THE UNIVERSITY OF TEXAS AT EL PASO

Department of Engineering
Education and Leadership

*MEMORANDUM*

**DATE**: Friday, October 7, 2020

**TO**: Art Duval, Chair of University Curriculum Committee

**THROUGH:** Louis Everett, Chair, COEN Undergraduate Curriculum Committee

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

**THROUGH:** Patricia Nava, Interim Dean, College of Engineering

**THROUGH:** Roger Gonzalez – Chair, Engineering Education & Leadership Department

**FROM**: Peter Golding – Undergraduate Program Director, Engineering Education & Leadership Department

**RE**: Proposed Changes to the Engineering Innovation and Leadership Degree Plan

The Department of Engineering Education and Leadership proposes curriculum changes to the B.S. in Engineering Innovation and Leadership degree plan.

These changes encompass two new courses, removing two current courses, updated course names and associated course description modifications. These changes provided improvements consistent with meeting the intended student outcomes for the degree. The changes are also consistent with our ABET-accreditation achieved in the recent College of Engineering- review cycle.

The proposed changes are seen summarized in the attached documents highlighting the changes between the 2020 and (next) 2021 catalog.

Included in the changes to the catalog for the E-Lead 2021 degree plan, are proposals to:
1. Add a new course EL 1301 *Engineering Innovation & Leadership* to the Institutional Core curriculum options;
2. Remove EL 1405 and El 1302, our current freshman courses;
3. Adding a new course El 1402, which incorporates much of our current from EL 1302 and the graphics content from EL 1405.
4. Add three-credit hours to the emphasis options in each concentration of the BS in Innovation and Leadership Engineering degree.
5. Adjust the prerequisite of EL 2301.

These changes are supported by the faculty and we believe they will again improve the success of the students in our programs.

*500 W. University Ave. El Paso, Texas 79968-0517 | Office: (915) 747-8427 | FAX: (915) 747-8427 | eel.utep.edu*

# CURRICULUM CHANGE PROPOSAL

# APPROVAL PAGE

**Proposal Title:**

**College:** **Department:**

## DEPARTMENT CHAIR

**I have read the enclosed proposal and approve this proposal on behalf of the department.**

_____ _____

**Signature** **Date**

## COLLEGE CURRICULUM COMMITTEE CHAIR

**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.**

Digitally signed by Patricia A. Nava
DN: cn=Patricia A. Nava, o=UTEP, ou, email=pnava@utep.edu, c=US
Date: 2020.10.21 09:42:51 -06'00'

10/21/2020

**Signature** **Date**

| | |
|---|---|
| **From:** | Granda, Virginia D |
| **To:** | Rivera, Julie A |
| **Cc:** | Nava, Patricia A.; Love, Norman D; Gonzalez, Roger V; Starks, Scott; Golding, Peter |
| **Subject:** | FW: UG EEL Proposal Approved by COECC on October 16 |
| **Date:** | Wednesday, October 21, 2020 9:54:17 AM |
| **Attachments:** | Proposed-Changes-to-Engineering-Innovation-and-Leadership-Degree-Plan--SIGNED.pdf<br>image027.png<br>image001.png<br>image002.png<br>image003.png<br>image004.png<br>image005.png<br>image006.png<br>image028.png<br>image029.png<br>image030.png<br>image031.png<br>image007.png |

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Julie,

Attached is the approved UG EEL Proposal that we would to include in the next UGCC meeting.

See below for the chain of approvals.

Best Regards,

Virginia


**Virginia Granda-Becker**
Coordinator for Academic Affairs and Undergraduate Studies

College of Engineering
The University of Texas at El Paso
500 W. University Ave
El Paso, TX 79968
Office: (915) 747-8011
www.utep.edu/engineering/eec


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**From:** Nava, Patricia A.
**Sent:** Wednesday, October 21, 2020 9:45 AM
**To:** Love, Norman D <ndlove@utep.edu>; Granda, Virginia D <granda@utep.edu>
**Subject:** RE: UG Proposals Approved by COECC on October 16

Virginia,

I approve of the attached proposals, one from CS and one from E-LEAD.

PN


**Patricia A. Nava, Ph.D.**

Interim Dean
Professor of Electrical and Computer Engineering
El Paso Electric Professor in Education
UTEP Distinguished Teaching Professor

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500 West University Avenue
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Office: 915-747-6917
Fax: 915-747-5437
utep.edu/engineering

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**From:** Love, Norman D
**Sent:** Monday, October 19, 2020 8:57 AM
**To:** Granda, Virginia D <granda@utep.edu>
**Cc:** Nava, Patricia A. <pnava@utep.edu>
**Subject:** FW: UG Proposals Approved by COECC on October 16

Hi Virginia,

I approve of the 2 attached proposals from CS and E-LEAD. I am forwarding the proposals to Dr. Nava for her review.

**Norman Love, Ph.D.**
Associate Dean for Academic Affairs and Undergraduate Studies
Professor of Mechanical Engineering
Provost's Faculty Fellow, University Honors Program

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**From:** "Granda, Virginia D" <granda@utep.edu>
**Date:** Friday, October 16, 2020 at 4:52 PM
**To:** Norman Love <ndlove@utep.edu>
**Subject:** FW: UG Proposals Approved by COECC on October 16

Good afternoon Dr. Love,

Attached are two of the three UG proposals that have been approved by our COECC and its chair.

