UNDERGRADUATE CURRICULUM CHANGE MEMO

Date: February 3, 2020

From: Roger Gonzalez, Chair of Engineering Education and Leadership Department

Through: Louis Everett, Chair of Curriculum Committee, College of Engineering

Through: Norman Love, Associate Dean for Academic Affairs and Undergraduate Studies, College of Engineering

Through: Theresa Maldonado, Dean, College of Engineering

To: Carla Ellis, Chair of University Curriculum Committee

Proposal Title: Proposed Changes to the BS in Engineering Leadership Degree Name and Plan

Explain the nature of the change and the rationale.

The Department of Engineering Education and Leadership (EEL) proposes the following changes to the B.S. in Engineering Leadership degree.

1) Degree Name Change: Given the evolving nature of our new degree since 2014 coupled with the emphasis our degree has on innovation and entrepreneurship with significant input from key stakeholders, we would like to change the degree name by adding "Innovation" to its title. That is, the new degree name to be: Engineering Innovation and Leadership.

2) Adding a Mechanical Engineering Sequence to our existing six sequences. (See changes in Concentrations section of Catalog.)

3) Changing the name of our current Engineering Mechanics Sequence to Civil Engineering Concentration to more clearly reflect its coursework and not confuse it with the Mechanical Engineering Concentration.

4) Changing the naming of the current General Engineering Sequence to Engineering Innovation Sequence.

5) Since CS 1320 is now part of the University Core, all sequences, except the CS sequence, will take it instead of COMM 1302.

6) Two minor pre-req changes, to EL 1405 and EL 2301. (See attached forms.)

7) To become consistent with the COEN descriptors and nomenclature, we will change the naming of our "concentration" to "emphasis" and also "sequence" to "concentration".
The University of Texas at El Paso

Curriculum Change Proposal

Approval Page

Proposal Title: Proposed Changes to the BS in Engineering Leadership
Degree Name and Plan

Department Chair Roger V. Gonzalez
I have read the enclosed proposal and approve this proposal on behalf of the department.

Signature

Feb 3, 2020
Date

College Curriculum Committee Chairperson
I have read the enclosed documents and approve the proposal on behalf of the college curriculum committee.

Signature

Date

College Dean
I have read the enclosed documents and approve the proposal on behalf of the college. I certify that the necessary funds will be allocated by the college in support of this proposal.

Signature

Feb 17, 2020
Date

Graduate Council/Undergraduate Curriculum Committee

Council Action: □ Approved □ Returned to the College

Date of Action Report:

Signature, Chairman

Date
Texas Higher Education Coordinating Board

Existing Degree Program
Title Change Request

Directions: Complete this form to request a change to the title (name) of an existing degree program. The degree program must already be on an institution's program inventory. A degree program title consists of the following two parts:

1) degree designation, such as Bachelor of Science (BS), Master of Arts (MA), or Doctor of Philosophy (PhD); and,
2) name of the discipline, such as History, Mechanical Engineering, or Zoology.

NOTE: This form requires the signature of the Provost or Chief Academic Officer.

Submit the Degree Program Title Change Request via the Online Submission Portal: https://www1.thecb.state.tx.us/apps/proposals/

Information: Contact the Division of Academic Quality and Workforce at 512/427-6200.

Administrative Information

1. Institution: The University of Texas at El Paso

2. Current Degree Program Title – Show how the program appears on the Coordinating Board's approval letter (e.g., Bachelor of Business Administration degree with a major in Accounting):

Bachelor of Science in Engineering Leadership

3. Degree Program CIP Code:
14.0101 06

4. Contact Person: Provide contact information for the person who can answer specific questions about the degree program.

   Name: Roger V. Gonzalez
   Title: Department Chair, Engineering Education & Leadership
   E-mail: rvgonzalez@utep.edu
   Phone: 915-747-5909
Existing Program Degree Title Change
Page 2

Request for Change in Degree Program Designation (e.g., Bachelor of Science (BS), Master of Arts (MA), or Doctor of Philosophy (PhD))

Current Degree Program Designation:

Proposed Degree Program Designation:

Implementation Date (MM/DD/YYYY):

Reason for Change:
Describe why this change would be beneficial to students and/or the degree program.

Request Change in Name of Discipline (e.g., History, Mechanical Engineering, or Zoology)

Current Name: B.S. in Engineering Leadership

Proposed Name: B.S. in Engineering Innovation and Leadership

Implementation Date (09/01/2020):

Reason for Change:
Describe why this change would be beneficial to students and/or the program.

Given the evolving nature of our new degree since 2014, coupled with the emphasis our degree has on innovation and entrepreneurship with significant input from key stakeholders, we would like to change the degree name by adding “Innovation” to its title, as this better describes the nature of our degree.

Signature of Compliance

I hereby certify that all of the above changes have been approved in accordance with the procedures required by my institution, system office, and Board of Regents, as applicable.

