Appendix to the Faculty Senate Agenda, 09-20-18

FRANCIS MARION UNIVERSITY: DESCRIPTION OF PROPOSED NEW COURSE or MODIFICATION OF AN EXISTING COURSE

Department/School Physics and Engineering **Date** August 11, 2018

Course No. or Level ENGR 250 **Title** Mechanics of Materials

Semester hours 3 Clock hours: Lecture 3 Laboratory

Prerequisites ENGR 301 Pre/Co: MATH 301

Enrollment expectation 10 per year

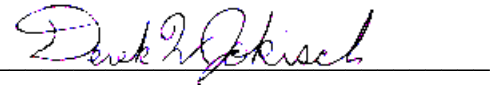
Indicate any course for which this course is a (an)

modification ___
(proposed change in course title, course description, course content or method of instruction)

substitute ___
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate ___
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description Rahul Renu

Department Chairperson's/Dean's Signature 

Provost's Signature ___

Date of Implementation Spring 2020

Date of School/Department approval 8/20/18

Catalog description:

250 Mechanics of Materials (3) (Prerequisite: 301; Prerequisite/corequisite: Math 301) S. The course covers determination of stresses, deflections, and stability of deformable bodies

with an introduction to finite element analysis. By successfully completing this course, students will be able to identify, formulate and solve problems related to the effect of forces on deformable bodies. An emphasis will be placed on the behavior of beams and columns.

Purpose: 1. For Whom (generally?)

For mechanical engineering majors.

2. What should the course do for the student?

By successfully completing the course, students will be able to identify, formulate and solve problems related to the effect of forces on deformable bodies. An emphasis will be placed on the behavior of beams and columns.

Teaching method planned:

Lecture

Textbook and/or materials planned (including electronic/multimedia):

Mechanics of Materials, 10th Edition, Russell C. Hibbeler, ISBN: 978-0134319650

Course Content: This course teaches students methods to analyze the effects of forces on deformable bodies. The analysis of beams and columns is emphasized as these are elementary structures that are components of many designs.

Syllabus for Proposed Course:

Mechanics of Materials Syllabus

1. Course Name and Number - Mechanics of Materials: ENGR 250

2. 3 credits, 45 contact hours

3. Mechanics of Materials, 10th Edition - Russell C. Hibbeler, ISBN: 978-0134319650

4. Specific Course Information

a. Determination of stresses, deflections, and stability of deformable bodies with an introduction to finite element analysis.

b. Prerequisites: ENGR301 (Engineering Mechanics); Corequisite: MATH301

c. Required

5. Specific Goals for the Course

a. By successfully completing this course, students will be able to identify, formulate and solve problems related to the effect of forces on deformable bodies. An emphasis will be placed on the behavior of beams and columns.

6. Brief List of Topics to be covered

- Definition of stress and strain
- Deformation of axially loaded members
- Torsion of circular bars
- Shear force and bending moment diagrams
- Normal and shear stress in beams
- Properties of sections
- Beam deflection
- Stress and strain transformation at a point
- Principal stresses and maximum shear stress
- Mohr's circle
- Combined loading
- Column buckling
- Introduction to Finite Element Analysis

Grading Scale

100 - 90	=	A
89 - 88	=	B+
87 - 80	=	B
79 - 78	=	C+
77 - 70	=	C
69 - 68	=	D+
67 - 60	=	D
< 60	=	F

FRANCIS MARION UNIVERSITY: DESCRIPTION OF PROPOSED NEW COURSE or MODIFICATION OF AN EXISTING COURSE

Department/School Physics and Engineering **Date** August 11, 2018

Course No. or Level ENGR 370 **Title** Fluid Mechanics

Semester hours 3 Clock hours: Lecture 3 Laboratory

Prerequisites ENGR 250, MATH 301, 306, PHYS 200

Enrollment expectation 10 per year

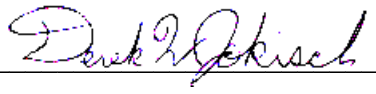
Indicate any course for which this course is a (an)

modification ___
(proposed change in course title, course description, course content or method of instruction)

substitute ___
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate ___
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description Rahul Renu

Department Chairperson's/Dean's Signature 

Provost's Signature ___

Date of Implementation Spring 2021

Date of School/Department approval 8/20/18

Catalog description:

370 Fluid Mechanics (3) (Prerequisite: 250, Mathematics 301, Mathematics 306, Physics 200) S. The course introduces the concepts and applications of fluid mechanics and dimensional analysis with an emphasis on fluid behavior, internal and external flows, analysis of engineering applications of incompressible pipe systems, and external aerodynamics.

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Purpose: 1. For Whom (generally?)

For mechanical engineering majors.

2. What should the course do for the student?

By successfully completing this course, students will be able to determine types of flow, apply dimensional analysis to fluid systems, and design fluid systems.

Teaching method planned:

Lecture

Textbook and/or materials planned (including electronic/multimedia):

Fundamentals of Fluid Mechanics, Munson, B.R., Young, D.F., Okiishi, T.H. and Huebsch, W.W. Eighth Edition, John Wiley & Sons, Inc. ISBN: 9781119311157

Course Content: In this course, students are taught the fundamentals of fluid mechanics, fluid behavior and design of fluid systems.

Syllabus for Proposed Course:

Fluid Mechanics Syllabus

1. Course Name and Number - Fluid Mechanics: ENGR 370

2. 3 credits, 45 contact hours

3. Fundamentals of Fluid Mechanics, Munson, B.R., Young, D.F., Okiishi, T.H. and Huebsch, W.W. Eighth Edition, John Wiley & Sons, Inc. ISBN: 9781119311157

4. Specific Course Information

a. Introduction to the concepts and applications of fluid mechanics and dimensional analysis with an emphasis on fluid behavior, internal and external flows, analysis of engineering applications of incompressible pipe systems, and external aerodynamics.

b. Prerequisites: Mechanics of Materials, MATH301, MATH306, PHYS200

c. Required

5. Specific Goals for the Course

a. By successfully completing this course, students will be able to determine types of flow, apply dimensional analysis to fluid systems, and design fluid systems.