Can you please reply letting me know if you approve them as well?

I will send you the last proposal once the corrected version has been submitted and Dr. Everett has approved it.

Best Regards,

Virginia

**Virginia Granda-Becker**
Coordinator for Academic Affairs and Undergraduate Studies

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**From:** Everett, Louis
**Sent:** Friday, October 16, 2020 4:39 PM
**To:** Granda, Virginia D <granda@utep.edu>
**Subject:** FW: UG Proposals Approved by COECC on October 16

These look good. I approve them.

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**From:** Granda, Virginia D <granda@utep.edu>
**Sent:** Friday, October 16, 2020 4:20 PM
**To:** Everett, Louis <leverett@utep.edu>
**Subject:** UG Proposals Approved by COECC on October 16

Dr. Everett,

I am attaching two of the three UG proposals that were approved today by our COECC committee.

Please let me know if the proposals have your approval to move forward.

I will be sending you the last proposal once I receive it with the corrections.

Best Regards,

Virginia

**Virginia Granda-Becker**
Coordinator for Academic Affairs and Undergraduate Studies

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# COURSE ADD

## All fields below are required

**College :** Engineering **Department :** Engineering Education & Leadership

**Rationale for adding the course:**
New iterations of two current courses, updated to support the success and pathway of students in their Freshman year

## All fields below are required

**Subject Prefix and #** EL 1301

**Title (29 characters or fewer):** Eng Innovation and Leadership

**Dept. Administrative Code** : 978

**CIP Code** 14.0101

**Departmental Approval Required** ☒Yes ☐No

**Course Level** ☒UG ☐GR ☐DR ☐SP

**Course will be taught:** ☒ Face-to-Face ☒ Online ☒ Hybrid

**How many times may the course be taken for credit? (Please indicate 1-9 times):** 3

**Should the course be exempt from the "Three Repeat Rule?"** ☐Yes ☒No

**Grading Mode:** ☒Standard ☐Pass/Fail ☐Audit

**Description (600 characters maximum):**
Through the Engineering Innovation and Leadership course, students will gain engineering foundational knowledge of innovation, technological and leadership advancement in modern society, develop principles of personal, professional and social responsibility for living in a diverse world, and advance intellectual and practical skills that are essential for all learning.

**Contact Hours (per week):** 3 Lecture Hours Lab Hours Other

**Types of Instruction (Schedule Type): Select all that apply**

| | | | |
|---|---|---|---|
| ☒ A | Lecture | ☐ H | Thesis |
| ☐ B | Laboratory | ☐ I | Dissertation |
| ☐ C | Practicum | ☐ K | Lecture/Lab Combined |
| ☐ D | Seminar | ☐ O | Discussion or Review (Study Skills) |
| ☐ E | Independent Study | ☐ P | Specialized Instruction |
| ☐ F | Private Lesson | ☐ Q | Student Teaching |

## Fields below if applicable

**If course is taught during a part of term in addition to a full 16-week term please indicate the length of the course (ex., 8 weeks): 16 weeks**

**TCCN (Use for lower division courses) :**

| **Prerequisite(s):** | | |
|---|---|---|
| **Course Number/ Placement Test** | **Minimum Grade Required/ Test Scores** | **Concurrent Enrollment Permitted? (Y/N)** |
| TSI | **350 - 390** | n/a |
| MATH 0311 | C | N |
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| **Corequisite Course(s):** |
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| **Equivalent Course(s):** |
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| **Restrictions:** | |
|---|---|
| **Classification** | |
| **Major** | **Engineering Innovation and Leadership** |

## UTEP Core Curriculum Course Addition Proposal

**Course Prefix, Number, and Title**: EL 1301, Engineering Innovation & Leadership

**Proposal Approvals:**

**Proposal Creator:**
Name: Dr. Peter Golding, Undergraduate Program Director,
Department: Engineering Education & Leadership
Email: pgolding@utep.edu
Phone: (915) 747-8125
Office: ENG 130F
**Alternate Point of Contact:**
Name: Dr. Roger V Gonzalez, Chair
Department: Engineering Education & Leadership
Email: rvgonzalez@utep.edu
Phone: (915) 747-5761
Office: Bell Hall 120
**Course Information:**
Type: New Course
Course: EL 1301
Credit Hours: 3
Course Offered: Fall Spring Summer
TCCN: EL 1301
Prerequisites: (MATH 0311 w/C or better ) OR (TSI 350-390)

**Course Description:**
Through the Engineering Innovation and Leadership course, students will gain a foundation of knowledge of innovation, technological and leadership advancement in modern society, develop principles of personal, professional and social responsibility for living in a diverse world, and advance intellectual and practical skills that are essential for all learning.

**Foundational Component Area:** Arts, Science, Engineering, Mathematics, Technology, Culture

**Foundational Component Area Intent:** The EL 1301 core curriculum course includes foci on all six TCC Core Objectives: *Critical Thinking Skills* (CT), *Communication Skills* (COM), *Empirical and Quantitative Skills* (EQS), *Teamwork* (TW), *Social responsibility* (SR) and *Personal Responsibility* (PR).

