MASTER OF SCIENCE (M.S.) MAJOR IN TECHNOLOGY MANAGEMENT

Major Program
The technology management graduate program at Texas State is designed for those who seek careers or career advancement in the management of engineering and production activity in the construction and concrete industries, in the semiconductor, cast metals, machining, fabrication, and other manufacturing industries, or in the fields of power generation, environmental management, and occupational health and safety.

Application Requirements
The items listed below are required for admission consideration for applicable semesters of entry during the 2017-2018 academic year. Submission instructions, additional details, and changes to admission requirements for semesters other than the 2017-2018 academic year can be found on the program’s web page (http://gradcollege.txstate.edu/programs). International students should review the International Admission Documents (http://mycatalog.txstate.edu/graduate/admission-documents/international) section of the catalog for additional requirements.

- completed online ApplyTexas application
- $40 nonrefundable application fee
- $50 nonrefundable international evaluation fee (if applicable)
- baccalaureate degree from a regionally accredited university
- official transcripts required from each four-year institution where course credit was granted
- minimum 2.75 GPA in your last 60 hours of undergraduate course work (plus any completed graduate courses)*
- official GRE scores not required*

TOEFL or IELTS Scores
Non-native English speakers who do not qualify for an English proficiency waiver:

- official TOEFL iBT scores required with a 78 overall
- official IELTS (academic) scores required with a 6.5 overall and minimum individual module scores of 6.0

This program does not offer admission if the scores above are not met.

*Additional Information
If your GPA falls below the minimum requirement of 2.75, please submit the following:

- official GRE scores with a preferred minimum of 297 (verbal and quantitative sections combined)

Degree Requirements
The Master of Science (M.S.) major in Technology Management is a 36-hour degree program. It is comprised of a 30-hour major in technology management plus a 6-hour cognate minor in business management. The major includes 15 hours of core technology courses that are common to all students, regardless of specialization. Students may elect one of three 9-hour specializations in construction management, manufacturing management, or general industrial management. The 6-hour cognate minor allows students to select from such industry-focused business courses as supply chain management, process improvement management, managing business creativity, organizational change management, etc.

All students are required to complete a 6-hour research component. Students may select either a traditional academic thesis or an industry-focused directed project. A thesis is the more appropriate option for full-time students who may have ambitions of further graduate study, while the directed project is the best choice for part-time students who hold jobs in industry.

Course Requirements

<table>
<thead>
<tr>
<th>Core</th>
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<tbody>
<tr>
<td>TECH 5390</td>
<td>Research in Technology</td>
</tr>
<tr>
<td>TECH 5394</td>
<td>Design of Industrial Experiments</td>
</tr>
<tr>
<td>TECH 5315</td>
<td>Engineering Economic Analysis</td>
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<tr>
<td>TECH 5365</td>
<td>Industrial Project Management and Scheduling</td>
</tr>
<tr>
<td>TECH 5382</td>
<td>Industrial Ecology and Sustainability Engineering</td>
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<tr>
<th>Specializations</th>
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<tbody>
<tr>
<td>Select 9 hours from one of the following specializations:</td>
<td>9</td>
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<table>
<thead>
<tr>
<th>Construction Management</th>
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<tbody>
<tr>
<td>CSM 5313</td>
<td>Building Information Modeling</td>
</tr>
<tr>
<td>CSM 5360</td>
<td>Construction Company Financial Control</td>
</tr>
<tr>
<td>CSM 5362</td>
<td>Construction Contract Delivery Systems</td>
</tr>
<tr>
<td>CIM 5330</td>
<td>Advanced Concrete Technology</td>
</tr>
<tr>
<td>CIM 5340</td>
<td>Innovation Strategies for the Concrete Industry</td>
</tr>
<tr>
<td>TECH 5384</td>
<td>Problems in Technology</td>
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<thead>
<tr>
<th>Manufacturing Management</th>
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<tbody>
<tr>
<td>TECH 5310</td>
<td>Product Design and Development</td>
</tr>
<tr>
<td>TECH 5311</td>
<td>Computer Aided Engineering</td>
</tr>
<tr>
<td>TECH 5364</td>
<td>Robust Product and Process Design</td>
</tr>
<tr>
<td>TECH 5387</td>
<td>Advanced Facilities Planning</td>
</tr>
<tr>
<td>TECH 5391</td>
<td>Advanced Manufacturing Systems</td>
</tr>
<tr>
<td>TECH 5392</td>
<td>Fundamentals of Microelectronics Manufacturing</td>
</tr>
<tr>
<td>TECH 5384</td>
<td>Problems in Technology</td>
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<table>
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<tr>
<th>Industrial Management</th>
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</thead>
<tbody>
<tr>
<td>TECH 5364</td>
<td>Robust Product and Process Design</td>
</tr>
<tr>
<td>TECH 5385</td>
<td>Readings in Technology</td>
</tr>
<tr>
<td>TECH 5387</td>
<td>Advanced Facilities Planning</td>
</tr>
<tr>
<td>TECH 5384</td>
<td>Problems in Technology</td>
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<tr>
<th>Research Component</th>
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<tbody>
<tr>
<td>Select one of the following:</td>
<td>6</td>
</tr>
<tr>
<td>TECH 5399A</td>
<td>Thesis</td>
</tr>
<tr>
<td>TECH 5399B</td>
<td>and Thesis</td>
</tr>
<tr>
<td>TECH 5398</td>
<td>Directed Project (Repeatable for credit)</td>
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<tr>
<th>Cognate Minor in Business Management</th>
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<tr>
<td>Select 6 hours from the following:</td>
<td>6</td>
</tr>
<tr>
<td>MGT 5310</td>
<td>Organizational Change Management</td>
</tr>
<tr>
<td>MGT 5311</td>
<td>Process Improvement Management in Organizations</td>
</tr>
<tr>
<td>MGT 5315</td>
<td>New Venture Management</td>
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### Thesis Proposal

