computer Engineering.

Code	Title	Hours
Course Work		27
ELC 5397	Special Projects in Engineering (MS Project)	3
Total Hours		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.

### 3.4 Program: Master of Engineering, M.E.

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.

#### 3.4.1 Admission and Financial Aid

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

#### 3.4.2 Requirements

Requirement	Hours
Course Work <sup>1</sup>	30

<sup>1</sup> 3 hours may be EGR 5V98 Master's Project course with engineering applications.

Courses will be selected in consultation with the student's advisor. Oral examination is not required. Master of Engineering students may take up to 12 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.

## 3.5 Program: Engineering Accelerated Degree Programs

The engineering accelerated degree programs are also known as the BS/MS programs or the 4 + 1 programs. Students who are near completion of their undergraduate engineering degree at Baylor University may enter one of the accelerated 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 accelerated 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.

This program enables currently enrolled undergraduate engineering students that apply and are admitted to the MS programs in the School of Engineering and Computer Science to select up to six hours of course work taken at the graduate level (i.e., courses with ME/ECE/EGR53xx designators) to simultaneously fulfill elective credit in their undergraduate and graduate programs of study. The MS programs of study otherwise remain the same.

By enabling dual credit for those courses, students are able to accelerate their MS program of study to complete it in one year. Students graduating from the Baylor University undergraduate engineering degree programs are eligible to apply for the ECS Dean's Graduate Scholarships for Master's level coursework, resulting in a cost per credit hour comparable to the rates at public universities in Texas.

Current rising seniors in an undergraduate engineering degree program interested in the 4+1 accelerated degree program should contact your advisors for more information.

### 3.5.1 Process

Students apply during their Senior year but before graduating to start the semester after they graduate. Two courses from the undergraduate degree can count for both their BS and MS/ME degree, but must be eligible for both (see general requirements above).

1. Ensure that students apply to the Graduate School no earlier than their 4th year (final undergraduate year) and are not admitted for a term that starts before their 9th semester.
2. They apply online through the portal as any graduate student, but select the joint BS/MS program.

Students can fill out the Interest Form, which technically is also an application. You will be contacted by the graduate program director (GPD), who can answer your questions and admit you to the program. The graduate school might also require you to fill in an MS application, which is proforma for students admitted through the interest form described above. The GPD will notify the Associate Dean for Academic Affairs in the School of Engineering and Computer Science of all admissions.

When student's take a graduate course as an undergraduate a graduate level petition is required. The student's ECS academic advisor will assist the student in completing the form and forward the form to the Associate Dean for Academic Affairs in the School of Engineering and Computer Science, who will approve the graduate level petition.

### 3.5.2 Baylor Tuition Support

Beginning Fiscal Year 2025 (Summer/Fall 2024)

1. As normal, undergraduates receive an eight-semester funding package as part of their admission to Baylor. This aid will continue for students who are accepted into an accelerated program. Their undergraduate aid will be applied to all courses taken, regardless of level.



2. Graduate tuition support will not be applied until the student is no longer eligible for the eight-semester funding package, which will normally correspond with being awarded the bachelor's degree and formally entering graduate school. At this point, graduate tuition support will cover all classes taken, regardless of level. Students who are unable to complete the undergraduate degree by the end of the eighth semester will still follow this funding pattern.

Beginning Now

1. Ensure that your current and prospective students are aware of the new financial aid process.
2. Ensure that students apply to the Graduate School no earlier than their 4th year (final undergraduate year) and are not admitted for a term that starts before their 9th semester.

### 3.5.3 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.

### 3.5.4 Course Requirements for Master of Science

#### Thesis Option Requirements

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

Code	Title	Hours
Course Work		24
ELC 5V99	Master's Thesis	6
Total Hours		30

#### Non-Thesis Option Requirements

A 3 credit MS-level project to be completed under the supervision of a ME graduate faculty member that results in a project report submitted to the Department of Mechanical Engineering.

Code	Title	Hours
Course Work		27
MS Project - Select one of the following: 3 EGR 5V98 Master's Project 3	Total Hours	33

Course work 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.

### 3.5.5 Course Requirements for Master of Engineering

Requirement	Hours
Course Work <sup>1</sup>	30

<sup>1</sup> 3 hours may be EGR 5V98 Master's Project project course with engineering applications

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.

## 3.6 Program: Dual Master of Business Administration/Master of Engineering

Associate Dean for Graduate Business Programs: Tim Kayworth

Graduate Directors in Engineering: Keith Schubert and Stephen T. McClain

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 dual 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.

### 3.6.1 Admission

Students must apply and be accepted separately into both programs. Additional admissions requirements for the MBA can be found under the Business School Admissions.

### 3.6.2 Requirements

Candidates for the joint Master of Engineering/MBA degree must complete 37 hours for MBA and 15 core engineering hours. In addition, the student must complete an additional 15 hours of electives. 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 completing the Master of Engineering. Since both degrees are awarded simultaneously, 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.