6. Brief List of Topics to be covered

- Introduction and overview of fluid mechanics
- Hydrostatic forces
- Types of fluid flow
- Bernoulli's Theorem
- Flow losses
- Flow over bodies
- Dimensional analysis
- Compressible fluid flow

Grading Scale

100 - 90	=	A
89 - 88	=	B+
87 - 80	=	B
79 - 78	=	C+
77 - 70	=	C
69 - 68	=	D+
67 - 60	=	D
< 60	=	F

FRANCIS MARION UNIVERSITY: DESCRIPTION OF PROPOSED NEW COURSE or MODIFICATION OF AN EXISTING COURSE

Department/School Physics and Engineering **Date** August 11, 2018

Course No. or Level ENGR 400 **Title** Thermodynamics and Heat and Mass Transfer

Semester hours 4 Clock hours: Lecture 3 Laboratory 3

Prerequisites ENGR 250, 370, PHYS 200, MATH 301

Enrollment expectation 10 per year

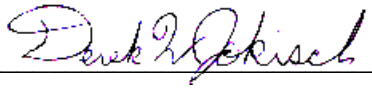
Indicate any course for which this course is a (an)

modification ___
(proposed change in course title, course description, course content or method of instruction)

substitute ___
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate ___
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description Rahul Renu

Department Chairperson's/Dean's Signature 

Provost's Signature ___

Date of Implementation Spring 2022

Date of School/Department approval 8/20/18

Catalog description:

400 Thermodynamics and Heat and Mass Transfer (4:3-3) (Prerequisites: 250, 370, Physics 200, Mathematics 301) S. The course covers applications of the laws of thermodynamics to closed and open systems. Topics include steady one-dimensional conduction, lumped parameter analysis, convection, radiation, and diffusion.

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Purpose: 1. For Whom (generally?)

For mechanical engineering majors.

2. What should the course do for the student?

By successfully completing this course, students will be able to: Apply the laws of thermodynamics to analyze mechanical systems; and analyze the modes of heat transfer in mechanical systems.

Teaching method planned:

Lecture and laboratory

Textbook and/or materials planned (including electronic/multimedia):

Introduction to Thermodynamics and Heat Transfer - Second Edition, Yunus A. Çengel, ISBN: 978-0071287739

Course Content: (Please explain the content of the course in enough detail so that the Academic Affairs Committee can make an informed judgment. Include a syllabus for the course.)

The course covers applications of the laws of thermodynamics to closed and open systems. Topics include steady one-dimensional conduction, lumped parameter analysis, convection, and radiation.

Syllabus for Proposed Course:

On next page

Thermodynamics and Heat Transfer Syllabus

1. Course Name and Number - Thermodynamics and Heat Transfer: ENGR 400

2. 3 credits, 45 contact hours

3. Introduction to Thermodynamics and Heat Transfer - Second Edition, Yunus A. Çengel, ISBN: 978-0071287739

4. Specific Course Information

a. Applications of the laws of thermodynamics to closed and open systems. Steady one-dimensional conduction, lumped parameter analysis, convection, radiation.

b. Prerequisites: Mechanics of Materials, PHYS200, MATH301, Fluid Mechanics

c. Required

5. Specific Goals for the Course

a. By successfully completing this course, students will be able to: Apply the laws of thermodynamics to analyze mechanical systems; and analyze the modes of heat transfer in mechanical systems.

6. Brief List of Topics to be covered

- Introduction and basic concepts
- Energy transfer and analysis
- Energy analysis of pure substances
- Mass and energy analysis of control volumes
- Second Law of Thermodynamics
- Entropy
- Mechanisms of heat transfer
- Steady and transient heat conduction
- Forced convection
- Natural convection
- Radiation heat transfer
- Heat exchangers

Grading Scale

100 - 90	=	A
89 - 88	=	B+
87 - 80	=	B
79 - 78	=	C+
77 - 70	=	C
69 - 68	=	D+
67 - 60	=	D
< 60	=	F

FRANCIS MARION UNIVERSITY: DESCRIPTION OF PROPOSED NEW COURSE or MODIFICATION OF AN EXISTING COURSE

Department/School Physics and Engineering **Date** August 12, 2018

Course No. or Level ENGR 401 **Title** Design of Mechanisms

Semester hours 3 Clock hours: Lecture 3 Laboratory

Prerequisites ENGR 201, 250, MATH 301

Enrollment expectation 10 per year

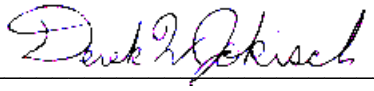
Indicate any course for which this course is a (an)

modification ___
(proposed change in course title, course description, course content or method of instruction)

substitute ___
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate ___
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description Lorna Cintron-Gonzalez

Department Chairperson's/Dean's Signature 

Provost's Signature ___

Date of Implementation Fall 2021

Date of School/Department approval 8/20/18

Catalog description:

401 Design of Mechanisms (3) (Prerequisites: 201, 250, Mathematics 301) F. The course focuses on the function, classification, position, velocity, and acceleration of multi-element mechanical linkages. Furthermore, the course discusses design methods and practical information about common mechanisms and mechanism components. By successfully

completing this course, students will be able to identify and analyze various mechanical linkage mechanisms including four-bar mechanisms, gears, gear trains, and cams.
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Purpose: 1. For Whom (generally?)

For mechanical engineering majors.