______________________________    ____________________
Provost/Chief Academic Officer          Date
Memo

To: Undergraduate Curriculum Committee

From: Dr. Carlos Ferregut, Chair
Department of Civil Engineering

Date: February 10, 2020

Subject: CE Concentration in the BS Engineering Leadership Degree

This memo is to indicate my support in renaming the current “Engineering Mechanics” Concentration to “Civil Engineering” (CE) Concentration. With the new addition of a Mechanical Engineering (ME) Concentration to the E-Lead program this name change will assist in reducing confusion between the CE and ME concentrations.
To: Undergraduate Curriculum Committee

From: Dr. Jack Chessa, Chair Department of Mechanical Engineering

Date: February 10, 2020

Subject: ME Concentration in the BS Engineering Leadership Degree

This memo is to indicate the support of the Mechanical Engineering Department in adding a Mechanical Engineering (ME) Concentration to the B.S Degree in Engineering Leadership in the upcoming 2020 academic catalog. We believe that this concentration has been constructed in such a manner that it sufficiently justifies this title and support its adoption. The ME Concentration has been developed in collaboration between our two respective Chairs and Undergraduate Program Advisors and has the approval of the faculty of the Mechanical Engineering Department.

Sincerely,

Jack Chessa
Department Chair
Department of Mechanical Engineering
jfchessa@utep.edu
(915) 747-6900

Cc: Ms. Myra Rodarte
B.S. in Engineering Innovation and Leadership Engineering Leadership

The B.S. in Engineering Innovation and Leadership Engineering Leadership program (BSEIL) offers a rigorous and flexible major in Engineering with an in-depth study of leadership and its effect upon engineering and society. The program includes tracks in Business, Education, and Technical Specialization sequences concentrations in UTEP engineering fields. Each track contains 12-hour core competencies. The Engineering Innovation and Engineering Leadership program and its associated tracks sequences concentrations meet the curricular accreditation requirements of the Engineering Accreditation Commission of ABET using the criteria for General Engineering.

"We live in a technological age, and if our society is to flourish, many of our leaders should be engineers, and many of our engineers should be leaders" — Samuel Florman, The Interactive Engineer, 1997

Program Educational Objectives

Graduates of this program will

1. Value the role of engineering and leadership for the betterment of community and society.

Elaboration: Our graduates will value and will demonstrate their ability to recognize leadership opportunities and to take initiative for beneficial change. They will understand the broader impacts, social, economic, and ethical implications of their endeavors both inside and outside of engineering, and they will be cognizant of their professional, civic, and societal responsibilities.

2. Inventively cultivate success in their field by demonstrating technical competence and problem solving skills, which will foster success in a variety of postgraduate environments, including professional practice and graduate school.

Elaboration: Our graduates will have a solid grounding in fundamental principles of engineering, mathematics, and science, and they will apply this knowledge to a variety of systems inside and outside of engineering. They will be able to
develop inventive solutions that are responsive to technical, social, economic, and cultural considerations and constraints among others.

3. Possess attributes for assuming increasing levels of professional responsibility [within and beyond engineering].

Elaboration: In accelerating their ability to innovate and lead, our graduates will develop their character, competency, and capacity. They will also develop a deep understanding of engineering, mathematics, science, business, and entrepreneurship. They will build on this foundation by engaging in independent and team learning to identify and respond to emerging technical and societal developments.

**Admission Requirements**

New and returning students can declare their intention to work toward an Engineering Leadership degree if they meet UTEP’s admission requirements. Students will not be admitted into the Engineering Leadership program until they are pre-calculus-ready (can register for MATH 15081414105 or higher). Each semester, students admitted into the BSEIL program must complete their major’s technical courses and their general education courses by preparing a plan of study and, when this is completed, meeting with a BSEIL advisor for approval of their courses.

**Engineering Sequence Concentration Selection:**

Students will select a particular engineering sequence concentration or a specialized combination of discipline specific courses. Students can choose from the following engineering sequences:

- General Engineering
- Biomedical Engineering
- Electrical Engineering
- Civil Engineering
- Mechanical Engineering, or
- Metallurgical and Materials Engineering, or
- Computer Science
Students who choose these tracks will likely proceed into either conventional engineering employment or into graduate school to obtain an M.S. or a Ph.D. in Engineering.

## Joint-Degree BS-MBA Program

Students with at least 90 hours accumulated toward their BS in Engineering degree, a cumulative GPA of at least 3.30, and admission to the full-time MBA program can pursue a joint-degree BS-MBA program. Students admitted to this program (a) will apply credit for ECON 5360 Global Econ Environment-Mgrs, SLAW 5306 Business Law and Ethics, and ACCT 5301 Financial Accounting toward the requirements of three track electives in Engineering Leadership and (b) will apply graduate credit for (a) EL 4395 CD I: Definition & Exploration, (b) EL 4396 CD II: Develop & Evaluation, and (c) ENGR 4320 toward the elective requirements of the MBA program.

## Degree Plan

Required Credits: 125 University

**Core Curriculum (45 er hrs)**
- Complete the University Core Curriculum requirements.
- Designated Core
- CE 2326 Econ for Engrs & Scientists 3
CS 1320 Computer Programming for Sci/Engr (3)
COMM 1302 Business/Professional Comm (C) 3

3

COMM 1302 Business/Professional Comm (C) 3
MATH 1411 Calculus I 4
PHIL 2308 Ethics (C) 3
PHYS 2420 Introductory Mechanics 4
PHYS 2421 Introductory Electromagnetism 4
UNIV 1301 Seminar/Critical Inquiry (C) 3
Foundation Math/Sci (15 cr hrs)
CHEM 1305 General Chemistry 3

MATH 1312 Calculus II 3
MATH 2313 Calculus III 3
(MATH 2300 Discrete Math)
MATH 2326 Differential Equations 3
MATH 3323 Matrix Algebra 3
(ESC Sequence Concentration take MATH 2300 Discrete Math)