3.6. PROGRAM: DUAL MASTER OF BUSINESS ADMINISTRATION/MASTER OF ENGINEERING27

Code	Title	Hours
Required Framework Courses		
BUS 5401	Business Frameworks	4
Required MBA Core Courses		
ACC 5300	Accounting Tools for Management Decision Making	3
BUS 5050	Graduate Business Colloquium	0
BUS 5101	Focus Firm I	1
BUS 5111	Professional Career Development for First Semester Graduate Students	1
BUS 5112	Professional Career Development for Second Semester Graduate Students	1
BUS 5385	Strategic Management	3
BUS 5390	Management Communication	3
ECO 5340	Economic Tools for Management Decision Making	3
FIN 5360	Seminar in Corporate Finance	3
MGT 5310	Management of Organizational Behavior	3
MGT 5320	Manufacturing and Service Operations	3
MGT 5325	Leadership in the Global Marketplace	3
MKT 5310	Seminar in Marketing Strategy	3
QBA 5330	Business Analytics for Decision Making	3
Students who do not have an undergraduate degree in Business Administration are required to take the following:		
BL 5104	Business Foundations - Business Law	(1)
MIS Requirement		
Select one course from the following:		3
ISEC 5305	Seminar in Information Security Foundations	
MIS 5342	Business Intelligence	
MIS 5345	Decision Making Using Excel	
MIS 5346	Data Warehousing	
MIS 5355	Management of Information Systems	
Core Engineering		
Select 15 semester hours		15
Required ME Electives		
Select 15 semester hours		15
Total Hours		70

## Chapter 4

# Funding

Teaching Assistants (TAs) are supported by the department to assist a professor in a class as needed.

Research Assistants (RAs) are supported by individual faculty members' research grants.

# Chapter 5

## Mentoring

Our goal is to develop a multi-generational intellectual community dedicated to the development of knowledge and skills and characterized by respect and generosity.

Baylor defines mentoring as a professional, working alliance in which individuals work together over time to support the personal and professional growth, development, and success of relational partners through the provision of career and psychosocial support (Byars-Winston and Dahlberg, 2019). It includes discipline-specific, intentional activities that enable students to develop the knowledge, skills, and abilities necessary to succeed as professionals.

Note mentoring should not be limited to your advisor. Multiple mentors can provide the particular experience and support needed to succeed. For instance peer mentoring is particularly important for developing many of the skills needed to perform activities in your lab group.

### 5.1 Advisors and Advisees

The biggest influence on a graduate student's experience is usually the advisor-advisee relationship. A major help in getting a good relationship going is open, honest communication with clear expectations.

1. Regular (weekly) meetings
2. Annual reviews with an Individual Development Plan (IDP)
3. Advisor-Advisee Agreements
4. Expectations
  - (a) Publications & Authorship
  - (b) Timeline
  - (c) Courses & Training
  - (d) Finding a position

### 5.2 Individual Development Plan (IDP)

A great place to start is myIDP from Science. You can create your own free IDP at <http://myidp.sciencecareers.org>. The myIDP tool will help you assess your skills, interests, and values, then make evidence-based decisions on the particular career goals. It will help you get a plan of how to achieve your goals, and it will provide you a print out for your advisor to help your advisor help you. You should do this annually before your review to help guide the discussion. Give yourself a few days to go through the self-assessment at a leisurely pace. A good overview of the steps can be found in <https://www.science.org/content/article/getting-mentoring-you-need-rev2>. If you would like to read up more about IDPs in general and myIDP in particular then look at <https://www.science.org/content/article/myidp>.

### **5.3 Advisor Advisee Agreement**

Baylor Advisor Advisee Agreement



## **Graduate Advisor/Advisee Agreement**

### **Graduate Student:**

1. Assume the primary responsibility for the successful completion of degree and development of career. Remain committed to graduate education and maintain high levels of professionalism, self-motivation, engagement, curiosity, and ethical standards. Seek guidance from faculty, career counseling services, committee members, and other available resources.
2. Meet regularly with advisor and provide regular progress updates.
3. Work with research advisor to develop a thesis/dissertation project. Strive to establish a clear timeline and meet established deadlines.
4. Work with research advisor to select an Advisory/Supervisory/Dissertation committee. Commit to checking in with this committee on a regular basis (as suggested by research advisor).
5. Attend and participate in cohort meetings, laboratory meetings, seminars, journal clubs, academic workshops, etc., that are part of educational program and recommended by faculty.
6. Maintain the academic and ethical standards of my graduate program, academic field, and institution. Be knowledgeable about the requirements for graduate program and assistantship and meet the requirements.
7. Participate in all training required by the university and graduate program for research and teaching responsibilities. Comply with all institutional policies.
8. Be a good research citizen. Receive the written permission of research group and/or advisor before publicly sharing or publishing research findings. Agree to take part in shared responsibilities of the research group in a collegial and professional manner.
9. Discuss authorship and collaborative research with my research advisor and cohort peers.
10. Uphold the Graduate School standards for professional behavior.
11. Maintain high personal and ethical standards for own research.