2. What should the course do for the student?

By successfully completing this course, students will be able to identify and analyze various mechanical linkage mechanisms including four bar mechanisms, gears, gear trains, and cams.

Teaching method planned:

Lecture

Textbook and/or materials planned (including electronic/multimedia):
Design of Machinery, R.L. Norton, 5th edition, McGraw-Hill, 2012, ISBN 978-0-07-352935-6

Course Content: (Please explain the content of the course in enough detail so that the Academic Affairs Committee can make an informed judgment. Include a syllabus for the course.)

The course focuses on the function, classification, position, velocity, and acceleration of multi-element mechanical linkages. Furthermore, the course discusses design methods and practical information about common mechanisms and mechanism components. By successfully completing this course, students will be able to identify and analyze various mechanical linkage mechanisms including four bar mechanisms, gears, gear trains, and cams.

Syllabus for Proposed Course:

Design of Mechanisms Syllabus

1. Course Name and Number - Design of Mechanisms: ENGR 401

2. 3 credits, 45 contact hours

3. Design of Machinery, R.L. Norton, 5th edition, McGraw-Hill, 2012, ISBN 978-0-07-352935-6

4. Specific Course Information

a. The course focuses on the function, classification, position, velocity, and acceleration of multi-element mechanical linkages. Furthermore, the course discusses design methods and practical information about common mechanisms and mechanism components.

b. Prerequisites: MATH301, ENGR201, Mechanics of Materials

c. Required

5. Specific Goals for the Course

a. By successfully completing this course, students will be able to identify and analyze various mechanical linkage mechanisms including four bar mechanisms, gears, gear trains, and cams.

6. Brief List of Topics to be covered

- Introduction and overview of application of mechanisms
- Kinematics chains and inversions
- Description of various mechanisms
- Velocity and acceleration analysis of mechanisms
- Spur gears
- Gear trains
- Cams

Grading Scale

100 - 90	=	A
89 - 88	=	B+
87 - 80	=	B
79 - 78	=	C+
77 - 70	=	C
69 - 68	=	D+
67 - 60	=	D
< 60	=	F

FRANCIS MARION UNIVERSITY: DESCRIPTION OF PROPOSED NEW COURSE or MODIFICATION OF AN EXISTING COURSE

Department/School Physics and Engineering **Date** August 12, 2018

Course No. or Level ENGR 402 **Title** Systems Dynamics and Controls

Semester hours 3 Clock hours: Lecture 3 Laboratory

Prerequisites ENGR 250, 310, MATH 301

Enrollment expectation 10 per year

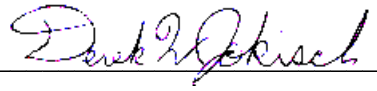
Indicate any course for which this course is a (an)

modification
(proposed change in course title, course description, course content or method of instruction)

substitute
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description Rahul Renu

Department Chairperson's/Dean's Signature 

Provost's Signature

Date of Implementation Spring 2022

Date of School/Department approval 8/20/18

Catalog description:

402 System Dynamics and Controls (3) (Prerequisites: 250, 310, Mathematics 301) S. The course covers dynamic modeling and simulation of systems with mechanical, hydraulic, thermal, and/or electrical elements. Topics include frequency response analysis, stability, and feedback control design of dynamic systems.

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Purpose: 1. For Whom (generally?)

For mechanical engineering majors.

2. What should the course do for the student?

By successfully completing this course, students will demonstrate the ability to formulate mathematical models for mechanical, electrical, fluid, and thermal systems; students will demonstrate the ability to model mixed systems such as electro-mechanical and hydromechanical systems; and students will demonstrate the ability to apply feedback control to real-world engineering systems.

Teaching method planned:

Lecture

Textbook and/or materials planned (including electronic/multimedia):

System Dynamics, William J. Palm III, 3rd Edition, McGraw-Hill College, 2013, ISBN: 978-0073398068

Course Content: This course teaches the application of mathematical principles to modeling mechanical and electro-mechanical systems. The design and development of feedback loops for controlling systems is also covered.

Syllabus for Proposed Course:

On next page

System Dynamics and Controls Syllabus

1. Course Name and Number - Systems Dynamics and Controls: ENGR 402

2. 3 credits, 45 contact hours

3. System Dynamics, William J. Palm III, 3rd Edition, McGraw-Hill College, 2013, ISBN: 978-0073398068

4. Specific Course Information

a. Dynamic modeling and simulation of systems with mechanical, hydraulic, thermal, and/or electrical elements. Frequency response analysis, stability, and feedback control design of dynamic systems.

b. Prerequisites: Mechanics of Materials, MATH301, ENGR310

c. Required

5. Specific Goals for the Course

a. By successfully completing this course, students will demonstrate the ability to formulate mathematical models for mechanical, electrical, fluid, and thermal systems; students will demonstrate the ability to model mixed systems such as electro-mechanical and hydromechanical systems; and students will demonstrate the ability to apply feedback control to real-world engineering systems.

6. Brief List of Topics to be covered

- Overview of rigid body dynamics
- Euler equations for 3D rotational motion of rigid bodies
- Laplace transforms
- Modeling of mechanical systems
- Transfer function modeling
- Modeling of electrical and electromechanical systems
- Modeling of fluid and thermal systems
- Time response analysis of linear dynamic systems
- Frequency response analysis of linear dynamic systems
- Transient response analysis
- Introduction to feedback control systems