Engineering Innovation and Leadership Coursework (28 cr hrs)
All EL courses must be completed with a grade of "C" or better
EL 3003 Professional Practice I 0
EL 3005 Professional Practice II 0
EL 1302 Intro to Eng Design & Leadership 3
EL 1405 Fund of Eng Lead and Graphics 4
EL 2301 Modeling and Simulation 3
EL 3302 Engineering Measurements 3
EL 3331 Engr Design: People to Products 3
EL 3332 Engr Entrepreneurship: Products to People 3
EL 3373* Eng Prob. & Statistical Models 3
EL 4395 Capstone Design I: Definition & Exploration 3
EL 4396 Capstone Design II: Develop & Evaluation 3

* May substitute IE 3373 or EE 3384

Emphasis Concentration Courses (12 cr hrs)
In the Concentration sequences below, a student must take twelve (12) credit hours of Emphasis concentration courses approved by the Department. These courses must constitute an approved plan of study and can be inside or outside of engineering.
Exceptions include those students taking the CS or BME Concentration Sequence (see required Emphasis concentration courses for CS or BME Concentration Sequence)
Emphasis courses for Engineering Innovation Concentration may include: EL 3320, EL 3330, EL 4330, EL 4332, EL 4331, EL 4334, and EL 4393, or other courses approved by the Department.

**Sequences Concentrations**
Choose one of the following seven sequences Concentrations:

**Engineering Innovation General Engineering Sequence Concentration**
(25 cr hrs)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering Innovation General Engineering</td>
<td></td>
</tr>
<tr>
<td>Sequence Concentration Courses</td>
<td></td>
</tr>
<tr>
<td>Upper Division Engineering / Technical Electives</td>
<td></td>
</tr>
<tr>
<td>9 cr hrs approved by the Department advisor</td>
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</table>

**Additional Required Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>CE 2377 or IE 2377 or ME 2342 Electro Mechanical Systems</td>
<td>3</td>
</tr>
<tr>
<td>CE 2338 Mechanics II (Dynamics) or ME 2340 Mechanics II - Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>MECH 2311 Intro to Thermal-fluid Sci</td>
<td>3</td>
</tr>
<tr>
<td>MME 2303 Intro to Materials Sci &amp; Engrg</td>
<td>3</td>
</tr>
<tr>
<td>MME 2434 Mechanics of Materials</td>
<td>4</td>
</tr>
</tbody>
</table>

Total Hours 125

**Biomedical Engineering Sequence Concentration** (37 cr hrs)

Biomedical Engineering Sequence Concentration Courses (required Emphasis concentration courses in this Sequence Concentration)

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 1305 General Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 1107 and Topics in Study of Life I</td>
<td>1</td>
</tr>
<tr>
<td>BIOL 2313 Human Anat/Physiology II (C)</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 2113 and Human Anat/Physio Lab II (C)</td>
<td>1</td>
</tr>
<tr>
<td>OR BIOL 2311 Human Anat/Physiology I (C)</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 2111 and Human Anat/Physio Lab I</td>
<td>1</td>
</tr>
</tbody>
</table>

4 cr hrs approved by the Department

**Additional Required Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 2377 or IE 2377 or ME 2342 Electro Mechanical Systems</td>
<td>3</td>
</tr>
<tr>
<td>CE 2338 Mechanics II (Dynamics) or ME 2340 Mechanics II - Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>MECH 2311 Intro to Thermal-fluid Sci</td>
<td>3</td>
</tr>
<tr>
<td>MME 2303 Intro to Materials Sci &amp; Engrg</td>
<td>3</td>
</tr>
</tbody>
</table>
MME 2434 Mechanics of Materials

Upper Division Engineering Technical Electives
BME 3303 Fundamentals of BME I
BME 3305 Fundamentals of BME II
Upper Division Course from list approved for BME Minor

Total Hours 125

Computer Science Sequence Concentration (37 cr hrs)
Computer Science Sequence Concentration Courses (required Emphasis/concentration courses in this Sequence Concentration)
CS 1301 Intro to Computer Science
CS 1302 Data Structures
CS 2401 Elem. Data Struct./Algorithms
EL 4137 Eng Ed and Lead/Problems

9 cr hrs from the following courses or as approved by the Department advisor
CS 3320, CS 3331, CS 3350, CS 3360, CS 3370, CS 3432, CS 4310, CS 4311,
CS 4316, CS 4317, CS 4320, CS 4330, CS 4339, CS 4342, CS 4351, CS 4352,
CS 4364, CS 4365, CS 4371, CS 4373, CS 4374, CS 4375, CS 4376, CS 4377,
CS 4379, CS 4387, CS 4390, CS 4392

Additional Required Courses
CE 2377 or IE 2377 or ME 2342 Electro Mechanical Systems

Note required Math Course for CS Sequence Concentration (see Foundation Math/Sci above)
### Electrical Engineering Sequence Concentration (25 cr hrs)