### **Students who belong to research labs should also consider the following:**

12. Attend and participate in laboratory meetings, seminars and journal clubs that are part of educational program.
13. Comply with all institutional policies, including academic program milestones. Comply with both the letter and spirit of all institutional safe laboratory practices and animal-use and human-research policies at the institution.
14. Participate in the institution's Responsible Conduct of Research Training Program and practice those guidelines in conducting thesis/dissertation research.
15. Be a good lab citizen. Agree to take part in shared laboratory responsibilities and use laboratory resources carefully and frugally. Maintain a safe and clean laboratory space. Be respectful of, tolerant of, and work collegially with all laboratory personnel.
16. Maintain a detailed, organized, and accurate laboratory notebook. Be aware that original notebooks and all tangible research data are the property of my institution, but a copy of notebooks can be kept by the student after completing the thesis/dissertation.
17. Discuss policies on work hours, sick leave and vacation with research advisor. Consult with advisor and notify fellow lab members in advance of any planned absences.
18. Discuss policies on authorship and attendance at professional meetings with research advisor. Work with advisor to submit publications in a timely manner prior to graduation.

## Graduate Advisor

1. Mentor the graduate student as a future member of the scholarly community.
2. Oversee the research project of the graduate student, including planning, directing, and establishing a reasonable timeline for the project. Commit to overseeing student research and reading student work within a timely manner. Help the student select an appropriate Advisory/Supervisory/Dissertation/Thesis committee.
3. Meet individually with the graduate student on a regular basis and provide appropriate resources.
4. Understand the requirements and deadlines of the graduate program and communicate those requirements and deadlines with the student.
5. Discuss authorship and attendance at professional meetings with the graduate student and help train the graduate student to be a good research citizen. Acknowledge the graduate student's contributions to projects beyond his or her own, and work with the graduate student to publish his/her work in a timely manner.
6. Lead by example and facilitate the training of the student in necessary skills, such as oral and written communication, grant writing, archival research, animal and human research policies, ethical conduct of research.
7. Be supportive, equitable, accessible, encouraging, and respectful. Work hard to provide an emotionally supportive and intellectually stimulating learning environment that is safe and free from harassment.
8. Provide career advice and assist in helping the student meet career goals. Participate in helping secure and facilitate funding to support training.
9. Refrain from requiring the graduate student to perform tasks that are unrelated to his/her training program and professional development.

## Graduate advisors supervising graduate students within a research lab or working on collaborative research projects should also consider:

10. Expect the graduate student to share common laboratory responsibilities and utilize resources carefully and frugally. Lead by example in these areas.
11. Discuss intellectual policy issues with the student regarding disclosure, patent rights, and publishing research discoveries. This can include discussions of research in public forums such as blog posts, podcasts, etc.

I have read this document and discussed its tenets with my advisor/advisee.

IN SLATE

Advisor Acknowledgement

Advisee Acknowledgement



# Chapter 6

## Who To Talk To

### 6.1 Advisor

Your advisor should be your first resource in any questions. You should meet with your advisor weekly on your research and writing, but your advisor will also help you select the best courses and then raise your **advising flag**, which must be done every semester to allow you to register. Please make sure you do this early or it could create a problem getting the courses you want.

### 6.2 Graduate Program Director (GPD)

If you have a question, the graduate program director (GPD) is ultimately responsible for all areas of the graduate program, and thus can handle any problem.

### 6.3 Graduate Program Coordinator (GPC)

The graduate program coordinator (GPC) assists the GPD in administering the program, and is often the most useful person. Make sure you answer any GPC emails immediately. When the GPC emails it is important to keep you on track. The GPC also helps you register for classes, fills out necessary petitions, keeps all the paperwork, etc. Most students find the GPC to be a great encourager and friend, so drop by for a friendly chat every now and then!

### 6.4 ECS Support

If you are having any issues with general equipment, logging into the network, running software, or using printers, then contact ECS Support. The ECS Support team is amazingly helpful and are a great help with any of your equipment and computer needs.

# Chapter 7

## Resources

### 7.1 Graduate School Resources

<https://graduate.baylor.edu/studentresources>

Completing your degree: <https://graduate.baylor.edu/studentresources/completingyourdegree>

Graduate Pathway to Success (GPS) Workshops <https://graduate.baylor.edu/gps>

Graduate Student Association <https://gsa.graduate.baylor.edu/>

### 7.2 Thesis/Disertation

thesis dissertation templates LaTeX

### 7.3 When life gets tough

Health Services <https://healthservices.web.baylor.edu/>

Counseling Center <https://counselingcenter.web.baylor.edu/>

### 7.4 Baylor online resources

1. Payroll stub (Ignite)
2. Yearly tax forms (Ignite)
3. Registering for classes (Bearweb)
4. Degree Audit (u.achieve)

## Chapter 8

# Graduate Student Success

### 8.1 Leave Policies

Graduate students suffering from a serious medical condition may apply for short-term medical leave from their academic and assistantship responsibilities. See the Short-Term Leave Accommodation webpage for additional information.

Male or female parents with Graduate Assistant status (GA) of a newly born baby or a newly adopted child may apply for a childbirth/adoption accommodation. See the Childbirth & Adoption Accommodation webpage for additional information.

### 8.2 Health Insurance

Baylor University requires Health Insurance for degree-seeking domestic graduate students under the purview of the Graduate School enrolled in 3 or more credit hours, including DPT, online graduate students, and/or those enrolled in at least one hour of a full-time equivalency course.