### Core Curriculum Objectives

**Critical Thinking**: EL 1301 content is designed to develop students' critical thinking skills by teaching them engineering design thinking and mathematical problem solving skills. Students will be prompted to explain their reasoning when working through engineering problems and ask critical questions about another students' work. Students will also think critically about the role of engineers in society, innovation and leadership practices.

**Communication**: EL 1301 will emphasize communication of student reasoning in both oral and written form. The ability to communicate and be open, honest and respectful is a vital aspect of Engineering Innovation and Leadership Education. Students will always be encouraged to orally and empathetically explain problems and will be required to provide written explanations of scientific and mathematical

reasoning at times. Class discussions will be used to encourage student collaboration and communication. Students will complete individual and team project presentations.

**Empirical and Quantitative Skills**: EL 1301 will utilize manipulation and analysis of numerical data to evaluate innovative alternatives and use observable facts resulting in informed conclusions. Engineering calculations engineering development propositions will include business analytics, accounting and reliability functions, systems of equations, and engineering design matrix calculations. The course content is focused on developing students' empirical and quantitative skills.

**Teamwork Competencies:** EL 1301 will emphasize the value of teamwork, which is common in technical or engineering environments. Whether it's a project team, product development, a production line, a maintenance team or a manufacturing cell, effective teamwork is the basis for most modern engineering innovation and technical operations. Students will understand teamwork promotes:

- **Increased moral**, as people believe they have a stake in something, are supported by others and if stuck, can seek assistance to get the job done.
- Enables more challenging **problems can be tackled faster** by drawing on the team's collective skills, experience and knowledge.
- Often solutions proposed by the team have **greater credibility** and therefore are more likely to be accepted. Proposals tend to be thorough, having drawn on the collective experience and skills of the group, as well as being scrutinized by all team members.
- Working collaboratively helps team members to **learn and develop,** as they share ideas and experiences.
- **Teamwork encourages communication**, trust, support and a positive working environment – all important for improved business productivity.

**Social Responsibility:** EL 1301 will emphasize the social responsibility of the Engineering profession in terms of the commitment to place public safety and interest ahead of all considerations. Students will learn that the engineering professional takes into account and shows due regard for the consequences of their conduct for wellbeing of others as well as the impact of their work on society. Students will value intercultural competence, knowledge of civic responsibility, and the ability to engage effectively in regional, national, and global communities. Students will become aware of the role of professional societies, and diversity and equity initiatives arising therefrom.

**Personal Responsibility:** EL 1301 will assist students to develop the ability to connect choices, actions and consequences to ethical decision-making of engineers. Students in training to be engineers will know engineering personal responsibility initiatives are categorized as follows:

- Environmental responsibility.
- Human rights responsibility.
- Philanthropic responsibility.
- Economic responsibility.

Accordingly, the services provided by engineers require honesty, impartiality, fairness, and equity, and must be dedicated to the protection of the public health, safety, and welfare. Engineers must perform under a standard of professional behavior that requires adherence to the highest principles of ethical conduct.

**Proposed Syllabus:** Sample syllabus is included below.

**Course Assessment Plan**

[Examples of the major assignments referenced for each category below are below, following the syllabus pages]

**Critical Thinking (CT)**: Critical thinking skills are assessed as major components of the homework and exams by evaluating the quality of student mathematical reasoning using the following measures of evidence:

- Written explanations steps taken in solving problems (both using a narrative and complete scientific and mathematical explanation)
- Written explanations of problem solving plan and needed information to complete the process
- Presentation of problem solving process to class or group

**Communication Skills (COM)**: Communication skills are assessed by evaluating the ability of students to use written or oral explanations to clarify problem solving process. This is assessed by analyzing the students' use of a narrative with correct grammar, spelling and sound sentence structure. The arguments must also be logically organized.

- Journaling related to course work and experiential learning
- Short Narratives summarizing concepts and methods in class

**Empirical and Quantitative Skills (EQS)**: Empirical and quantitative skills are assessed through several written assignments (homework and exams) throughout the semester. This component is a core skill of this course and will be assessed using:

- Regular Homework Assignment requiring shown work
- In-class Quizzes
- In-class Exams

**Teamwork (TW)**: Teamwork is assessed through students' ability to consider different points of view and to work effectively with others to support a shared purpose or goal. Team building and teamwork skills are assessed through (homework and team syntheses) throughout the semester. This component is a core skill of this course and will be assessed using:

- Regular Team Project progress presentations
- Interactive team effectiveness analyses
- Final Team Project presentations

**Social Responsibility** (SR) - Intercultural competence, knowledge of civic responsibility, and the ability to engage effectively in regional, national, and global communities assessed through using:

- Social responsibility assessment tools for the engineering professionals (EPRA). The EPRA measures students' social responsibility attitudes and operationalizes the professional social responsibility development model, which describes the development of personal and professional social responsibility in engineers. The EPRA is intended to be used by educators to assess curricular interventions aimed at changing students' views of social responsibility.
- Engineering Code of Ethics assignments and case study assessments.

**Personal Responsibility (PR)**: Personal responsibility is assessed through the ability to connect choices, actions and consequences to ethical decision-making. Personal responsibility is measured using:

- A Personal Responsibility Questionnaire that includes self-control of emotion and thoughts. This is pertinent since national policies in education are increasingly concerned with values and skills that students develop through their education to take personal responsibility for their choices and actions.
- Student knowledge and awareness evaluations of ABET criteria, objectives and outcomes.