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>Electrical Engineering Sequence Concentration Courses</td>
<td></td>
</tr>
<tr>
<td>CS-1320 Computer Programming Sci/Engr 3</td>
<td></td>
</tr>
<tr>
<td>EE 2369 Digital Systems Design I</td>
<td>3</td>
</tr>
<tr>
<td>EE 2168 Laboratory for EE 2369</td>
<td>1</td>
</tr>
<tr>
<td>EE 2350 Electric Circuits I</td>
<td>3</td>
</tr>
<tr>
<td>EE 2351 Electric Circuits II</td>
<td>3</td>
</tr>
<tr>
<td>EE 2372 Software Design I</td>
<td>3</td>
</tr>
<tr>
<td>EE 3321-2352 Continuous Time Signals &amp; Systems, Electromagnetic Field Theory</td>
<td>3</td>
</tr>
<tr>
<td>EE 2372 Software Design I</td>
<td>3</td>
</tr>
</tbody>
</table>

#### Upper Division Engineering / Technical Electives:
- 9 cr hrs approved by the Department advisor
- 9 EE 33xx or EE 43xx Upper Division Elective 3

*Students seeking the Academic Minor in EE must take 8 credit hours from the list (EE 3321, EE 3329, EE 3338 & EE 3138, EE 3340, EE 3376 & EE 3176, EE 3384, EE 3353)*

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 33xx or EE 43xx Upper Division Elective 3</td>
<td></td>
</tr>
</tbody>
</table>

Total Hours 125

### Civil Engineering Mechanics Sequence Concentration (25 cr hrs)

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
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</thead>
<tbody>
<tr>
<td>Civil Engineering Mechanics Sequence Concentration Courses</td>
<td></td>
</tr>
<tr>
<td>Upper Division Civil Engineering / Technical Electives</td>
<td></td>
</tr>
<tr>
<td>6 cr hrs of CE courses approved by the EEU Department</td>
<td>6</td>
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</tbody>
</table>

#### Additional Required Courses
- CE 1301 Civil Engineering Fundamentals 3
- CE 2315 Statics 3
- CE 2334 Mechanics of Materials 3
CE 2375 Introduction to Thermal-Fluid ScienceMechanics
3
CE 2343 Structural Analysis or ME 2377 or IE 2377 or ME
3
2342 Electro-Mechanical Systems
3
OR CE 3336 Civil Engineering Materials
3
OR CE 2385 Environmental Engr Fundamental
3
CE 2338 Mechanics II (Dynamics) or ME 2340 Mechanics II - Dynamics
3
EL 4171 Eng Ed and Lead Problems
1

Total Hours 125

Mechanical Engineering Concentration (25 cr hrs)
Mechanical Concentration Required Courses (13 SCH)
MECH 1321 - Mechanics I - Statics
3
MECH 2311 - Intro to Thermal-Fluid Sci
3
MECH 2322 - Mechanics of Materials
3
MECH 2103 - Engineering Computations
1
MECH 2340 - Mechanics II - Dynamics
3

Upper Division Engineering Technical Electives (9 SCH)
MECH 3312 - Thermodynamics
3
MECH 3314 - Fluid Mechanics
3
MECH 4315 - Heat Transfer
3

Mechanical Concentration Elective (choose one) (3 SCH)
MECH 3345 System Dynamics
3
MECH 3324 Mechanical Design
3
AERO 3312 Aerodynamics I
3
AERO 3343 System Modelling and Control
3
AERO 3323 Aerospace Structures I
3
EL 4393 Special Topics in Engineering Leadership
3

Total Hours 125

Metallurgical and Materials Engineering Sequence Concentration (25 cr hrs)
Metallurgical and Materials Engineering Sequence Concentration Courses
Upper Division Metallurgical and Materials Civil Engineering / Technical Electives

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 cr hrs of MME courses approved by the EEL Department</td>
<td></td>
</tr>
<tr>
<td>MME 2305 Material &amp; Energy Balance</td>
<td>3</td>
</tr>
<tr>
<td>Additional Required Courses</td>
<td>3</td>
</tr>
<tr>
<td>CE 2377 or IE 2377 or ME 2342 Electro Mechanical Systems</td>
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<tr>
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</tr>
<tr>
<td>MME 4316 Failure Analysis</td>
<td>3</td>
</tr>
<tr>
<td>MME 3309 Electronic Mat Sci &amp; Tech</td>
<td>3</td>
</tr>
<tr>
<td>MME 3312 Biomat. Biomat Printng &amp; Dev</td>
<td>3</td>
</tr>
<tr>
<td>Total Hours</td>
<td>125</td>
</tr>
</tbody>
</table>

The standard University Core Curriculum info follows here.

Ertes, Maxwell, Rainey and Tanik

During follow-up discussions, Kornetzky advanced the word *format*—exploratory to define the notion of the integrated use of the tools, techniques, and methods from various disciplines.
B.S. in Engineering Innovation and Leadership

The B.S. in Engineering Innovation and Leadership program (BSEIL) offers a rigorous and flexible major in Engineering with in-depth study of leadership and its effect upon engineering and society. The program includes concentrations in UTEP engineering fields. The Engineering Innovation and Leadership program and its associated concentrations meet the curricular accreditation requirements of the Engineering Accreditation Commission of ABET using the criteria for General Engineering.

"We live in a technological age, and if our society is to flourish, many of our leaders should be engineers, and many of our engineers should be leaders" — Samuel Florman, The Interactive Engineer, 1997

Program Educational Objectives

Graduates of this program will

1. Value the role of engineering and leadership for the betterment of community and society.

Elaboration: Our graduates will value and will demonstrate ability to recognize leadership opportunities and to take initiative for beneficial change. They will understand the broader impacts of their endeavors both inside and outside of engineering, be they social, economic, environmental, or ethical. They will be cognizant of their professional, civic, and societal responsibilities.