Grading Scale

100 - 90	=	A
89 - 88	=	B+
87 - 80	=	B
79 - 78	=	C+
77 - 70	=	C
69 - 68	=	D+
67 - 60	=	D
< 60	=	F

FRANCIS MARION UNIVERSITY: DESCRIPTION OF PROPOSED NEW COURSE or MODIFICATION OF AN EXISTING COURSE

Department/School Physics and Engineering **Date** August 12, 2018

Course No. or Level ENGR 411 **Title** Design for Manufacturing and Assembly

Semester hours 3 Clock hours: Lecture 3 Laboratory ___

Prerequisites ENGR 350 Pre/Co: ENGR 401

Enrollment expectation 10 per year

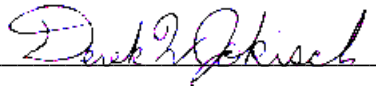
Indicate any course for which this course is a (an)

modification_____
(proposed change in course title, course description, course content or method of instruction)

substitute_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate___
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description Rahul Renu

Department Chairperson's/Dean's Signature 

Provost's Signature_____

Date of Implementation Fall 2021

Date of School/Department approval 8/20/18

Catalog description:

411 Design for Manufacturing and Assembly (3) (Prerequisites: 350 Prerequisite/corequisite: 401) F. The course is based on concurrent engineering techniques to link product design to modern manufacturing and assembly process design. The course will also introduce students to modern manufacturing and assembly process design techniques

used to reduce costs. By successfully completing this course, students will be able to: design new products while considering manufacturing and/or assembly processes; redesign existing products to reduce product realization costs; analyze manufacturing and assembly systems to determine inefficiencies; and apply several other Design for X principles.

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Purpose: 1. For Whom (generally?)

For mechanical engineering majors.

2. What should the course do for the student?

By successfully completing this course, students will be able to: design new products while considering manufacturing and/or assembly processes; redesign existing products to reduce product realization costs; analyze manufacturing and assembly systems to determine inefficiencies; and apply several other Design for X principles.

Teaching method planned:

Lecture

Textbook and/or materials planned (including electronic/multimedia):

Product Design for Manufacture and Assembly, Geoffrey Boothroyd, Peter Dewhurst, Winston A. Knight, 3rd edition, CRC Press, ISBN 978-1420089271

Course Content: In this course, students are taught methods to incorporate manufacturing considerations during the design of new product, or during redesign of existing products. These range from traditional rule-based design decision-making methods to more contemporary artificial intelligence methods.

Syllabus for Proposed Course:

Design for Manufacturing and Assembly Syllabus

1. Course Name and Number - Design for Manufacturing and Assembly: ENGR 411

2. 3 credits, 45 contact hours

3. Product Design for Manufacture and Assembly, Geoffrey Boothroyd, Peter Dewhurst, Winston A. Knight, 3rd edition, CRC Press, ISBN 978-1420089271

4. Specific Course Information

a. The course is based on concurrent engineering techniques to link product design to manufacturing and assembly process design. The course will also introduce students to modern manufacturing and assembly process design techniques used to reduce costs.

b. Prerequisites: ENGR350; Pre/Corequisite: Design of Mechanisms

c. Required

5. Specific Goals for the Course

a. By successfully completing this course, students will be able to: design new products while taking in to consideration manufacturing and/or assembly processes; redesign existing products to reduce product realization costs; analyze manufacturing and assembly systems to determine inefficiencies; and apply several other Design for X principles.

6. Brief List of Topics to be covered

- Engineering design process
- Overview of Design for X, where X includes manufacturing, assembly, and sustainability
- Design for injection molding
- Design for casting
- Design for machining
- Design for sheet metal working
- Design for manual assembly
- Design for automated assembly
- Other Design for X techniques
- Overview and application of lean manufacturing
- Process variability and control
- Overview of AI techniques to optimize product realization

Grading Scale

100 - 90	=	A
89 - 88	=	B+
87 - 80	=	B
79 - 78	=	C+
77 - 70	=	C
69 - 68	=	D+
67 - 60	=	D
< 60	=	F

FRANCIS MARION UNIVERSITY: DESCRIPTION OF PROPOSED NEW COURSE or MODIFICATION OF AN EXISTING COURSE

Department/School Physics and Engineering **Date** August 12, 2018

Course No. or Level ENGR 482 **Title** Mechanical Engineering Senior Design

Semester hours 4 Clock hours: Lecture_____ Laboratory Project-based

Prerequisites ENGR 370, 411

Enrollment expectation 10 per year

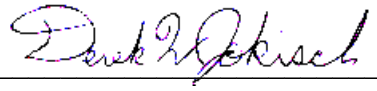
Indicate any course for which this course is a (an)

modification_____
(proposed change in course title, course description, course content or method of instruction)

substitute_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate___
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description Rahul Renu

Department Chairperson's/Dean's Signature 

Provost's Signature_____

Date of Implementation Spring 2022

Date of School/Department approval 8/20/18

Catalog description:

482 Mechanical Engineering Senior Design (4) (Prerequisites: 370, 411) S. This course serves as the capstone design experience for mechanical engineering students. The course involves the design and development of solutions to real-world mechanical engineering problems. Students will demonstrate the ability to work in teams and solve problems which

include multiple realistic constraints and require the application of engineering standards and codes.

Purpose: 1. For Whom (generally?)

For mechanical engineering majors.

2. What should the course do for the student?

Students will demonstrate the ability to work in teams and solve problems which include multiple realistic constraints and require the application of engineering standards and codes.

Teaching method planned:

Instruction and supervised group design projects with industry partners.

Textbook and/or materials planned (including electronic/multimedia):

No text. Resources determined by project.

Course Content: This is a capstone course for mechanical engineers, where students will work on a semester-long project and apply various mechanical engineering principles.

Syllabus for Proposed Course:

Mechanical Engineering Senior Design Syllabus

1. Course Name and Number – Mechanical Engineering Senior Design: ENGR 482

2. 3 credits, 45 contact hours

3. Text Book: None.

4. Specific Course Information

a. This course serves as the capstone design experience for mechanical engineering students. The course involves the design and development of solutions to real-world mechanical engineering problems.

b. Prerequisites: Design for Manufacturing and Assembly, Fluid Mechanics, Mechanics of Materials; This course is intended to be a culminating design experience for Mechanical Engineering students.

c. Required

5. Specific Goals for the Course

a. By successfully completing this course, students will demonstrate the ability to apply the engineering design process to solve mechanical engineering problems; students will demonstrate the ability to work in teams; and the students will demonstrate the ability to solve problems which include multiple realistic constraints and require the application of engineering standards and codes.