**ABET Syllabus - Course number and name:**
EL 1301 – Engineering Innovation & Leadership

**Course Description:** Self-development, with the goal of students becoming more effective leaders and team players, is a primary goal of 21st Century universities providing value. Innovation and leadership skills learned in this course have application to personal and professional relationships, work and lifelong learning goals. Through this course students will learn about themselves, about others, and about innovations (change) and engineering sciences. Students will learn through inquiry of the process by which arts, business, science and mathematics are utilized to develop critical thinking competencies, and though engaging in creative thinking will enhance their self-learning and future success. The empirical results of cognitive science will be used to illustrate the importance of understanding preconceptions, cognitive frameworks, and metacognition. Students will be able to apply this inquiry-based framework to research, scholarship, and learning with the goal of using UTEP Edge experiences to build success in their future in engineering.
This course advances individual leadership development through providing a framework for understanding the elements of innovation and organization's leadership development system. The course provides students with the foundations of leadership and innovation capacity in organizations. This course ties together and integrates many initiatives stemming from different areas of expertise with the primary goal to be to present knowledge in a way that students can use in their efforts to create leadership development experiences. We will specifically focus on how leadership skills effects the outcomes of engineering processes and engineering teamwork so as to enhance both individual and organizational leadership capacity.

**Course Credit:** 3 SCH **Contact Hours:** 3 Lecture
**Prerequisites:** MATH 1309 or higher
See here: http://catalog.utep.edu/undergrad/college-of-science/mathematical-sciences/

**Cross/Co-listed with:** N/A **Co-requisites:** N/A

**Instructor/Course Coordinator:** Peter Golding & Roger V Gonzalez

**Textbook(s) & required materials:**

- Osterwalder, A. & Pigneur, Y. (2020) A Handbook for Visionaries, Game Changers, and Challengers. John Wiley & Sons. ISBN 470-87641-1
- Kouzes, J. and Posner, B. (2020). The Leadership Challenge. 5th Ed. Jossey-Bass. ISBN 978-1-118-28196-3(ebk)
- Numerous Articles, Sources and Handouts provided just in time.

**Course Learning Outcomes:**

Developing Leaders Key Components: Students will demonstrate personal responsibility, social responsibility, and decision making within a framework of understanding leader development systems, how one learns from critical thinking, communication and teamwork experience. The value of networking, professional society engagement, and interdisciplinary knowledge and connectedness is established, through team projects and leadership challenges.

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| Developing Leaders Empirical, Quantitative and Integrative Measures: Students will be able to articulate how leader development coincides with social identify, leader development in times of change, democratization of leader development and evaluating leader development.<br><br>Developing Leadership for Organizational Challenges: Students will demonstrate an ability to apply empirical and quantitative skills, and synthesis developing (a) teamwork and leadership capacity, (b) strategic leadership, (c) globally responsible leadership, (d) intergroup leadership, and (e) independent leadership. |
| **Contribution to professional component:** Leadership and management, professional communication. Process of Innovation. Teamwork. Innovation. Sustainability. |
| **Relationship to Program Outcomes:**<br>• An ability to recognize ethical and professional responsibilities in engineering situations and to make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.<br>• An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives. |

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| **Grading Scheme:** | A: 90-100 / B: 80-90 / C: 70-80 / D: 60-70 / F: <60<br>Progress Presentations & Active Participation: 20%<br>Homework & Quizzes: 20%<br>Individual & Major Team Project: 10 and 20% respectively<br>Mid-Terms (2) & Final Exam: 30% (10% each) |

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| **Sample Topics:** |
| Innovation and creativity, Leadership techniques, Communication skills and competencies, Business and personal ethics, Leadership/management profiles, Knowledge transfer, Core values, History of leadership, Empirical Methods, Engineering, Science and Society, Motivational theories, Engineering and Society, Social and personal responsibilities in innovation and leadership engineering. |

**Additional Syllabus Statements:**

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| Make-up Policy: | No makeup exams will be allowed except with proper documentation, i.e. doctor's note, hospital's note, or UTEP excused absence document. |
| Attendance Policy: | Students must attend every class and attend all lectures. Attendance will be taken. A student will be dropped if he/she misses 3 lectures. Students are to arrive to class on time. It is the student's responsibility to make up missed assignments as determined by their instructor. |