2. Inventively cultivate success in their field by demonstrating technical competence and problem solving skills, which will foster success in a variety of postgraduate environments, including professional practice and graduate school.

Elaboration: Our graduates will have a solid grounding in fundamental principles of engineering, mathematics, and science, and they will apply this knowledge to a variety of systems inside and outside of engineering. They will be able to develop inventive solutions that are responsive to technical, social, economic, and cultural considerations and constraints among others.

3. Possess attributes for assuming increasing levels of professional responsibility within and beyond engineering.
Elaboration: In accelerating their ability to innovate and lead, our graduates will develop their character, competence, and capacity. They will also develop a deep understanding of engineering, mathematics, science, business, and entrepreneurship. They will build on this foundation by engaging in independent and team learning to identify and to respond to emerging technical and societal developments.

Admission Requirements

Students admitted into the program begin to take Engineering Innovation and Leadership courses when they are pre-calculus-ready (can register for MATH 1508 or higher). Each semester, students admitted into the BSEIL program must prepare for their ensuing registration by preparing a plan of study and, when this is completed, meeting with a BSEIL advisor for approval of their courses.

Engineering Concentration Selection:

Students will select a particular engineering Concentration or a specialized combination of discipline specific courses. Students can choose from the following engineering Concentrations:

- Engineering Innovation
- Biomedical Engineering
- Civil Engineering,
- Computer Science
- Electrical Engineering
- Mechanical Engineering, or
- Metallurgical and Materials Engineering.

Students who choose these tracks will likely proceed into either conventional engineering employment or into graduate school to obtain an M.S. or a Ph.D. in Engineering.

Fast-Track Combined BSEIL/Masters Programs in Engineering

Students with at least 90 hours accumulated toward their BSEIL degree and a cumulative GPA of at least 3.30 may be eligible for admission into the fast-track BSEIL/Masters Program. Students admitted to this program take graduate classes that count both toward graduate degree requirements and undergraduate degree requirements, for up to 15 credit hours of graduate courses in the student’s EIL concentration per approval of the undergraduate and graduate advisors. Eligible courses graduate courses come from a list approved for fast-track by the EEL Faculty. Students must earn a B or better in
the graduate course to count as graduate credit toward the graduate degree. If the grade is a C, it will not count towards the graduate degree but will still count towards the undergraduate degree.

**Joint – Degree BS–MBA Program**

Students with at least 90 hours accumulated toward their BSEIL degree, a cumulative GPA of at least 3.30, and admission to the full-time MBA program can pursue a joint-degree BS-MBA program. Students admitted to this program (a) will apply credit for ECON 5360 Global Econ Environment-Mgrs, BLAW 5306 Business Law and Ethics, and ACCT 5301 Financial Accounting toward the requirements of three track electives in Engineering Leadership and (b) will apply graduate credit for (a) EL 4395 CD I: Definition & Exploration, (b) EL 4396 CD II: Develop & Evaluation, and (c) ENGR 4320 toward the elective requirements of the MBA program.

**Degree Plan** Required Credits: 125

**University Core Curriculum** (45 cr hrs)

*Complete the University Core Curriculum requirements.*

**Designated Core**

- **CE 2326** Econ for Engrs & Scientists 3

- **CS 1320** Computer Programming for Sci/Engr (Exception CS Concentration take COMM 1302 Business/Professional Comm (C) 3.) 3

- **MATH 1411** Calculus I 4
- **PHIL 2306** Ethics (C) 3
- **PHYS 2420** Introductory Mechanics 4
- **PHYS 2421** Introductory Electromagnetism 4
- **UNIV 1301** Seminar/Critical Inquiry (C) 3

**Foundation Math/Sci** (15 cr hrs)

- **CHEM 1305** General Chemistry 3
- **MATH 1312** Calculus II 3
- **MATH 2313** Calculus III (CS Concentration take MATH 2300 Discrete Math) 3
**MATH 2326** Differential Equations  
**MATH 3323** Matrix Algebra 3 (Exception BME Concentration take Upper Division BIOL, CHEM, or CBCH course from list approved for BME Minor)

**Engineering Innovation and Leadership Coursework** (28 cr hrs)
All EL courses must be completed with a grade of “C” or better

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL 3003</td>
<td>Professional Practice I</td>
<td>0</td>
</tr>
<tr>
<td>EL 3005</td>
<td>Professional Practice II</td>
<td>0</td>
</tr>
<tr>
<td>EL 1302</td>
<td>Intro to Eng Design &amp; Leadshp</td>
<td>3</td>
</tr>
<tr>
<td>EL 1405</td>
<td>Fund of Engr Lead and Graphics</td>
<td>4</td>
</tr>
<tr>
<td>EL 2301</td>
<td>Modeling and Simulation</td>
<td>3</td>
</tr>
<tr>
<td>EL 3302</td>
<td>Engineering Measurements</td>
<td>3</td>
</tr>
<tr>
<td>EL 3331</td>
<td>Engr Design: People to Products</td>
<td>3</td>
</tr>
<tr>
<td>EL 3332</td>
<td>Engr Entrepreneurship: Products to People</td>
<td>3</td>
</tr>
<tr>
<td>EL 3373*</td>
<td>Eng Prob. &amp; Statistical Models</td>
<td>3</td>
</tr>
<tr>
<td>EL 4395</td>
<td>Capstone Design I: Definition &amp; Exploration</td>
<td>3</td>
</tr>
<tr>
<td>EL 4396</td>
<td>Capstone Design II: Develop &amp; Evaluation</td>
<td>3</td>
</tr>
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</table>