6. Brief List of Topics to be Covered

- Engineering design process
- Engineering codes and standards
- Working in teams
- Professional communication

Grading Scale

100 - 90	=	A
89 - 88	=	B+
87 - 80	=	B
79 - 78	=	C+
77 - 70	=	C
69 - 68	=	D+
67 - 60	=	D
< 60	=	F

FRANCIS MARION UNIVERSITY: DESCRIPTION OF PROPOSED NEW COURSE or MODIFICATION OF AN EXISTING COURSE

Department/School Physics and Engineering **Date** August 11, 2018

Course No. or Level ENGR 101 **Title** Introduction to Engineering

Semester hours 3 Clock hours: Lecture 3 Laboratory

Prerequisites Pre/Co: MATH 132 or 137 or permission of department

Enrollment expectation 30 per year

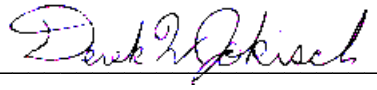
Indicate any course for which this course is a (an)

modification ENGR 101
(proposed change in course title, course description, course content or method of instruction)

substitute_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description Lorna Cintron-Gonzalez

Department Chairperson's/Dean's Signature 

Provost's Signature_____

Date of Implementation Spring 2020

Date of School/Department approval 8/20/18

Catalog description:

101 Introduction to Engineering (3) (Prerequisite/Corequisite: Mathematics 132 or 137 or permission of department) S. Introduction to the engineering profession; applications of engineering principles and approaches, integrated systems approach to problem solving, overall goals and components of the engineering programs, career opportunities, development

of engineering work skills, and communication skills. In addition, the course covers the importance of professionalism, ethics, contemporary challenges, and lifelong learning.

Purpose: 1. For Whom (generally?)

For industrial and mechanical engineering majors.

2. What should the course do for the student?

This course is designed to introduce students to engineering topics.

Teaching method planned:

Interactive lecture, demonstration, and tutoring of student work.

Textbook and/or materials planned (including electronic/multimedia):

Stephan, Bowman, Park, Sill, and Ohland, *Thinking Like an Engineer: An Active Learning Approach*, 4th Edition, 2018, Pearson

Goldratt, *The Goal*, 2014, North River Press

Course Content: (Please explain the content of the course in enough detail so that the Academic Affairs Committee can make an informed judgment. Include a syllabus for the course.)

This course will introduce our students to engineering so that students have an understanding of professional and ethical responsibility, and start to develop the ability to communicate effectively and work in teams. Students will learn fundamental skills, such as workplace assessment, simple data analysis, basic research skills, lean manufacturing, time studies, linear programming, among others.

Syllabus for Proposed Course:

Francis Marion University
Department of Physics and Engineering
ENGR 101 – Introduction to Engineering – Course Syllabus

General Information	
Course Number	ENGR 101
Course Title	Introduction to Engineering
Credit-Hours	3
Class Meetings/Time	
Location	
Co/Prerequisites	MATH 132 or 137, or permission of Department

Instructor Information	
Instructor	
Office	
Office Hours	
Email	

Course Details	
Course Description	Introduction to the engineering profession, applications of engineering principles and approaches, integrated systems approach to problem solving, overall goals and components of the engineering programs, career opportunities, development of engineering work skills, oral and written communication skills, and the importance of professionalism, ethics, contemporary challenges, and lifelong learning.
Course Objectives/ Outcomes	Upon completion of this course, students are expected to: • Have an understanding of professional and ethical responsibility. • Have a stronger ability to communicate effectively and work in teams. • Apply fundamental skills, such as workplace assessment, simple data analysis, basic research skills, lean manufacturing, time studies, linear programming, among others. • Recognize a need for, and develop an ability to engage in life-long learning, especially in –and for- the Industrial Engineering profession.
Textbook(s)/ References	*Thinking Like an Engineer: An Active Learning Approach*, by Stephan, et.al. (3rd Edition or newer) *The Goal* by Eliyahu Goldratt (2014 Edition or newer)

Course Policies

Attendance	Attendance to lecture is required and follows FMU policy. Based on that policy, the maximum of un-excused absences for this course will be six. After six unexcused absences, you will receive a warning from your professor and your attendance will be mandatory from there on. Failure to comply will result in getting dropped from the course. In addition, tardiness will also affect this policy.
Homework/Classwork	Homework will be posted on Blackboard or distributed by the instructor. Late homework will result in penalty, which will be to the discretion of the instructor.
Quizzes/Tests	Quizzes and tests will be announced and will consist mainly of exercises, short answer questions and/or multiple-choice questions relevant to the current topics of the class. Students are expected to take all quizzes and tests when they are scheduled. Make-up quizzes and tests will be allowed only in case of medical conditions that will impede your assistance to the quiz or test. Proof from a health professional may be required and you should try to contact your instructor prior to missing the quiz or test. Student athletes must present official excuses from coach or staff.
Electronic Devices	Use of mobile phones, tablets and/or mp3 players will not be tolerated during class, quizzes or tests (unless otherwise specified by your instructor). Please put these devices at least on 'silent' mode and keep away from your table. Failure to comply will affect your participation/attendance grade. Instructor may also ask you to leave the classroom.
Withdrawals	If you decide to withdraw from the course, you should do so following FMU policies and procedures. Please refer to the FMU Academic Calendar to find important deadlines.
Academic Dishonesty	Plagiarism and collusion are common ways of violating FMU's honor code (please refer to FMU's Academic Integrity Policy in your student handbook). Copying assignments from any other source is strictly prohibited and is a form of Plagiarism. However, you are encouraged to work with classmates in topics needed for homework assignments and in-class problems. The interaction of teaching and learning within a group setting is a great way to learn the principles taught in class. The first time a student is found responsible for academic dishonesty on an assignment or quiz, he/she will receive a zero on their assignment, will be reported to the Office of the Provost and must attend a workshop on Plagiarism. Further incidents will result on dropping the course with a failing grade (F). If academic dishonesty occurs during a test, student will be dropped from course with a failing grade (F). Further incidents may result in suspension and/or expulsion.
Students with Disabilities	Students with disabilities are encouraged to contact the Office of Counseling and Testing to request alternate accommodations for testing. This service is available to qualified students with documented disabilities who are attending FMU.