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| Civility Statement: | Please do not use smart phones, smart watches, IPads, blue tooth or any smart device during quizzes and exams. Cell phones and tablets should be set to silent or vibrate, and any calls should be taken outside of class. Please do not wear headsets or blue tooth devices during class. Please don't talk in class. Cell phone calculators may not be used on quizzes or exams. Calculators may not be shared during quizzes and exams. Active participation in class is expected, teamwork in class will be implemented. Video or pictures of lectures must have written consent from the instructor and student(s). |
| Disability Statement: | If you have a disability and need classroom accommodations, please contact The Center for Accommodations and Support Services (CASS) at 747-5148, or by email to cass@utep.edu, or visit their office located in UTEP Union East, Room 106. For additional information, please visit the CASS website at www.utep.edu/CASS. *CASS' Staff are the only individuals who can validate and if need be, authorize accommodations for students with disabilities*. |
| Academic Integrity Policy: | Each student is responsible for notice of and compliance with the provisions of the Regents' Rules and Regulations, which are available for inspection electronically at http://www.utsystem.edu/bor/rules/homepage.htm.<br><br>All students are expected and required to obey the law, to comply with the Regents' Rules and Regulations, with System and University rules, with directives issued by an administrative official in the course of his or her authorized duties, and to observe standards of conduct appropriate for the University. A student who enrolls at the University is charged with the obligation to conduct himself/herself in a manner compatible with the University's function as an educational institution.<br><br>Any student who engages in conduct that is prohibited by Regents' Rules and Regulations, U. T. System or University rules, specific instructions issued by an administrative official or by federal, state, or local laws is subject to discipline, whether such conduct takes place on or off campus or whether civil or criminal penalties are also imposed for such conduct. |
| Military Statement: | If you are a military student with the potential of being called to military service and /or training during the course of the semester, you must contact me as soon as possible **before** you leave. |

# COURSE DELETE FORM

## All fields below are required

**College :** Engineering **Department :** Engineering Education & Leadership

**Rationale for deleting the courses:**
**This course is one of two being replaced by updated courses, advantageous to the learning pathway of students in their Freshman year in the Bs in Engineering Innvoation and Leadership**

## Courses to be deleted: (You may list several on the same sheet)

| Course Prefix and Number | Course Title |
|---|---|
| **Ex. POLS 2310** | **Introduction to Politics** |
| EL 1405 | Fundamentals of Engineering Leadership & Graphics |
| EL 1302 | Introduction to Engineering Leadership & Design |
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# COURSE ADD

## All fields below are required

**College :** Engineering **Department :** Engineering Education & Leadership

**Rationale for adding the course:**
New iterations of two current courses, updated to support the success and pathway of students in their Freshman year

## All fields below are required

**Subject Prefix and #** EL 1402

**Title (29 characters or fewer):** Fund of Lead, Design & Graph

**Dept. Administrative Code** : 978

CIP Code 14.0101

**Departmental Approval Required** ☒Yes ☐No

**Course Level** ☒UG ☐GR ☐DR ☐SP

**Course will be taught:** ☒ Face-to-Face ☒ Online ☒ Hybrid

**How many times may the course be taken for credit? (Please indicate 1-9 times):** 3

**Should the course be exempt from the "Three Repeat Rule?"** ☐Yes ☒No

**Grading Mode:** ☒Standard ☐Pass/Fail ☐Audit

**Description (600 characters maximum):**
Through the Engineering Innovation and Leadership course, students will gain engineering foundational knowledge of innovation, technological and leadership advancement in modern society, develop principles of personal, professional and social responsibility for living in a diverse world, and advance intellectual and practical skills that are essential for all learning.

**Contact Hours (per week):** 4 Lecture Hours Lab Hours Other

**Types of Instruction (Schedule Type): Select all that apply**

| | | | |
|---|---|---|---|
| ☒ A | Lecture | ☐ H | Thesis |
| ☐ B | Laboratory | ☐ I | Dissertation |
| ☐ C | Practicum | ☐ K | Lecture/Lab Combined |
| ☐ D | Seminar | ☐ O | Discussion or Review (Study Skills) |
| ☐ E | Independent Study | ☐ P | Specialized Instruction |
| ☐ F | Private Lesson | ☐ Q | Student Teaching |

## Fields below if applicable

**If course is taught during a part of term in addition to a full 16-week term please indicate the length of the course (ex., 8 weeks): 16 weeks**

**TCCN (Use for lower division courses) :**

| Prerequisite(s): | | |
|---|---|---|
| **Course Number/ Placement Test** | **Minimum Grade Required/ Test Scores** | **Concurrent Enrollment Permitted? (Y/N)** |
| EI 1301 | | YES |
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| Corequisite Course(s): |
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| Equivalent Course(s): |
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| Restrictions: | |
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| Classification | |
| Major | Engineering Innovation and Leadership |

**Course number and name:**
EL1402 – Fundamentals of Leadership, Design & Graphics

**Course Description:**
This course focuses on engineering design and graphics, and engineering project management with emphases on techniques and skills needed for innovation and leadership within this domain. Topics include innovation and creativity, continuous quality improvement and sustainability. The course helps students develop fundamental skills to help them thrive during the pursuit of their BS in Engineering Innovation and Leadership. Therefore, one 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. This includes building skills in sketching of 2D and 3D drawings, creating assemblies, and creating animations using contemporary computer aided design software.

**Course Credit:** 4 SCH
**Contact Hours:** 4 per week
**Prerequisites:** El 1301

**Cross/Co-listed with:** N/A
**Co-requisites:** MATH 1411 (Calc I)

**Instructor/Course Coordinator:** Dr. Peter Golding & Dr. Cole Joslyn

**Textbook(s) & required materials**: Northouse, P. G. (2015). Leadership: *Theory and practice.* SAGE publications.

**Course Learning Outcomes:**
Leadership development: Students will develop an ability to recognize leadership issues and to apply leadership principles.
Communication: Students will enhance their ability to communicate effectively with a range of audiences.
Identity Development: Students articulate their personal, engineering and leadership identity.
Teamwork: Students will work on teams and learn to construct healthy team-based working environments.
Graphics: Students will be able to create useful representations of parts and assemblies by hand and by using contemporary computer aided design software.
E-Lead: Students will be able to articulate E-Lead program expectations, culture, courses, and classroom teaching style.