International graduate students are required to maintain insurance coverage through Baylor's student health insurance plan. International students will be automatically enrolled in SHIP. If an International graduate student would like to add additional coverage (dental, dependents, etc.), they should contact Lisa Bland. Otherwise, the health insurance enrollment process will be automatic for our international students.

Information about the Baylor University Health Insurance Plan can be found via the Graduate School and the Health Center (under the "Insurance" quick link).

### 8.3 Housing

The Graduate Student Housing Community consists of four Baylor owned apartment complexes: Browning Square, PineTree, The Quadrangle, and Speight-Jenkins Apartments. Our single bedroom units at Browning Square, PineTree, and Speight-Jenkins and two bedroom units at The Quadrangle can accommodate singles, families, children, and pets. The Graduate Student Housing Community provides a quiet, adult residence with a living area suitable to the professional and family lives that are unique to graduate students. The community also serves as a place for scholars and families to gather for social, spiritual, and academic pursuits. To this end, we encourage residents to attend events that provide occasions for the community to come together and share in fellowship, friendship, and ideas.

### 8.4 Graduate Student Association

The Graduate Student Association (GSA) is an organization concerned with the intellectual and social growth of graduate students at Baylor University. The GSA sponsors activities and programs that facilitate an exchange of ideas, promotion of scholarly development, cultivation of social support systems, and

dissemination of other information concerning graduate student life. All students currently enrolled for one or more semester hours of graduate course work toward an advanced degree and with a graduate GPA of 3.0 or greater are automatically members of the GSA. Students desiring further information about the GSA should review the website at [www.baylor.edu/gsa](http://www.baylor.edu/gsa) or contact the Associate Dean for Student Development (254) 710-4487.

# Chapter 9

## Facilities

Access to Baylor facilities are governed by the Baylor Access Control Policy.

### 9.1 BRIC

The BRIC is a unique, fully appointed research environment where scientists and engineers collaborate with industry, business, and workforce development professionals to bring new ideas and products to life. Faculty have offices and research lab space as well as cubicles for graduate students. Common facilities include

- Clean room
- Electronics fabrication
- Computer cluster room (Tardis, Polar Bear)

### 9.2 Rogers

#### 9.2.1 ECS Support

facilities and support

- Computer Lab
- Machine Shop
- Electronics Shop
- PawPrints
- Software

To access printers from a Baylor provided system in the BRIC:

1. Select Start – > run or from the system search next to start search for run
2. A window will appear with a text entry to which you enter `\\printserv1.ecs.baylor.edu`
3. Another window will open with the printers available, select the one nearest you, for instance in the 2110 area of the BRIC that would be `BRIC-2110-BW`.
4. Once you print a document, you will need to log into to `print.ecs.baylor.edu` to release it.

To access printers from a personal system in the BRIC:

<https://support.ece.baylor.edu/print>

Installs a virtual printer that you can connect to several printers at the BRIC and Rogers.

Students still need to release the job at <https://print.ece.baylor.edu>

personnel (send help requests to [ecs\\_support@baylor.edu](mailto:ecs_support@baylor.edu) or visit Rogers 318)

- Lead: Patrick Hynan
- Robert Baish
- Patrick Clancy
- George Gonzales
- James Johnston
- Ashley Orr

### 9.2.2 Career Center

- Michael Estep, Sr. Director
- Reina Wiseman, Assistant Director
- Kristen Revard, Sr. Career Success Professional

## 9.3 Baylor Information Technology Services

### 9.3.1 High Performance Computing Systems

Baylor University provides several systems for faculty and students who require academic and research computing resources. These systems are operated and supported by the High Performance and Research Computing Services group. Detailed information about these systems can be found [here](#).

### 9.3.2 HPC Programming Support

The High Performance and Research Computing Services group provides programming support and mentoring for faculty and student researchers using the central HPC systems at Baylor.

Programming support includes the following:

- Assisting clients with parallelizing their serial applications.
- Helping clients debug and optimize their applications.
- Research Technology Consultation

HPRCS staff will consult with faculty to assess their research needs and coordinate support from ITS, Library and Academic Technology Services, the Vice Provost for Research, Academic Technology Directors, and other university resources. Note: consult with your faculty advisor to get ITS support

### 9.3.3 Linux Support

The High Performance and Research Computing Services group provides support for Linux on departmental workstations. This support includes installation and setup of the operating system, assistance with Linux issues/problems, installation of the CrashPlan backup client, and, to a limited extent, help with hardware problems.

personnel

- Mike Hutcheson, Director

- Carl Bell, Senior Analyst/Programmer
- Brian Sitton, Systems Administrator

### 9.3.4 Kodiak Accounts

Kodiak accounts are available to Baylor faculty, graduate and undergraduate students. To request an account, contact [HPRCS@baylor.edu](mailto:HPRCS@baylor.edu). Students should have their faculty sponsor request the account on the student's behalf. Accounts are also available to non-Baylor individuals who are collaborating with Baylor researchers. Once your account is created, you should receive an email with your username and your account's initial password that you will use to log in to Kodiak.