Grading	Homework assignments, tests, quizzes, papers, tests, and attendance and participation in class will determine final grades. The weight of those on your final grade will be distributed as follows: Homework – 10% Quizzes – 20% Midterm Exam – 15% Project/Papers/Presentations – 30% Final Exam – 20% Participation/Attendance – 5% TOTAL – 100% Grading Scale: 100-90 = A 89-88 = B+ 87-80 = B 79-78 = C+ 77-70 = C 69-68 = D+ 67-60 = D 59-0 = F Grades will be posted/managed on Blackboard.

Projected Class Topics*

- About Engineering
  - History, Careers, Research, Organizations, Future
- Engineering Ethics
- Teamwork and Decision Making
- Effective Communication in Engineering
- Engineering Design Process
- Introduction Engineering in Manufacturing
  - Role Industrial Engineering in Manufacturing
  - Role of Mechanical Engineering in Manufacturing
  - Process Diagrams, Lean Manufacturing, Time Studies
- Introduction to Excel Spreadsheets and Data Analysis
  - Probability, Descriptive Statistics
- Introduction to Operations Research
  - Simple Forecasting, Linear Programming Fundamentals
- Additional:
  - Invited Speaker(s)
  - Site Visit/Plant Tour

**Topics are subject to change or may not be covered. Additional topics will be covered as needed. Changes will be notified in class.*

/cg18

FRANCIS MARION UNIVERSITY: DESCRIPTION OF PROPOSED NEW COURSE or MODIFICATION OF AN EXISTING COURSE

Department/School Physics and Engineering **Date** August 11, 2018

Course No. or Level ENGR 320 **Title** Statistics for Engineers

Semester hours 3 Clock hours: Lecture 3 Laboratory

Prerequisites 250 or 355

Enrollment expectation 15 per year

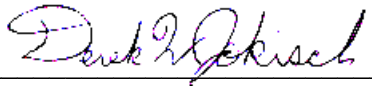
Indicate any course for which this course is a (an)

modification ENGR 320
(proposed change in course title, course description, course content or method of instruction)

substitute_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description Brett Shields

Department Chairperson's/Dean's Signature 

Provost's Signature_____

Date of Implementation Fall 2019

Date of School/Department approval 8/20/18

Catalog description:

320 Statistics for Engineers (3) (Prerequisite: 250 or 355; Prerequisite/corequisite: Physics 220) F. This course will introduce students to the theories and engineering applications of statistical methods, data analysis, experimental design, and data visualization. A major objective of this course is to develop students' capabilities to analyze datasets, including the visualization and

communication of observations in addition to the application of statistical, mathematical, and probabilistic analytical methods, to engineering challenges.

Purpose: 1. For Whom (generally?)

For industrial and mechanical engineering majors.

2. What should the course do for the student?

This course will introduce students to the theories and engineering applications of statistical methods, data analysis, experiment design, and data visualization.

Teaching method planned:

Lecture

Textbook and/or materials planned (including electronic/multimedia):

Statistics for Engineers and Scientist, William Navidi, McGraw-Hill, 2015 (ISBN: 978-0-07-340133-1).

Course Content: (Please explain the content of the course in enough detail so that the Academic Affairs Committee can make an informed judgment. Include a syllabus for the course.)

This course will introduce students to the theories and engineering applications of statistical methods, data analysis, experiment design, and data visualization. A major objective of this course is to develop students' analytical capabilities on datasets, including the visualization and communication of observations in addition to the application of statistical, mathematical, and probabilistic analytical methods, to engineering challenges.

Syllabus for Proposed Course:

Francis Marion University
Industrial Engineering Program
Course Syllabus – Fall 2019

ENGR 320 Statistics for Engineers

Course Description:

This course will introduce students to the theories and engineering applications of statistical methods, data analysis, experimental design, and data visualization. A major objective of this course is to develop students' analytical capabilities on datasets, including the visualization and communication of observations in addition to the application of statistical, mathematical, and probabilistic analytical methods, to engineering challenges.

Educational Objectives:

- Develop students' ability to apply statistical methods.
- Develop students' ability to visualize and interpret datasets.
- Develop students' ability to design and analyze experiments related to engineering.

Instructor: Brett Shields
Office: 101B
Office hours: MWF: 10:00am-11:00am, WF: 1:30pm-3:30pm. TTH: 10:00 am - 11:00noon, or by appointment.
Phone: (843) 661-1626
Email: bshields@fmarion.edu

Class Meeting Time and Room:
MWF 11:30-12:20; MSB 106

Suggested Text:

Statistics for Engineers and Scientist, William Navidi, McGraw-Hill, 2015 (ISBN: 978-0-07-340133-1).

Grading Policy:

Any late assignment will be decreased one letter grade for every 24 hours the assignment is late. Exceptions to this policy must be cleared with the professor prior to the assignment's due date. The grading scale is as follows. Note: I reserve the right to increase your grade based on class participation.