The student must submit an official Thesis Proposal Form (http://www.gradcollege.txstate.edu/forms.html) and proposal to his or her thesis committee. Thesis proposals vary by department and discipline. Please see your department for proposal guidelines and requirements. After signing the form and obtaining committee members’ signatures, the graduate advisor’s signature if required by the program and the department chair’s signature, the student must submit the Thesis Proposal Form with one copy of the proposal attached to the dean of The Graduate College for approval before proceeding with research on the thesis. If the thesis research involves human subjects, the student must obtain exemption or approval from the Texas State Institutional Review Board prior to submitting the proposal form to The Graduate College. If the thesis research involves vertebrate animals, the proposal form must include the Texas State IACUC approval code. It is recommended that the thesis proposal form be submitted to the dean of The Graduate College by the end of the student’s enrollment in 5399A. Failure to submit the thesis proposal in a timely fashion may result in delayed graduation.

### Thesis Committee

The thesis committee must be composed of a minimum of three approved graduate faculty members.

### Thesis Enrollment and Credit

The completion of a minimum of six hours of thesis enrollment is required. For a student’s initial thesis course enrollment, the student will need to register for thesis course number 5399A. After that, the student will enroll in thesis B courses in their field, e.g., ENG 5399A, ENG 5199B, ENG 5299B, ENG 5399B, ENG 5599B, and ENG 5999B, in each subsequent semester until the thesis is defended with the department and approved by The Graduate College. Preliminary discussions regarding the selection of a topic and assignment to a research supervisor will not require enrollment for the thesis course.

Students must be enrolled in thesis credits if they are receiving supervision and/or are using university resources related to their thesis work. The number of thesis credit hours students enroll in must reflect the amount of work being done on the thesis that semester. It is the responsibility of the committee chair to ensure that students are making adequate progress toward their degree throughout the thesis process. Failure to register for the thesis course during a term in which supervision is received may result in postponement of graduation. After initial enrollment in 5399A, the student will continue to enroll in a thesis B course as long as it takes to complete the thesis. Thesis projects are by definition original and individualized projects. As such, depending on the topic, methodology, and other factors, some projects may take longer than others to complete. If the thesis requires work beyond the minimum number of thesis credits needed for the degree, the student may enroll in additional thesis credits at the committee chair’s discretion. In the rare case when a student has not previously enrolled in thesis and plans to work on and complete the thesis in one term, the student will enroll in both 5399A and 5399B.

The only grades assigned for thesis courses are PR (progress), CR (credit), W (withdrawn), and F (failing). If acceptable progress is not being made in a thesis course, the instructor may issue a grade of F. If the student is making acceptable progress, a grade of PR is assigned until the thesis is completed. The minimum number of hours of thesis credit (“CR”) will be awarded only after the thesis has been both approved by The Graduate College and released to Alkek Library.