* May substitute IE 3373 or EE 3384

**Emphasis Courses** (12 cr hrs)
In the Concentrations below, a student must take twelve (12) credit hours of Emphasis courses approved by the Department. These courses must constitute an approved plan of study and can be inside or outside of engineering. Exceptions include those students taking the CS or BME Concentration (see required Emphasis courses for CS or BME Concentration below). Emphasis courses for Engineering Innovation Concentration may include: EL 3320, EL 3330, EL 4330, EL 4332, EL 4331, EL 4334, and EL 4393, or other courses approved by the Department.

**Concentrations**
Choose one of the following seven Concentrations:

**Engineering Innovation Concentration** (25 cr hrs)
Engineering Innovation Concentration Courses  
Upper Division Engineering / Technical Electives  
9 cr hrs approved by the Department  

**Additional Required Courses**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 2377 or IE 2377 or ME 2342</td>
<td>Electro Mechanical Systems</td>
<td>3</td>
</tr>
<tr>
<td>CE 2338</td>
<td>Mechanics II (Dynamics) or ME 2340 Mechanics II - Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>MECH 2311</td>
<td>Intro to Thermal-fluid Sci</td>
<td>3</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Name</td>
<td>Credits</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>MME 2303</td>
<td>Intro to Materials Sci &amp; Engrg</td>
<td>3</td>
</tr>
<tr>
<td>MME 2434</td>
<td>Mechanics of Materials</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td><strong>Total Hours 125</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Biomedical Engineering Concentration (37 cr hrs)**

Biomedical Engineering Concentration Courses (required Emphasis courses in this Concentration)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 1305</td>
<td>General Biology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 1107</td>
<td>and Topics in Study of Life I</td>
<td>1</td>
</tr>
<tr>
<td>BIOL 2313</td>
<td>Human Anat/Physiology II (C)</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 2113</td>
<td>and Human Anat/Physio Lab II (C)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>OR BIOL 2311 Human Anat/Physiology I (C)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>BIOL 2111 and Human Anat/Physio Lab I</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><strong>4 cr hrs approved by the Department</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Additional Required Courses</strong></td>
<td></td>
</tr>
<tr>
<td>CE 2377</td>
<td>or IE 2377 or ME 2342 Electro Mechanical Systems</td>
<td>3</td>
</tr>
<tr>
<td>CE 2338</td>
<td>Mechanics II (Dynamics) or ME 2340 Mechanics II - Dynamics</td>
<td>3</td>
</tr>
<tr>
<td>MECH 2311</td>
<td>Intro to Thermal-fluid Sci</td>
<td>3</td>
</tr>
<tr>
<td>MME 2303</td>
<td>Intro to Materials Sci &amp; Engrg</td>
<td>3</td>
</tr>
<tr>
<td>MME 2434</td>
<td>Mechanics of Materials</td>
<td>4</td>
</tr>
</tbody>
</table>

**Upper Division Engineering Technical Electives**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BME 3303</td>
<td>Fundamentals of BME I</td>
<td>3</td>
</tr>
<tr>
<td>BME 3305</td>
<td>Fundamentals of BME II</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Upper Division Course from list approved for BME Minor</strong></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total Hours 125</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Computer Science Concentration (37 cr hrs)**

Computer Science Concentration Courses (required Emphasis courses in this Concentration)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 1301</td>
<td>Intro to Computer Science</td>
<td>3</td>
</tr>
<tr>
<td>CS 1101</td>
<td>Intro to Computer Science Lab</td>
<td>1</td>
</tr>
<tr>
<td>CS 2302</td>
<td>Data Structures</td>
<td>3</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Name</td>
<td>Credits</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>CS 2401</td>
<td>Elem. Data Struct./Algorithms</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td><strong>Upper Division Engineering / Technical Electives</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9 cr hrs from the following courses or as approved by the Department</td>
<td>9</td>
</tr>
<tr>
<td>CS 3320, CS 3331, CS 3350, CS 3360, CS 3370, CS 3432, CS 4310, CS 4311, CS 4316, CS 4317, CS 4320, CS 4330, CS 4339, CS 4342, CS 4351, CS 4352, CS 4364, CS 4365, CS 4371, CS 4373, CS 4374, CS 4375, CS 4376, CS 4377, CS 4379, CS 4387, CS 4390, CS 4392</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Additional Required Courses</strong></td>
<td></td>
</tr>
<tr>
<td>CE 2377 or IE 2377 or ME 2342</td>
<td>Electro Mechanical Systems</td>
<td>3</td>
</tr>
<tr>
<td>EE 2369</td>
<td>Digital Systems Design I</td>
<td>3</td>
</tr>
<tr>
<td>EE 2169</td>
<td>Laboratory for Digital Systems Design I</td>
<td>1</td>
</tr>
<tr>
<td>MECH 2311</td>
<td>Intro to Thermal-fluid Sci</td>
<td>3</td>
</tr>
<tr>
<td>MME 2303</td>
<td>Intro to Materials Sci &amp; Engrg</td>
<td>3</td>
</tr>
<tr>
<td>MME 2434</td>
<td>Mechanics of Materials</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Note required Math Course for CS Concentration (see Foundation Math/Sci above)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total Hours 125</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Electrical Engineering Concentration** (25 cr hrs)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 2369</td>
<td>Digital Systems Design I</td>
<td>3</td>
</tr>
<tr>
<td>EE 2169</td>
<td>Laboratory for EE 2369</td>
<td>1</td>
</tr>
<tr>
<td>EE 2350</td>
<td>Electric Circuits I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Electric Circuits II</td>
<td>3</td>
</tr>
<tr>
<td>EE 2352</td>
<td>Continuous Time Signals &amp; Systems</td>
<td>3</td>
</tr>
<tr>
<td>EE 2372</td>
<td>Software Design I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Upper Division Engineering / Technical Electives:</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9 cr hrs approved by the Department</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Students must take 6 credit hours from the list (EE 3321, EE 3329, EE 3338 &amp; EE 3138, EE 3340, EE 3376 &amp; EE 3176, EE 3384, EE 3353)</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total Hours 125</strong></td>
<td></td>
</tr>
</tbody>
</table>
Civil Engineering Concentration (25 cr hrs)