90 - 100	A
88 - 89	B+
80 - 87	B
78 - 79	C+
70 - 77	C

68 - 69	D+
60 - 67	D
below 60	F

The grading will be based on the following:

Homework	15%
Quizzes	15%
Midterm	25%
Final	25%
Project	20%
Total	100%

Class Policies

- **Cell phone/tablet use will not be tolerated during class. Please keep these items on silent for the duration of the class.**
- **Attendance for the course follows that outlined in the FMU policy.**

Academic Misconduct

Plagiarism is a violation of FMU's honor code (please refer to the Academic Integrity Policy in your student handbook). Copying assignments/tests from other sources, including online and past/present students, is a form of Plagiarism, and will result in a formal report to the Office of the Provost. Any instance of cheating will be reported and appropriate action taken (which includes possible failure of the course).

Civility in the Classroom

Students will conduct themselves with civility and respect towards all individuals in the classroom.

Students with Special Accommodations Statement

Special accommodations will be made for students with certified disabilities at the request of the student.

*This syllabus is subject to change at any point during the semester.

FRANCIS MARION UNIVERSITY: DESCRIPTION OF PROPOSED NEW COURSE or MODIFICATION OF AN EXISTING COURSE

Department/School Physics and Engineering **Date** August 11, 2018

Course No. or Level ENGR 480 **Title** Industrial Engineering Senior Design

Semester hours 4 Clock hours: Lecture 3 Laboratory

Prerequisites ENGR 420 and 467 Corequisites: 330, 356, 470

Enrollment expectation 6 to 10 per year

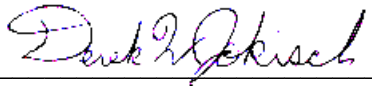
Indicate any course for which this course is a (an)

modification ENGR 480
(proposed change in course title, course description, course content or method of instruction)

substitute_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description Rahul Renu

Department Chairperson's/Dean's Signature 

Provost's Signature_____

Date of Implementation Spring 2020

Date of School/Department approval 8/20/18

Catalog description:

480 Industrial Engineering Senior Design (4) (Prerequisite: 420 and 467; Prerequisites/corequisites: 330, 356 and 470) S. The capstone design course for industrial engineering majors. Survey of methods, tools, and techniques used to plan, communicate, manage and control projects, and work on teams. Students work in teams to develop a

proposal for, and implement, an industrial engineering design project for an actual manufacturing or service industry client.

Purpose: 1. For Whom (generally?)

For industrial engineering majors.

2. What should the course do for the student?

Students work in teams to develop a proposal for, and implement, an industrial engineering design project for an actual manufacturing or service industry client.

Teaching method planned:

Student/team projects

Textbook and/or materials planned (including electronic/multimedia):

None.

Course Content: (Please explain the content of the course in enough detail so that the Academic Affairs Committee can make an informed judgment. Include a syllabus for the course.)

The capstone design course for industrial engineering majors. Survey of methods, tools, and techniques used to plan, communicate, manage and control projects, and work on teams. Students work in teams to develop a proposal for, and implement, an industrial engineering design project for an actual manufacturing or service industry client.

Syllabus for Proposed Course:

ENGR480 – Industrial Engineering Senior Design
Course Syllabus

INSTRUCTOR: Dr. Rahul S. Renu

OFFICE: MSB 101-B

OFFICE HOURS: Monday 930AM to 1130AM; Tuesday 1PM to 3PM; Or by appointment

EMAIL: rrenu@fmarion.edu

COURSE DESCRIPTION

The capstone design course for industrial engineering majors. Survey of methods, tool and techniques used to plan, communicate, manage and control projects and work on teams. Students work in teams to develop a proposal for, and implement, an industrial engineering design project for an actual manufacturing or service industry client.

CO/PREREQUISTES

Prerequisites: ENGR420, EGNR467;
Pre/Corequisite: ENGR330, ENGR356, ENGR470;

REQUIRED TEXT BOOK

None.

COURSE MEETING TIME AND LOCATION

T Th	830AM – 945AM	MSB106

COURSE OBJECTIVES

By successfully completing this course, the students will:

- Display an ability to apply industrial engineering principles to solve real-world problems.
- Be able to apply the engineering design process to solve problems with multiple realistic constraints.
- Demonstrate the knowledge of, and ability to apply engineering standards and codes.
- Be able to communicate effectively and work in an engineering team.

EXPECTATIONS

Work ethically. Work hard. This **your** opportunity to grow as an engineer.

100% effort on all work performed.

Present your work professionally.

Be punctual.

You are expected to check your **student (fmarion.edu) email and Blackboard regularly**. Course updates and notifications will be communicated to you through either your student email, or Blackboard, or both.

COURSE POLICIES

- If you decide to withdraw from the course, you should do so following FMU policies, dates, and procedures.
- Students may leave the classroom if the instructor is more than 15 minutes late.
- Students must be on time for class.
- There will be unannounced "pop" quizzes. There are no make-up pop-quizzes.
- NO CELLPHONES ALLOWED.
- In-class Decorum: You are encouraged to discuss course-related topics during in-class work times, but you are expected to pay quiet attention when your instructor is speaking. No tobacco products of any kind are acceptable for use in the class room.

The schedule, policies, procedures, and assignments in this course are subject to change to improve learning outcomes or by class-instructor consensus.

GRADING

Your final grade will be determined by your performance on the following criterion.

Project	90%
Class Participation and Attendance	10%

GRADING SCALE

100 - 90	**=**	**A**
89 - 88	**=**	**B+**
87 - 80	**=**	**B**
79 - 78	**=**	**C+**
77 - 70	**=**	**C**
69 - 68	**=**	**D+**
67 - 60	**=**	**D**
< 60	**=**	**F**

ACADEMIC INTEGRITY

Plagiarism and collusion are common ways of violating FMU's honor code (please refer to FMU's Academic Integrity Policy in your student handbook). Copying assignments from any other source is strictly prohibited and is a form of Plagiarism. However, I encourage you to discuss class-related topics with your classmates. The interaction of teaching and learning within a group setting is a great way to learn the principles taught in class.