A student who has selected the thesis option must be registered for the thesis course during the term or Summer I (during the summer, the thesis course runs ten weeks for both sessions) in which the degree will be conferred.

### Fee Reduction

A master’s degree candidate for graduation may be eligible for a one-time fee reduction under V.T.C.A. Education Code, Section 54.054. Please refer to the section titled Fee Reduction in the Additional Fees and Expenses chapter of this catalog for more information.

### Thesis Deadlines and Approval Process

Thesis deadlines are posted on The Graduate College (http://www.gradcollege.txstate.edu) website under “Current Students.” The completed thesis must be submitted to the chair of the thesis committee on or before the deadlines listed on The Graduate College website.

The following must be submitted to The Graduate College by the thesis deadline listed on The Graduate College website:

1. The Thesis Submission Approval Form bearing original (wet) and/or electronic signatures of the student and all committee members.
2. One (1) PDF of the thesis in final form, approved by all committee members, uploaded in the online Vireo submission system.

After the dean of The Graduate College approves the thesis, Alkek Library will harvest the document from the Vireo submission system for publishing in the Digital Collections database (according to the student’s embargo selection). **NOTE: MFA theses will have a permanent embargo and will never be published to Digital Collections.**
While original (wet) signatures are preferred, there may be situations as determined by the chair of the committee in which obtaining original signatures is inefficient or has the potential to delay the student's progress. In those situations, the following methods of signing are acceptable:

- signing and faxing the form
- signing, scanning, and emailing the form
- notifying the department in an email from their university's or institution's email account that the committee chair can sign the form on their behalf
- electronically signing the form using the university's licensed signature platform.

If this process results in more than one document with signatures, all documents need to be submitted to The Graduate College together.

No copies are required to be submitted to Alkek Library. However, the library will bind copies submitted that the student wants bound for personal use. Personal copies are not required to be printed on archival quality paper. The student will take the personal copies to Alkek Library and pay the binding fee for personal copies.

Master’s level courses in Engineering Technology: CIM (p. 3), CSM (p. 3), TECH (p. 3)

Courses Offered

Concrete Industry Management (CIM)

CIM 5300. Advanced Concrete Technology.
The course will cover hydraulic cements, aggregates, admixtures, and mix design; concrete production, quality control, early-age properties and durability. Concrete distress examination, identification, prevention, and nondestructive testing; advanced concrete technology, high-strength and high performance concrete. Prerequisite: CIM 2342
3 Credit Hours. 3 Lecture Contact Hours. 2 Lab Contact Hours.
Grade Mode: Standard Letter

CIM 5340. Innovation Strategies for the Concrete Industry.
This course provides students a new set of tools for and experience in finding and developing innovative alternatives for addressing strategic business problems in concrete industry. Students will explore creativity from individual and team perspectives and identify innovation opportunities and roadblocks in organizational settings. Prerequisite: CIM 3340 and CIM 3366 or Instructor’s Approval
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

Construction Science and Management (CSM)

This course introduces students to the legal aspects of design and construction contract documents, including dispute resolution methods and professional ethics commonly used in the construction industry. This course does not earn graduate degree credit
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

This course provides the student with a comprehensive introduction to the principles, techniques, technologies, and basic concepts involving methodologies and strategies used in the preparation of various types of construction estimates and bids. This course does not count as degree credit
3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.
Grade Mode: Standard Letter

This course is a commercial building construction systems class dealing with soils, site work, heavy foundations, steel, reinforced concrete, precast structures and common assemblies. Commercial MEPs are studied along with CSI master format, as-built/shop drawings, schedule of values, AIA documents, and appropriate building codes. Does not count as degree credit
3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.
Course Attribute(s): Leveling
Grade Mode: Leveling/Assistantships

CSM 5313. Building Information Modeling.
This course covers understanding the supervisory role of construction professionals in the design process including, directing a design team in the integration of construction documents for commercial buildings, coordination of site work, structural, architectural, mechanical, electrical, plumbing plans and contemporary CAD software for 2D & 3D design including Building Information Modeling. Prerequisite: CSM 2313 or consent of instructor
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

CSM 5360. Construction Company Financial Control.
Financial accounting and cost controls used at the company level in construction companies are studied. Topics include accounting systems, construction project profit calculations, and financial analysis. Prerequisites: CSM 5302, CSM 5304, and CSM 5306 or Instructor’s Approval
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