Civil Engineering Concentration Courses
Upper Division Civil Engineering Elective
6 cr hrs of CE courses approved by the Department 6

Additional Required Courses
CE 1301 Civil Engineering Fundamentals 3
CE 2315 Statics 3
CE 2334 Mechanics of Materials 3
CE 2375 Introduction to Fluid Mechanics 3
CE 2343 Structural Analysis 3
  OR CE 3336 Civil Engineering Materials 3
  OR CE 2385 Environmental Engr Fundamental 3
CE 2338 Mechanics II (Dynamics) or ME 2340 Mechanics II - Dynamics 3
EL 4171 Eng Ed and Lead Problems 1

Total Hours 125

Mechanical Engineering Concentration (25 cr hrs)

Mechanical Concentration Required Courses (13 SCH)
MECH 1321 – Mechanics I – Statics 3
MECH 2311 – Intro to Thermal-Fluid Sci 3
MECH 2322 – Mechanics of Materials 3
MECH 2103 – Engineering Computations 1
MECH 2340 – Mechanics II – Dynamics 3

Upper Division Engineering Technical Electives (9 SCH)
MECH 3312 – Thermodynamics 3
MECH 3314 – Fluid Mechanics 3
MECH 4315 – Heat Transfer 3

Mechanical Concentration Elective (choose one) (3 SCH)
MECH 3345 System Dynamics 3
MECH 3334 Mechanical Design 3
AERO 3312 Aerodynamics I 3
AERO 3343 System Modelling and Control 3
AERO 3323 Aerospace Structures I 3
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EL 4393 Special Topics in Engineering Leadership</td>
<td>3</td>
</tr>
<tr>
<td>Total Hours</td>
<td>125</td>
</tr>
</tbody>
</table>

**Metallurgical and Materials Engineering Concentration** (25 cr hrs)

Metallurgical and Materials Engineering Concentration Courses

Upper Division Metallurgical and Materials / Technical Electives

12 cr hrs of MME courses approved by the Department  
12

Additional Required Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 2377 or IE 2377 or ME 2342 Electro Mechanical Systems</td>
<td>3</td>
</tr>
<tr>
<td>MME 2303 Intro to Materials Sci &amp; Engrg</td>
<td>3</td>
</tr>
<tr>
<td>MME 2434 Mechanics of Materials</td>
<td>4</td>
</tr>
<tr>
<td>MME 4316 Failure Analysis</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Hours 125

The standard University Core Curriculum info follows here.

://www.arj.no/2012/03/12/disciplinaritles-2/
Granda, Virginia D

From: Ferregut, Carlos
Sent: Monday, February 10, 2020 12:14 PM
To: Gonzalez, Roger V
Cc: Carrasco, Cesar J.
Subject: RE: CE support of Name Change from Mechanics to Civil

Roger,

As per our conversation this morning I will go ahead and write the letter agreeing on the name change of the E-lead sequence from Engineering Mechanics to Civil Engineering with the understanding that you will go ahead and submit the following changes to the current sequence in the next cycle of curriculum revisions:

Delete: CE 2377 Electro Mechanical Systems
Add: CE 2343 or CE 3336 or CE 2385

Change the Upper Division Civil Engineering/Technical Elective title to Upper Division Civil Engineering Elective

This changes will align the E-lead Civil Engineering sequence to the Minor in Civil Engineering sequence.

Regards

cf

From: Gonzalez, Roger V <rvgonzalez@utep.edu>
Sent: Sunday, February 9, 2020 4:28 PM
To: Ferregut, Carlos <ferregut@utep.edu>
Cc: Carrasco, Cesar J. <ccarras@utep.edu>
Subject: Re: CE support of Name Change from Mechanics to Civil

Hi Carlos and Cesar:

The Civil sequence (which we are remaining all sequences to concentrations to be in line with UTEP nomenclature) has not changed. It is exactly as it is in the current catalog. Here is the link. And screenshot below.
# Engineering Mechanics Sequence