By using Baylor HPC resources, you agree to the Baylor Technology Usage Policy BUPP-025. HPC resources such as programming guides can be found at: <https://rtservices.baylor.edu/>.

### 9.3.5 Kodiak Cluster

Hardware: 100 Compute Nodes

84 x Cray Regular Compute Nodes

Dual 18-core Intel Xeon Gold 6140 processors  
256GB DDR4-2133 RAM  
240GB SSD

1 x Cray Large Memory Compute Node Dual 18-core Intel E5-2695 V4 processors

768GB DDR4-2133 RAM  
1.8TB SSD

2 x Cray GPU Nodes

Dual 18-core Intel Xeon E5-2695 V4 processors  
Dual NVIDIA P100 16GB GPUs 256GB DDR4-2133 RAM  
240GB SSD

3 x Cray GPU Nodes

Dual 18-core Intel Xeon Gold 6140 processors  
Dual NVIDIA V100 32GB GPUs 256GB DDR4-2666 RAM  
240GB SSD

1 x Dell GPU Node

Dual 32-core AMD Epyc 7452 processors  
Dual NVIDIA A100 40GB GPUs 512GB DDR4-3200 RAM  
440GB SSD

Storage: 2.5PB multi-tiered

Tier 0: 2 x Dell PowerEdge R7525 servers, 200TB NVMe Exceclero NVMesh  
Tier 1: 2 x Dell PowerEdge R740 servers, 2 x Dell ME4084 storage arrays, 2.5PB HDD

Cluster Interconnect:

Mellanox HDR 200Gb/s (100Gb/s split to compute)

# Chapter 10

## Courses

### 10.1 Undergraduate

#### **ELC 4318 Avionics System Design (3)**

Cross-listed as AVS 4318

Design of avionics systems for civil and military aircraft. Topics include avionics system technology and architectures; system engineering principles; radar, electro-optical, and radio frequency sensors; displays; and communication and navigation systems.

#### **ELC 4320 Introduction to Optics (3)**

Pre-requisite(s): C or better in ELC 3335

Geometrical optics, electromagnetic waves, diffraction, interference, polarization, Fourier optics, laser fundamentals, and optical communication basics. Laboratory sessions include semiconductor laser measurement, fiber optic coupling, and Michelson interferometer setup.

#### **ELC 4330 Introduction to Robotics (3)**

Cross-listed as ME 4330

Pre-requisite(s): C or better in MTH 2321; C or better in MTH 3325

Analysis of robot manipulators, including forward and inverse kinematics, rigid-body rotation parameterizations, velocity kinematics, path planning, nonlinear dynamics, single and multi-variable control.

#### **ELC 4332 Automatic Control Systems (3)**

Pre-requisite(s): C or better in ELC 3335

Analysis and design of linear feedback control systems. Laplace transforms, transfer functions, signal-flow graphs, electrical and mechanical system modeling, state variables, system stability, time-domain response, root-locus method, Nyquist criterion, and compensator design. Laboratory exercises to illustrate course concepts.

#### **ELC 4340 Power Systems (3)**

Pre-requisite(s): C or better in ELC 3335

Analysis of power systems, including energy sources, transmission lines, power flow, transformers, transmission and distribution systems, synchronous generators, stability, power system controls, short-circuit faults, and system protection.

#### **ELC 4345 Power Electronics (3)**

Pre-requisite(s): C or better in ELC 3314; C or better in 3114

Introduction to power electronic systems with emphasis on power control and switching circuits for AC/DC, DC/DC, and DC/AC converters. Associated laboratory component.

#### **ELC 4350 Principles of Communication (3)**

Pre-requisite(s): C or better in ELC 3335; C or better in STA 3381



Signal analysis, modulation techniques, random signals and noise, digital transmission, information theory, coding.

**ELC 4351 Digital Signal Processing (3)**

Pre-requisite(s): C or better in ELC 3335; C or better in STA 3381

Discrete-time signals and systems, sampling theory, z-transforms, spectral analysis, filter design, applications, and analysis and design of discrete signal processing systems. Credit cannot be earned for ELC 4351 if credit is earned for BME 4452.

**ELC 4353 Image Formation and Processing (3)**

Cross-listed as BME 4353

Pre-requisite(s): C or better in ELC 3335 or concurrent enrollment; C or better in STA 3381

Introduction to image formation systems that provide images for medical diagnostics, remote sensing, industrial inspection, nondestructive materials evaluation and optical copying. Image processing, including image enhancement, analysis, and compression. Student specialization through assignments and project.

**ELC 4360 Software Systems (3)**

Pre-requisite(s): C or better in ELC 3336

Software engineering methods and tools. Topics include the development lifecycle, requirements, specifications, design, implementation, verification, validation, and maintenance, project management and professional ethics.

**ELC 4362 Wireless Sensor Networks (3)**

Pre-requisite(s): C or better in ELC 3338; C or better in ELC 3314; or consent of instructor

Characterization and design of large-scale wireless sensor networks. Topics include wireless channel utilization, media access protocols, routing, energy management, synchronization, localization, data aggregation, and security. Laboratory exercises using wireless sensor devices, cross-development, and real-time operating systems.