The course will introduce students to designer/contractor interactions, including conceptual estimating and scheduling, the RFQ/RFP process and legal, insurance, risk allocation issues, along with procurement and selection. Prerequisites: CSM 5302, CSM 5304, and CSM 5306
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

Technology (TECH)

TECH 5100. Academic Instruction for Technology.
The course is seminar based and covers topics related to teaching and employment responsibilities. Completion of this course is required as a condition of employment for graduate assistants. This course does not earn graduate credit. Repeatable with different emphasis. Graded on a credit (CR), no-credit (F) basis
1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.
Course Attribute(s): Graduate Assistantship|Exclude from Graduate GPA
Grade Mode: Leveling/Assistantships
TECH 5195. Industrial Internship.
This course is a supervised experiential learning course in Technology Management. This work integrated learning course helps the student link theory with practice. Repeatable for credit. Prerequisites: 9 hours completed toward the Master of Science in Technology Management degree and the approval of the graduate advisor
1 Credit Hour. 0 Lecture Contact Hours. 4 Lab Contact Hours.
Course Attribute(s): Exclude from 3-peat Processing
Grade Mode: Credit/No Credit

TECH 5199B. Thesis.
This course represents a student’s continuing thesis enrollments. The student continues to enroll in this course until the thesis is submitted for binding. Graded on credit (CR), progress (PR), no-credit (F) basis
1 Credit Hour. 1 Lecture Contact Hour. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit

TECH 5299B. Thesis.
This course represents a student’s continuing thesis enrollments. The student continues to enroll in this course until the thesis is submitted for binding. Graded on credit (CR), progress (PR), no-credit (F) basis
2 Credit Hours. 2 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Credit/No Credit

TECH 5307. Fundamentals of Manufacturing Processes.
Application of metal cutting principles. Includes steel rule dye layout, machine layout, tool life, tool wear, tool geometry and reconditioning, principles of feed rate and speed, material removal rates and power consumption. Machining of steel and castings using various cutting tools. Does not count toward degree credit. Prerequisite TECH 2330
3 Credit Hours. 1 Lecture Contact Hour. 3 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Credit/No Credit

TECH 5310. Product Design and Development.
This course provides an overview of the new product realization process. The focus is on the steps of systematic product design including problem identification, product planning, conceptual design, and embodiment design. Standard CAD tools are employed for product modeling. Prerequisite: TECH 2310 or instructor’s approval
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

Application of computer hardware and software to the design of products and systems; geometric modeling; engineering computational methods; overview of engineering analysis software which may include finite element analysis, manufacturing simulation, solidification modeling, and rapid prototyping. Prerequisites: TECH 5310 and MATH 2471, or equivalents
3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.
Course Attribute(s): Lab Required
Grade Mode: Standard Letter

TECH 5315. Engineering Economic Analysis.
This course deals with economic analytical techniques used in engineering decision making. Topics include time value of money, comparing alternatives, depreciation, replacement, and income tax considerations. Prerequisite: MATH 1315 or MATH 1319 or consent of instructor
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 5345. Manufacturing Processes in Practice.
In-depth study of cutting tools and their application. Detailed study of cutting tool geometry, cutting tool life and wear, and applications and limitations of cutting tools. Machining of steel and castings using various cutting tools. Includes steel rule dye layout, machine layout, tool life, tool wear, tool geometry and reconditioning, principles of feed rate and speed, material removal rates and power consumption. Does not count toward degree credit. Prerequisite TECH 2330
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 5350. Advanced Facilities Planning.
An in-depth study of technical problems encountered in designing, equipping, arranging, and specifying facility requirements for industrial and technical training facilities. Past, present, and future issues will be studied with selected readings focusing on industrial related problems and issues
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 5351. Industrial Project Management and Scheduling.
Graduate students investigate a special topic by developing a technical problem, researching the topic, and presenting the findings. May be repeated for additional credit with permission of the department chair
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 5352. Research in Technology.
Examine scientific methods including theory formulation, deductive reasoning, hypothesis generation, observation, inductive reasoning, and theory revision. Categories of research are compared and contrasted as regards methodology. In-depth study of experimental research as it relates to significant industrial problems including considerations of design, internal and external validity, and appropriate analytical technique. Introduction to data analysis and its proper interpretation
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