**Contribution to professional component:** Leadership development, communication skills, teamwork, time management

**Relationship to Program Outcomes:** ABET Outcome 4: An ability to communicate effectively with a range of audiences.
ABET Outcome 8: An ability to recognize leadership issues and to apply leadership principles.

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|---|---|
| **Grading Scheme:** | A: 90-100 B: 80-90 C: 70-80 D: 60-70 F: <60<br>Project 1: 20%<br>Project 2: 40%<br>Project 3: 20%<br>Participation, ePortfolio, Leadership Reading, Assignments: 20% |

**Sample Topics:**
Leadership styles, teamwork, projects, professional practices (internships), personality types, personal identity, basic prototyping, design basics, time management, professional presentations, teamwork

# COURSE CHANGE FORM

## All fields below are required

**College :** Engineering **Department :** Engineering Education & Leadership

**Rationale for changing the course:**
**Prerequisite change to maintain alignment with new course, EL 1402, being introduced and becoming the prerequisite course, in place of EL 1302, which is being deleted.**

## All fields below are required

**Subject Prefix and number EL 2301**

**Course Title Modeling and Simulation**

| Change | From | To |
|---|---|---|
| **Ex. Prerequisite** | **Ex. POLS 2310** | **Ex. POLS 2312** |
| Prerequisite | EL 1302 with C or better | EL 1402 with C or better |
| | | |
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| | | |

**These changes will be reflected in Banner, Goldmine, and the catalog**

Required Credits: 125

| Code | Title | Hours |
|---|---|---|
| Complete the University Core Curriculum | | 42 |
| Complete the University Core Curriculum requirements. | | |
| **Designated Core** | | |
| CE 2326 | Econ for Engrs & Scientists | |
| CS 1320 | Computer Programming Sci/Engr ((Exception CS Concentration take COMM 1302 Business/Professional Comm (C) 3.)) | |
| MATH 1508 | Precalculus ((Listed if completed, but not required)) | |
| or MATH 1310 | Trigonometry and Conics | |
| PHIL 2306 | Ethics | |
| PHYS 2420 | Introductory Mechanics | |
| PHYS 2421 | Introductory Electromagnetism | |
| EL 1301 | ~~Seminar/Critical~~ InquiryEngineering Innovation & Leadership | |
| **Foundation Math/Sci** | | |
| CHEM 1305 | General Chemistry | 3 |
| MATH 1312 | Calculus II | 3 |
| MATH 1411 | Calculus I | 4 |
| MATH 2313 | Calculus III (CS Concentration take MATH 2300) | 3 |
| MATH 2326 | Differential Equations | 3 |
| MATH 3323 | Matrix Algebra | 3 |
| or BME Sequence must take upper-division BIOL, CHEM, CBCH course from approved BME minor list | | |

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| Code | Title | Hours |
|---|---|---|
| **Engineering Leadership Coursework** | | |
| All EL courses require a grade of "C" or better | | |
| ~~EL 1405~~ EL 1402 | Fund of Lead, Design and Graphics | 4 |
| EL 2301 | Modeling and Simulation | 3 |
| EL 3302 | Engineering Measurements | 3 |
| EL 3003 | Professional Practice I | 0 |
| EL 3005 | Professional Practice II | 0 |
| EL 3331 | Engr Design:People to Products | 3 |
| EL 3332 | Engr Entr: Products to People | 3 |
| EL 3373<br>or IE 3373<br>or EE 3384 | Eng Prob. & Statistical Models<br>Engr Probability & Stat Models<br>Probabilistic Methods-Engr/Sci | 3 |
| EL 4395 | CD I:Definition & Exploration | 3 |
| EL 4396 | CD II: Develop & Evaluation | 3 |

Course List

# Concentrations

In the Concentrations below, a student must take fifteen (15) credit hours of Emphasis courses approved by the Department. These courses must constitute an approved plan of study and can be taken 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 Finance Mgmt for the Engineer, EL 3330 Engineering Leadership Development, EL 4330 Innovation in Technology, EL 4332 Law and Commercialization, EL 4331 Intellectual Property Law, EL 4334 Eng Ethics & Professionalism, and EL 4393 Special Topics in Eng and Lead, or other course approved by the Department.

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# Engineering Innovation

| Code | Title | Hours |
|---|---|---|
| **Engineering Innovation Concentration Required Courses** | | |
| CE 2338 | Mechanics II (Dynamics) | 3 |
| or MECH 2340 | Mechanics II - Dynamics | |
| CE 2377 | Electro Mechanical Systems | 3 |
| or IE 2377 | Electro-Mechanical Systems | |
| or MECH 2342 | Electro Mechanical Systems | |
| MECH 2311 | Intro to Thermal-fluid Sci | 3 |
| MME 2303 | Intro to Materials Sci & Engrg | 3 |
| MME 2434 | Mechanics of Materials | 4 |
| **Upper Division Engineering/Technical Electives** | | |
| 9 credit hours approved by advisor | | 9 |
| **Emphasis Courses** | | |
| A student must take fifteen(15) credit hours of courses approved by the department. | | 15 |
| **Total Hours** | | **40** |