**ELC 4372 Bioinstrumentation (3)**

Cross-listed as BME 4372

Pre-requisite(s): C or better in ELC 2330

Principles of biomedical instrumentation and their real-world applications. Emphasis on understanding the basic design principles and technologies used in bioelectrical, biomechanical, and clinical instrumentation.

**ELC 4377 Solar Energy (3)**

Cross-listed as ME 4377

Pre-requisite(s): C or better in ELC 2330; C or better in ME 2345

A first course in the principles of solar energy collection, conversion and storage. Topics include solar photovoltaic and thermal collectors, sun-earth geometry, ground and sky radiation models, and balance-of-system components including stratified tanks, pumps, and power inverters. Students will learn industry-standard TRNSYS energy modeling software.

**ELC 4381 Antennas and Wireless Propagation I (3)**

Pre-requisite(s): C or better in ELC 3337

Fundamentals of radiation and propagation, antenna parameters, linear antennas, linear and planar phased arrays, and microstrip antennas. Analysis and design principles, simulation and measurement.

**ELC 4383 RF/Microwave Circuits I (3)**

Pre-requisite(s): C or better in ELC 3337

Introduction to passive RF, microwave, and wireless circuit design. Topics include transmission line theory; network analysis; impedance matching techniques; design of resonators, couplers, and filters; diodes; mixers; and principles and techniques of microwave measurements.

**ELC 4384 RF/Microwave Circuits II (3)**

Pre-requisite(s): C or better in ELC 4383

This is a second course in radio-frequency and microwave circuits covering microwave amplifier and oscillator design. Topics include the ZY Smith chart, matching network design, gain calculations, design

for amplifier stability, noise figure and low-noise amplifier design, gain matching, and negative resistance oscillator design. A final project will require the design, simulation, construction, and testing of an amplifier using microwave CAD tools and hands-on measurements.

**ELC 4396 Special Topics in Electrical or Computer Engineering (3)**

Pre-requisite(s): Consent of department chair

Study of advanced topics in electrical or computer engineering. This course may be repeated once under a different topic.

**ELC 4438 Embedded Systems Design (4)**

Pre-requisite(s): C or better in ELC 3336

Design and implementation of embedded computer systems using microcontrollers, sensors and data conversion devices, actuators, visual display devices, timers, and applications specific circuits. Software design using microprocessor cross-development systems and real-time operating system principles.

**ELC 4V97 Special Projects in Electrical or Computer Engineering (1-6)**

Pre-requisite(s): Consent of department chair

Advanced topics and/or special project activities in electrical or computer engineering.

**ELC 5302 Engineering Analysis (3)**

Cross-listed as EGR 5302, ME 5302

Pre-requisite(s): Graduate standing in Engineering

Selected topics in applied engineering mathematics. Topics include advanced linear algebra, signal theory, and optimization methods.

**ELC 5311 Advanced Logic Design (3)**

Pre-requisite(s): Graduate standing in Engineering

Computer-automated design of digital circuits. Functional specification; structural and behavioral modeling using hardware description languages; simulation for design verification and timing analysis; circuit synthesis for FPGA implementation; testing and fault diagnosis.

**ELC 5313 Advanced Computer Architecture (3)**

Pre-requisite(s): ELC 4438 or consent of instructor

Advanced topics in computer architecture, including instruction set design, instruction pipelines, super scaler and very-long instruction word processors, cache and virtual memory systems, multiprocessor systems, large data storage systems and computer networks.

**ELC 5316 Real-Time Systems Design (3)**

Pre-requisite(s): ELC 4438 or consent of instructor

Hardware and software characteristics of real-time concurrent and distributed reactive control systems; design methodologies; performance analysis; case studies and development projects.

**ELC 5336 Advanced Engineering Electromagnetics (3)**

Pre-requisite(s): ELC 3337 or consent of instructor

An in-depth study of electromagnetic fields and waves and their applications in modern wireless communication and sensor systems. Topics include Maxwell's equation for complex media, scalar and vector potentials, non-ideal transmission lines, cylindrical waveguides, general properties of guided waves, and antennas.

**ELC 5337 Principles of Microwave Sensing and Measurement (3)**

Fundamentals of microwave sensor design and applications. Emphasis on understanding the basic principles, fundamental electrical and magnetic properties of materials, and the sensor configurations of RF/microwave instruments used in industrial and biomedical application.

**ELC 5338 High Frequency Electronics Design (3)**

Design and analysis of solid-state electronic circuits at RF and microwave frequencies. Emphasis on operational characteristics and design procedures for two- and three-terminal semiconductor devices and the associated passive components and circuit fabrication techniques used for generating, amplifying, and processing signals in this frequency range.

**ELC 5339 High Frequency Electronics II (3)**

Pre-requisite(s): ELC 5338 or consent of instructor

The design of linear amplifiers and oscillators at microwave frequencies, including an emphasis on design procedures for optimum gain, stability, and noise performance of amplifiers and the negative resistance method for oscillators.

**ELC 5340 Radar Engineering (3)**

Pre-requisite(s): ELC 5336

Electromagnetics of radar, signal processing of radar, radar imaging, Doppler processing, and radar antenna arrays. Analysis and design principles, simulation, and measurement.