The first time a student is found responsible for academic dishonesty on an assignment or quiz, he/she will receive a zero on their assignment and must attend a workshop on Plagiarism. Further incidents will result on dropping the course with an F. If academic dishonesty occurs during a test, student will be dropped from course with an F. Further incidents may result in suspension and/or expulsion.

PROJECTED CLASS TOPICS

1. Engineering Design Process
2. Engineering Standards and Codes
3. Technical Communication
4. Teamwork
5. Review of Industrial Engineering principles

*Topics are subject to change or may not be covered. Changes will be notified in class

RELATIONSHIP TO ABET COURSE OUTCOMES

Outcome C: an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

Outcome E: an ability to identify, formulate, and solve engineering problems

Outcome G: an ability to communicate effectively

Outcome I: a recognition of the need for, and an ability to engage in life-long learning

Outcome K: an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

FRANCIS MARION UNIVERSITY: DESCRIPTION OF PROPOSED NEW COURSE or MODIFICATION OF AN EXISTING COURSE

Department/School Physics and Engineering **Date** August 20, 2018

Course No. or Level ENGR 397 **Title** Undergraduate Research in Engineering

Semester hours 3 Clock hours: Lecture 3 Laboratory

Prerequisites ENGR 320

Enrollment expectation a few per year

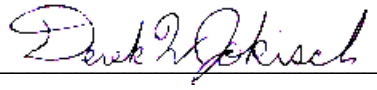
Indicate any course for which this course is a (an)

modification ENGR 397
(proposed change in course title, course description, course content or method of instruction)

substitute_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description Rahul Renu

Department Chairperson's/Dean's Signature 

Provost's Signature_____

Date of Implementation Spring 2021

Date of School/Department approval 8/20/18

Catalog description:

397 Undergraduate Research in Engineering (3), (2), or (1) (Prerequisite: 320) F, S. This course will be open to students in their junior or senior year. Working with an engineering faculty member, each student enrolled will be assigned to one or more engineering research projects. The project(s) assigned will be determined based on the interest of the student. The

number of hours will be based on the complexity of the project and the time required to complete the project(s). The culmination of this course will require a written report and a formal oral presentation.

Purpose: 1. For Whom (generally?)

For industrial and mechanical engineering majors.

2. What should the course do for the student?

This course is designed to allow students to complete supervised undergraduate research.

Teaching method planned:

Supervised research.

Textbook and/or materials planned (including electronic/multimedia):

None

Course Content: (Please explain the content of the course in enough detail so that the Academic Affairs Committee can make an informed judgment. Include a syllabus for the course.)

The student will meet with the advising faculty member to discuss research progress. The frequency of these meetings will be predetermined by the faculty member and communicated to the student. The faculty member will advise the student on how to explore literature, identify research gaps and perform research to address these gaps. The faculty member will also advise the student during the preparation of a written report and formal oral presentation.

Syllabus for Proposed Course:

ENGR397 – Undergraduate Research in Engineering

Course Syllabus

INSTRUCTOR: Dr. Rahul Sharan Renu
OFFICE: MSB 101
OFFICE HOURS: Weekdays: 9:30AM to 10:30AM
Or by appointment

EMAIL: rrenu@fmarion.edu

COURSE DESCRIPTION

This course will be open to students in their junior or senior year. Working with engineering faculty member, each student enrolled will be assigned to one or more engineering research projects. The project(s) assigned will be determined based on the interest of the student. The number of hours will be based on the complexity of the project and the time required to complete the project(s). The culmination of this course will require a written report and a formal oral presentation.

PREREQUISTES

ENGR 320

REQUIRED TEXT BOOK

None.

COURSE MEETING TIME AND LOCATION

Decided based on student and faculty availability.

STUDENT LEARNING OBJECTIVES

By successfully completing this course, the students will learn how to:

- Perform a literature review.
- Perform ethical research.
- Write a research report/paper.

COURSE FORMAT

The student will meet with the advising faculty member to discuss research progress. The frequency of these meetings will be predetermined by the faculty member and communicated to the student. The faculty member will advise the student on how to explore literature, identify research gaps and perform research to address these gaps. The faculty member will also advise the student during the preparation of a written report and formal oral presentation.

COMMUNICATION

You are expected to check your student (fmarion.edu) email and Blackboard regularly. Course updates and notifications will be communicated to you through either your student email, or Blackboard, or both.

COURSE POLICIES

- A student enrolled in ENGR 397 must have successfully passed ENGR 320.
- If you decide to withdraw from the course, you should do so following FMU policies, dates, and procedures

The schedule, policies, procedures, and assignments in this course are subject to change to improve learning outcomes or by class-instructor consensus.

GRADING

Your final grade will be determined by the following factors.

Research Performed	40%
Meeting Attendance	10%
Written Report	25%
Oral Presentation	25%

GRADING SCALE

100 - 90	**=**	**A**
89 - 88	**=**	**B+**
87 - 80	**=**	**B**
79 - 78	**=**	**C+**
77 - 70	**=**	**C**
69 - 68	**=**	**D+**
67 - 60	**=**	**D**
< 60	**=**	**F**

ACADEMIC INTEGRITY

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The first time a student is found responsible for academic dishonesty on an assignment or quiz, he/she will receive a zero on their assignment and must attend a workshop on Plagiarism. Further incidents will result on dropping the course with an F. If academic dishonesty occurs during a test, student will be dropped from course with an F. Further incidents may result in suspension and/or expulsion.