**Engineering Mechanics Sequence Required Courses**

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 1301</td>
<td>Civil Engineering Fundamentals</td>
</tr>
<tr>
<td>CE 2315</td>
<td>Statics</td>
</tr>
<tr>
<td>CE 2334</td>
<td>Mechanics of Materials</td>
</tr>
<tr>
<td>CE 2338</td>
<td>Mechanics II (Dynamics)</td>
</tr>
<tr>
<td>CE 2375</td>
<td>Intro to Fluid Mechanics</td>
</tr>
<tr>
<td>CE 2377</td>
<td>Electro Mechanical Systems</td>
</tr>
<tr>
<td></td>
<td>or IE 2377 or MECH 2342</td>
</tr>
<tr>
<td>EL 4171</td>
<td>Eng Ed and Lead Problems</td>
</tr>
</tbody>
</table>

Thx, RVG

---

**Roger V. Gonzalez, PhD, PE, FASME, F AIMBE**  
Chair and Professor  
Engineering Education and Leadership  
The University of Texas at El Paso  
500 W. University Ave.; El Paso, TX 79968  
Email: rvgonzalez@utep.edu  
Office: 915-747-5909  
eel.utep.edu  

---

**From:** "Ferregut, Carlos" <ferregut@utep.edu>  
**Date:** Sunday, February 9, 2020 at 4:06 PM  
**To:** Roger Gonzalez <rvgonzalez@utep.edu>  
**Cc:** "Carrasco, Cesar J." <ccarras@utep.edu>  
**Subject:** RE: CE support of Name Change from Mechanics to Civil

Hi Roger,

I would be glad to support the name change but we are going to have to review the sequence before I signed the letter. I was thinking that you could specify the tree minors we have in the department as the sequences your students could
follow. We no longer offer electromechanical systems and it is no longer part of our curriculum. Kelvin Cheu also had some questions regarding the approval of upper division courses. Let’s talk.

cf

From: Gonzalez, Roger V <rgonzalez@utep.edu>
Sent: Saturday, February 8, 2020 4:17 PM
To: Ferregut, Carlos <ferregut@utep.edu>
Subject: CE support of Name Change from Mechanics to Civil

Hi Carlos:

The UGCC approved the E-Lead changes for the 2020 catalog. They asked for a memo indicating your support of this name change. I have taken the liberty to draft the memo for you (see attached). Feel free to edit as needed.

Could you sign when done and email it back or I can have it picked up at your office?

Thanks Carlos. Let me know if questions.
COURSE CHANGE FORM

All fields below are required

College : Engineering    Department : Engineering Education & Leadership

Rationale for changing the course:
Change from prerequisite to corequisite: MATH 1411 no longer a prerequisite. MATH 1508 Precalculus OR MATH 1310 Trigonometry and Conics [Second semester of Precal] being a corequisite.

All fields below are required

Subject Prefix and number EL 1405

Course Title Fund of Engr Lead and Graphics

<table>
<thead>
<tr>
<th>Change</th>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex. Prerequisite</td>
<td>Ex. POLS 2310</td>
<td>Ex. POLS 2312</td>
</tr>
<tr>
<td>Prerequisite</td>
<td>MATH 1411</td>
<td>N/A</td>
</tr>
<tr>
<td>Corequisite</td>
<td>N/A</td>
<td>MATH 1411 OR MATH 1508 OR MATH 1310</td>
</tr>
<tr>
<td>Description</td>
<td>This course equips students with fundamental skills to help thrive during pursuit of their BS in Engineering Innovation and Leadership. Therefore, a major focus of the course is to help students develop their own identity as leaders and as engineers. Another focus of the course is to build community and culture within the E-Lead Program. Further, this course introduces students to the flipped classroom and project based learning styles common in E-Lead courses. The final focus of this course is the development of critical engineering graphics skills for students.</td>
<td>This course equips students with fundamental skills to help thrive during pursuit of their BS in Engineering Innovation and Leadership. Therefore, a major focus of the course is to help students develop their own identity as leaders and as engineers. Another focus of the course is to build community and culture within the Program. Further, this course introduces students to the flipped classroom and project based learning styles common in EL courses. The final focus of this course is the development of critical engineering graphics skills for students.</td>
</tr>
</tbody>
</table>
COURSE CHANGE FORM

All fields below are required

College: Engineering  Department: Engineering Education & Leadership

Rationale for changing the course:
Change of prerequisite and addition of prerequisite. MATH 1312 changed to MATH 1411. Add CS 1320 prerequisite, exception: CS Concentration must take CS 1301.

All fields below are required

Subject Prefix and number EL 2301

Course Title Modeling and Simulation

<table>
<thead>
<tr>
<th>Change</th>
<th>From</th>
<th>To</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ex. Prerequisite</td>
<td>Ex. POLS 2310</td>
<td>Ex. POLS 2312</td>
</tr>
<tr>
<td>Prerequisite</td>
<td>EL 1302 w/C or better</td>
<td>EL 1302 w/C or better</td>
</tr>
<tr>
<td>Prerequisite</td>
<td>MATH 1312 w/C or better</td>
<td>MATH 1411 w/C or better</td>
</tr>
<tr>
<td>Prerequisite</td>
<td>N/A</td>
<td>CS 1320 w/C or better, except CS Concentration (requires CS 1301 w/C or better)</td>
</tr>
</tbody>
</table>

Description
This course introduces the use of difference and differential equations in the modeling of systems with examples drawn from the life and natural sciences, engineering, and business. Computer simulations are developed using programming Matlab. Topics also include leadership theories and practices.

Prerequisite