**ELC 5351 Multidimensional Signal Analysis (3)**

Cross-listed as BME 5351

Pre-requisite(s): ELC 4451

Introduction to the processing and analysis of images in higher dimensions, including images and video. Characterization of higher dimensional signals. Multidimensional Fourier analysis, FFT's, systems and convolution. Reconstruction of images from projections. Tomography, Abel transforms, Radon transforms. Synthesis and restoration of signals using projection methods. Alternating projections onto convex sets.

**ELC 5353 Biomedical Signal Analysis (3)**

Cross-listed as BME 5353

Pre-requisite(s): ELC 4451 or BME 4452

Applications of signal theory and digital signal processing concepts toward biomedical signals. Topics include filters, signal modeling, adaptive methods, spectral analysis and statistical signal processing methods.

**ELC 5354 Random Signals and Noise (3)**

Pre-requisite(s): ELC 3335 and consent of instructor

Foundational treatment of probability, random variables and stochastic processes used in the analysis of random signals and noise in many areas of engineering. Topics include the modeling and properties of probability, scalar and vector random variables, the central limit theorem, stochastic processes, stationarity, ergodicity, the Karhunen-Loeve expansion, power spectral densities, response of linear systems to random signals, and Markov chains.

**ELC 5356 Statistical and Adaptive Signal Processing (3)**

Pre-requisite(s): ELC 5354

Unified introduction to the theory, implementation, and applications of statistical and adaptive signal processing methods. Key topics focus on spectral estimation, signal modeling, adaptive filtering, and signal detection.

**ELC 5357 Cardiovascular Engineering and Instrumentation (3)**

Cross-listed as BME 5357, EGR 5357, ME 5357

See BME 5357 for course information.

**ELC 5358 Introduction to Computational Intelligence (3)**

Pre-requisite(s): Consent of instructor

Foundational knowledge of computational intelligence and its application to engineering problems. Discriminant analysis, artificial neural networks, perception training and inversion, fuzzy logic, fuzzy inference engines, evolutionary computation, particle swarms, intelligent agents, and swarm intelligence.

**ELC 5360 Linear Systems (3)**

Pre-requisite(s): ELC 4332 or equivalent

Analysis of linear systems, including system modeling, state-variable representations, discrete-time systems, linear algebra, linear dynamic equations, stability, observability, controllability, state-feedback and state-estimators, realization, and pole placement.

**ELC 5362 Optimal Control (3)**

Pre-requisite(s): ELC 5360 or equivalent

Optimal control problems, static optimization, optimal control of discrete-time systems, the variational approach to optimal control, linear quadratic regulator problems, the maximum principle, extensions of LQR problem, time-optimal control problems, dynamic programming.

**ELC 5364 Intelligent Control (3)**

Pre-requisite(s): ELC 4332 or 4335 or Graduate standing

Introduction to intelligent control and optimization using a control-engineering approach. Topics include decision-making techniques, neural network architectures for modeling and control, system identification, fuzzy systems, evolutionary algorithms, and swarm intelligence.

**ELC 5370 Introduction to Information Theory (3)**

Pre-requisite(s): ELC 4350 or instructor approval

Topics include: information models, entropy measures, data compression, coding theory, error correcting codes, the Kraft inequality, optimal codes, Shannon coding theorem, Burg's theorem, evolutionary informatics, Kolmogorov complexity, algorithmic information theory, and Chaitin's number.

**ELC 5381 Advanced Power Grid Interface Techniques (3)**

Pre-requisite(s): ELC 4332 and either ELC 4340 or ELC 4345

Introduction to distributed power generation, power conversion topologies and their control, power factor correction circuits, harmonic concepts and power quality, modeling and control of grid-connected loads and filters, interconnection standards and control issues, and control systems for rotating machines.

**ELC 5390 Research Methods and Project Formulation (3)**

Cross-listed as BME 5390, EGR 5390

Pre-requisite(s): Approval of student's proposed master's thesis or project advisor

Designed for students in the process of selection of thesis or project topic. Students will gain experience in literature and/or laboratory research methods and formulation of a project appropriate for their area.

**ELC 5396 Special Topics in Engineering (3)**

See EGR 5396 for course information.

**ELC 5397 Special Projects in Engineering (3)**

Cross-listed as BME 5397, EGR 5397, ME 5397

See EGR 5397 for course information.

**ELC 5V99 Master's Thesis (1-6)**

Pre-requisite(s): Approval of student's master's thesis advisor

Students completing a master's program with a thesis must complete six hours of ELC 5V99.

**ELC 6V00 Graduate Research (1-10)**

Pre-requisite(s): Graduate standing

For research credit prior to admission to candidacy for an advanced degree. Credit will be given for the amount of work done. May be repeated for credit through 45 hours.

**ELC 6V10 Doctoral Prospectus Research (1-6)**

Pre-requisite(s): Instructor approval

Supervised research for developing a dissertation prospectus that will be the subject of the preliminary exam that will admit students to candidacy. A student may repeat this course for credit with a maximum of ten total hours. Registration for this course is sufficient for achieving full-time status.