Course List

# Biomedical Engineering

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| Code | Title | Hours |
|---|---|---|
| **Biomedical Engineering Concentration** | | |
| BIOL 1305 & BIOL 1107 | General Biology and Topics in Study of Life I | 4 |
| BIOL 2313 & BIOL 2113 | Human Anat/Physiology II and Human Anat/Physio Lab II | 4 |
| or | | |
| BIOL 2311 & BIOL 2111 | Human Anat/Physiology I and Human Anat/Physio Lab I | |
| 4 cr approved by the Department | | 4 |
| **Additional Required Courses** | | |
| CE 2338 | Mechanics II (Dynamics) | 3 |
| or MECH 2340 | Mechanics II - Dynamics | |
| CE 2377 | Electro Mechanical Systems | 3 |
| or IE 2377 | Electro-Mechanical Systems | |
| or MECH 2342 | Electro Mechanical Systems | |
| MECH 2311 | Intro to Thermal-fluid Sci | 3 |
| MME 2303 | Intro to Materials Sci & Engrg | 3 |
| MME 2434 | Mechanics of Materials | 4 |
| **Upper Division Engineering Technical Electives** | | |

| Code | Title | Hours |
|---|---|---|
| BME 3303 | Fundamentals of BME I | 3 |
| BME 3305 | Fundamentals of BME II | 3 |
| Upper Division Course from list approved for BME Minor | | 3 |
| **Total Hours** | | **37** |
| **Emphasis Course** | | |
| A student must take three (3) credit hours of emphasis courses approved by the department. | | 3 |
| **Total Hours** | | **40** |

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Course List

## Computer Science

| Code | Title | Hours |
|---|---|---|
| **Computer Science Concentration Courses** | | |
| CS 1101 | Intro to Computer Science Lab | 1 |
| CS 1301 | Intro to Computer Science | 3 |
| CS 2302 | Data Structures | 3 |
| CS 2401 | Elem. Data Struct./Algorithms | 4 |
| EL 4171 | Eng Ed and Lead Problems | 1 |
| **Additional Required Courses** | | |
| CE 2338 | Mechanics II (Dynamics) | 3 |
| or MECH 2340 | Mechanics II - Dynamics | |

| Code | Title | Hours |
|---|---|---|
| CE 2377 | Electro Mechanical Systems | 3 |
| or IE 2377 | Electro-Mechanical Systems | |
| or MECH 2342 | Electro Mechanical Systems | |
| MECH 2311 | Intro to Thermal-fluid Sci | 3 |
| MME 2303 | Intro to Materials Sci & Engrg | 3 |
| MME 2434 | Mechanics of Materials | 4 |
| **Upper Division Engineering / Technical Electives** | | |
| 9 cr hrs from the following courses or as approved by the Department | | 9 |
| CS 3320 | | |
| CS 3331 | Adv. Object-Oriented Programng | |
| CS 3350 | Automata/Computabi/Formal Lang | |
| CS 3360 | Design/Implementation Prog Lan | |
| CS 3370 | | |
| CS 3432 | Comp Arch I: Comp Org/Design | |
| CS 4310 | Software Eng: Requirements Eng | |
| CS 4311 | Software Eng: Design & Implmnt | |
| CS 4316 | Computer Networks | |
| CS 4317 | Human-Computer Interaction | |
| CS 4320 | Artificial Intelligence | |

| Code | Title | Hours |
|---|---|---|
| CS 4330 | Mobile Application Development | |
| CS 4339 | Secure Web-Based Systems | |
| CS 4342 | Data Base Management | |
| CS 4351 | Computer Security | |
| CS 4352 | | |
| CS 4364 | Topics in Data Science | |
| CS 4365 | Topics in Soft Computing | |
| CS 4371 | Computer Science Problems | |
| CS 4373 | Computer Science Internship | |
| CS 4374 | Software Construction | |
| CS 4375 | Theory of Operating Systems | |
| CS 4376 | Comp Dcsn-Mkng & Risk Analysis | |
| CS 4377 | | |
| CS 4379 | Software Reverse Engineering | |
| CS 4387 | Software Integration and V&V | |
| CS 4390 | Special Topics in Computer Sci | |
| CS 4392 | | |
| **Total Hours** | | **37** |
| **Emphasis Courses** | | |
| A student must take three (3) credit hours of emphasis courses approved by the department. | | 3 |

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| Code | Title | Hours |
|---|---|---|
| Total Hours | | ~~37~~40 |

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Course List

## Electrical Engineering

| Code | Title | Hours |
|---|---|---|
| **Electrical Engineering Concentration Courses** | | |
| EE 2350 | Electric Circuits I | 3 |
| EE 2351 | Electric Circuits II | 3 |
| EE 2352 | | 3 |
| EE 2369<br>& EE 2169 | Digital Systems Design I<br>and Laboratory for EE 2369 | 4 |
| EE 2372 | Software Design I | 3 |
| **Upper Division Engineering Technical Electives** | | |
| 9 hours approved by Department | | 9 |
| Students seeking the Academic Minor in EE must take 6 credit hours from the list | | |
| EE 3321 | Electromagnetic Field Theory | |
| EE 3329 | Fund. of Semiconductor Dev | |
| EE 3338<br>& EE 3138 | Electronics I<br>and Lab for Electrical Engr 3338 | |
| EE 3340 | Electronics II | |
| EE 3353 | Discrete Time Signals & System | |

| Code | Title | Hours |
|---|---|---|
| EE 3376<br>& EE 3176 | Microprocessor Systems I<br>and Laboratory For EE 3376 | |
| EE 3384 | Probabilistic Methods-<br>Engr/Sci | |
| **Emphasis Courses** | | |
| A student must take fifteen (15) credit hours of emphasis courses approved by the department | | ~~12~~15 |
| **Total Hours** | | ~~37~~40 |