Provides the student with in-depth knowledge of inferential statistics as applied to design of robust processes and products. Topics covered include probability distributions, ANOVA, fractional factorial design, response surface method, orthogonal arrays, and Taguchi method. Prior experience with introductory-level statistics is assumed. Prerequisite: TECH 5394 with a grade C or higher
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 5382. Industrial Ecology and Sustainability Engineering.
This course covers the basic principles of life cycle analysis (LCA) of engineered products and processes. Topics covered include: industrial ecology, resource depletion, product design, process design, material selection, energy efficiency, product delivery, use, and end of life considerations
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 5384. Problems in Technology.
A study of the ethical and moral viewpoints typically associated with American society as related to the development and introduction of new technology and engineering. Past, present, and future issues will be studied with selected readings focusing on industrial related problems and issues
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 5385. Readings in Technology.
Provides the student with in-depth knowledge of inferential statistics as applied to design of robust processes and products. Topics covered include probability distributions, ANOVA, fractional factorial design, response surface method, orthogonal arrays, and Taguchi method. Prior experience with introductory-level statistics is assumed. Prerequisite: TECH 5394 with a grade C or higher
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 5387. Advanced Facilities Planning.
An in-depth study of technical problems encountered in designing, equipping, arranging, and specifying facility requirements for industrial and technical training facilities
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter

TECH 5390. Research in Technology.
Examine scientific methods including theory formulation, deductive reasoning, hypothesis generation, observation, inductive reasoning, and theory revision. Categories of research are compared and contrasted as regards methodology. In-depth study of experimental research as it relates to significant industrial problems including considerations of design, internal and external validity, and appropriate analytical technique. Introduction to data analysis and its proper interpretation
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.
Grade Mode: Standard Letter
TECH 5391. Advanced Manufacturing Systems.  
This course introduces students to various advanced tools, technologies, and strategies in modern manufacturing. An emphasis is placed on the state-of-the-art in factory automation and global manufacturing enterprises. Topics include process automation and control, advanced manufacturing processes, intelligent manufacturing control, and information technology in manufacturing. Prerequisites: TECH 1363 and TECH 5307 or instructor’s approval  
3 Credit Hours. 2 Lecture Contact Hours. 2 Lab Contact Hours.  
Grade Mode: Standard Letter

An introduction to integrated circuit fabrication to include crystal growth, wafer preparation, epitaxial growth, oxidation, diffusion, ionimplantation, thin film deposition, lithography, etching, device and circuit formation, packaging and testing. Significant project includes circuit design/simulation and/or process design. Laboratory component involves actual production/testing of a functional semiconductor device.  
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.  
Grade Mode: Standard Letter

TECH 5394. Design of Industrial Experiments.  
This course deals with the study of the fundamentals and applications of industrial experiments. Prerequisite: TECH 5390  
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.  
Grade Mode: Standard Letter

TECH 5398. Directed Project.  
This course is a formal investigation into a business or industry problem. The directed project is an applied research project that is more extensive than an independent study and less extensive than a thesis. The course culminates in a detailed project report and oral presentation. Prerequisites: TECH 5390 and TECH 5394 and the approval of the graduate advisor  
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.  
Course Attribute(s): Exclude from 3-peat Processing  
Grade Mode: Credit/No Credit

TECH 5399A. Thesis.  
This course represents a student’s initial thesis enrollment. No thesis credit is awarded until student has completed the thesis in Technology 5399B. Graded on a credit (CR), progress (PR), no-credit (F) basis  
3 Credit Hours. 3 Lecture Contact Hours. 0 Lab Contact Hours.  
Grade Mode: Credit/No Credit

TECH 5399B. Thesis.  
This course represents a student’s continuing thesis enrollments. The student continues to enroll in this course until the thesis is submitted for binding. Graded on credit (CR), progress (PR), no-credit (F) basis  
9 Credit Hours. 9 Lecture Contact Hours. 0 Lab Contact Hours.  
Grade Mode: Credit/No Credit

TECH 5599B. Thesis.  
This course represents a student’s continuing thesis enrollments. The student continues to enroll in this course until the thesis is submitted for binding. Graded on credit (CR), progress (PR), no-credit (F) basis  
5 Credit Hours. 5 Lecture Contact Hours. 0 Lab Contact Hours.  
Grade Mode: Credit/No Credit

TECH 5999B. Thesis.  
This course represents a student’s continuing thesis enrollments. The student continues to enroll in this course until the thesis is submitted for binding. Graded on credit (CR), progress (PR), no-credit (F) basis  
9 Credit Hours. 9 Lecture Contact Hours. 0 Lab Contact Hours.  
Grade Mode: Credit/No Credit