**ELC 6V99 Dissertation (1-12)**

Pre-requisite(s): Consent of student's supervisory graduate committee and admission to doctoral candidacy

Required of all doctoral candidates. In no case will fewer than 12 semester hours be accepted for a dissertation. Students may not enroll for dissertation hours until they have been officially accepted into candidacy for the doctoral degree. After initial enrollment, students must register for at least one semester hour of dissertation every semester thereafter (summer semester excluded).

# Chapter 11

## Graduate Student Employment

This chapter is taken from the graduate catalog.

### 11.1 Assistantships

The University provides many students with stipend support, which is available with varying compensation levels depending upon the nature of the service and the amount of time required of the students. Specific information and opportunities may be obtained from the chairperson or the graduate program director in the degree program of your choice. In addition to University-funded stipends, there are foundation grants that provide funds for various kinds of assistantships. Students receiving assistantships must maintain an overall grade point of 3.0 to avoid being placed on probation. Probationary status makes the student ineligible for University funding and employment. Graduate stipends are usually awarded by the graduate programs and fall into the following classifications:

#### 11.1.1 Graduate Assistant

A Graduate Assistant (GA) is a student-employee paid by the University to engage in activities related to their academic degree programs under the following conditions. GAs are identified based on two criteria: the nature of their work and the nature of their relationship to the university.

1. The nature of their work: GAs are full-time students whose primary responsibilities are linked to their academic and professional development. Thus, their roles and responsibilities are directly related to and often part of their academic requirements. Examples of GA duties include the following:
  - (a) Serving as a “teacher of record” or teaching assistant to another instructor
  - (b) Serving as a research assistant on a range of research or scholarly projects as defined by their discipline, such as working in a lab, assisting with a journal, or editing a book
  - (c) Serving as a TA or RA or in other roles related to their professional development outside their home academic department
2. The nature of their relationship to the university: GAs are identified by their Graduate Program Directors and approved by the Graduate School. They are full-time students who are awarded, normally as part of their admission into their program, full tuition and stipend funding for all or most of the time required to complete their degree and are eligible for subsidized student health insurance per the Graduate School’s insurance subsidy policy.
3. GAs are employed on an on-going basis, either 10-months or 12-months per year, throughout their enrollment in a graduate degree program, subject to continuing academic eligibility and other factors.
4. GAs must retain full-time enrollment and are expected to devote an average of 20 hours per week to their assistantship responsibilities. Graduate Assistants may be assigned and compensated for more

than 20 hours with approval of the Graduate Dean but may not be assigned more than 28 hours of work that is not directly related to their academic program.

## 11.2 Graduate Student Employees

Graduate students who are employed by the University but whose employment or relationship to the university does not meet the definition of a Graduate Assistant as defined in the Graduate Assistant Policy are classified as either a Graduate Student Employee (GSE) – Monthly or Graduate Student Employee (GSE) – Bi-Weekly. The exempt (monthly) or non-exempt (bi-weekly) distinction is based solely on the primary work duties assigned to the graduate student, as further explained below. GSEs may be assigned up to 29 hours of work per week in total. Additional hours beyond that must be approved by the GPD and the Graduate Dean.

### 11.2.1 Graduate Student Employee (GSE) – Monthly

A non-GA graduate student performing professional services utilizing knowledge or experience beyond the experience of an undergraduate and whose primary duties are teaching or research, as defined by the US Department of Labor. Based on the duties performed, GSE – Monthly employees are classified as exempt employees in the performance of work duties for wage and hour purposes. Examples of exempt GSE assignments include the following.

A graduate student who is employed as teacher of record for a single course  
A graduate student who is employed to conduct research under the direction of a faculty member  
In many cases, the work performed by GSE monthly employees (exempt professional work) may be very similar or even identical in nature to work being performed by GA's. However, a Graduate Assistantship is not awarded to every graduate student performing professional exempt services at the university.

### 11.2.2 Graduate Student Employee (GSE) – Bi-Weekly

A graduate student performing non-exempt work as defined by the US Department of Labor. Examples of non-exempt GSE assignments include assisting with the professional or administrative functions of the university.

Baylor University is a member of the Council of Graduate Schools (CGS). Baylor abides by a CGS Resolution, “Resolution Regarding Graduate Scholars, Fellow, Trainees and Assistants,” that concerns the conditions surrounding the acceptance of offers of certain kinds of graduate student financial assistance, namely, scholarships, fellowships, traineeships, and assistantships. The general spirit of the Resolution is that students should have an opportunity to consider more than one offer and should have until April 15 to do so, that institutions and students should be able to view acceptances in force after April 15 as binding, that everyone should know what the rules are, and that an offer by the institution and its acceptance by the student constitute an agreement which both expect to honor. The Resolution acknowledges that students, after having accepted an offer, may change their minds and withdraw that acceptance. The intent of the Resolution is to provide a uniform and widely acceptable framework for so doing, one that provides protection for both student and institution. Full text of the Resolution can be viewed at [www.cgsnet.org/pdf/resolution.pdf](http://www.cgsnet.org/pdf/resolution.pdf). The April 15 date applies to fall applications submitted by the Graduate School’s posted deadline.