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Course List

## Civil Engineering

| Code | Title | Hours |
|---|---|---|
| **Civil Engineering Concentration Required Courses** | | |
| CE 1301 | Civil Engineering<br>Fundamentals | 3 |
| CE 2315 | Statics | 3 |
| CE 2334 | Mechanics of Materials | 3 |
| CE 2338 | Mechanics II (Dynamics) | 3 |
| or MECH 2340 | Mechanics II - Dynamics | |
| CE 2343 | Structural Analysis | 3 |
| or CE 3336 | Civil Engineering Materials | |
| or CE 2385 | Environmental Engr Fundamental | |
| CE 2375 | Intro to Fluid Mechanics | 3 |
| EL 4171**40** | Eng Ed and Lead Problems | 1 |
| **Upper Division Civil Engineering/Technical Electives** | | |
| 6 credit hours approved by the Department | | 6 |

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| Code | Title | Hours |
|---|---|---|
| **Emphasis Courses** | | |
| A student must take fifteen (15) credit hours of emphasis courses approved by the department. | | ~~12~~15 |
| **Total Hours** | | ~~37~~40 |

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Course List

## Mechanical Engineering

| Code | Title | Hours |
|---|---|---|
| **Mechanical Concentration Required Courses** | | |
| MECH 1321 | Mechanics I-Statics | 3 |
| MECH 2103 | Engineering Computations | 1 |
| MECH 2311 | Intro to Thermal-fluid Sci | 3 |
| MECH 2322 | Mechanics of Materials | 3 |
| MECH 2340 | Mechanics II - Dynamics | 3 |
| **Upper Division Engineering Technical Electives** | | |
| MECH 3312 | Thermodynamics | 3 |
| MECH 3314 | Fluid Mechanics | 3 |
| MECH 4315 | Heat Transfer | 3 |
| **Mechanical Concentration Elective (choose one) (3 SCH)** | | **3** |
| AERO 3312 | | |
| AERO 3323 | | |
| AERO 3343 | | |
| EL 4393 | Special Topics in Eng and Lead | |

| Code | Title | Hours |
|---|---|---|
| MECH 3334 | Mechanical Design | |
| MECH 3345 | System Dynamics | |
| **Emphasis Courses** | | |
| A student must take fifteen (15) credit hours of emphasis courses approved by the department. | | ~~12~~15 |
| **Total Hours** | | **37** |

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Course List

## Metallurgical and Materials Engineering

| Code | Title | Hours |
|---|---|---|
| **Metallurgical and Materials Engineering Concentration Required Courses** | | |
| **Upper Division MME/ Technical Electives** | | |
| 12 cr hrs of MME courses approved by the EIL Department | | 12 |
| CE 2377 | Electro Mechanical Systems | 3 |
| or IE 2377 | Electro-Mechanical Systems | |
| or MECH 2342 | Electro Mechanical Systems | |
| MME 2303 | Intro to Materials Sci & Engrg | 3 |
| MME 2434 | Mechanics of Materials | 4 |
| MME 4316 | Failure Analysis | 3 |
| **Emphasis Courses** | | |
| A student must take fifteen (15) credit hours of concentration courses approved by department. | | 15 |
| **Total Hours** | | **40** |

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Course List

# University Core Curriculum

NOTE: The department may make specific suggestions for courses which are most applicable towards your major.

**Psychology and Criminal Justice majors and minors** are required to take MATH 1320 Math for Social Sciences I or a higher level Calculus course.
**Business majors** are required to take MATH 1320 Math for Social Sciences I or a higher level Calculus course.
NOTE: All courses require a C or better

## Communication (six hours)
## American History (six hours)
## Language, Philosophy & Culture (three hours)
## Mathematics (three hours)
## Life & Physical Sciences (six hours)
## Political Science (six hours)
## Social and Behavioral Sciences (three hours)
## Creative Arts (three hours)
## Component Area Option (six hours)

| Code | Title | Hours |
|---|---|---|
| The objective of the institutionally designated option component is to develop the critical thinking skills and academic tools required to be an effective learner. Special emphasis is placed on the use of technology in problem solving, communications, and knowledge acquisition. | | |
| Select two of the following: | | 6 |
| BUSN 1301 | Intro to Global Business | |
| COMM 1301 | Public Speaking | |
| COMM 1302 | Business/Profession Comm | |

| Code | Title | Hours |
|---|---|---|
| CS 1310 | Intro-Computational Thinking | |
| CS 1320 | Computer Programming Sci/Engr | |
| SCI 1301 | Inquiry in Math & Science | |
| UNIV 1301 | Seminar/Critical Inquiry | |
| EL 1301 | Eng Inn & Lead | |
| **Total Hour** | | **6** |

Course List

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