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

Department/School__**Physics and Astronomy**_____Date_____**October 2012**

Course No. or Level **ENGR 101**_Title **Introduction to Industrial Engineering**

Semester hours__**3**___Clock hours: Lecture____**3**_____Laboratory____**0**____

Prerequisite/Corequisite__**MATH 201**_____

Enrollment expectation_____**25**_____

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

modification_____**N/A**_____
(proposed change in course title, course description, course content or method of instruction)

substitute_____**N/A**_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate_____**N/A**_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description_David Peterson_____

Department Chairperson's/Dean's Signature_____

Provost's Signature_____

Date of Implementation_____**Spring 2014**_____

Date of School/Department approval_____

Catalog description: Introduction to the Industrial Engineering (IE) profession, applications of IE principles and approaches, integrated systems approach to problem solving, overall goals and components of the IE degree program, career opportunities, development of engineering work skills, oral and written communication skills, and the importance of professionalism, ethics, contemporary challenges, and lifelong learning.

Purpose

1. For Whom (generally?) **Majors in industrial engineering, and those interested in learning more about the discipline.**
2. What should the course do for the student? **This course serves as an introduction to the discipline of engineering, and industrial engineering in**

particular. Students will learn about industrial engineering as a career and will learn what is expected for both industrial engineering students and practicing industrial engineers. Students will learn the importance of critical thinking, attention to detail, neatness, organization and communication.

Teaching method planned
Lecture with frequent in-class demonstrations and problems. Plant tours will be included to provide real-world demonstrations of industrial engineering work. Active class discussion will be encouraged.

Textbook and/or materials planned (including electronic/multimedia)
Book: Turner, W.C., Mize, J.H., Case, K.E., Nazemetz, J.W., Introduction to Industrial and Systems Engineering (3rd edition), John Wiley & Sons, 2003.

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 provide students with an introduction to the foundations and fundamentals of Industrial Engineering (IE) as both an academic program at Francis Marion and as a profession. During this course, students will develop the skill to recognize IE problems (e.g., opportunities and challenges), and understand the types of technical and professional skills and competencies that are needed to address these problems. The course will expose students to the breadth of the discipline so they can develop a holistic and integrated view of the profession before advancing to remaining courses in the program. This course will also introduce the student to the Francis Marion IE program, including curriculum requirements, policies, resources, and strategies for successful degree completion.**

When completed, forward to the Office of the Provost. 9/03

COURSE SYLLABUS
ENGR 101
Introduction to Industrial Engineering

Course Description
Introduction to the Industrial Engineering (IE) profession, applications of IE principles and approaches, integrated systems approach to problem solving, overall goals and components of the IE degree program, 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
Having successfully completed this course, the student will be able to

- demonstrate an understanding of IE development and history as a discipline and profession and describe current career opportunities across multiple industries and contexts;
- describe the areas of technical concentration, core concepts and principles, and approaches that underpin IE;
- apply systems thinking principles to define and identify problems that IEs address;
- recognize the breadth and importance of contemporary challenges of the IE profession, in particular the importance of continued professional development and lifelong learning;
- describe the curriculum and policy requirements, educational opportunities, and strategies for successful degree completion for the undergraduate degree in IE;
- identify and analyze ethical issues in IE problem contexts; and
- demonstrate effective oral and written communication skills by applying appropriate tools and techniques in communicating and presenting results and/or ideas

Textbook
Turner, W.C., Mize, J.H., Case, K.E., Nazemetz, J.W., Introduction to Industrial and Systems Engineering (3rd edition), John Wiley & Sons, 2003.

Class Format
Class sessions will be primarily lecture, with in-class examples and problem solving. This course is taught at an introductory level but will still include engineering analysis and mathematics at an appropriate level.

Class Participation
Taking notes and active participation in problem solving exercises is important for success in this class. Come prepared to ask questions, participate in class discussions, and solve in-class problems as they are given. You should have no distractions during class (e.g., cell phones, e-mail, web surfing).

Neatness, Legibility, and Professionalism in Submitted Work
These attributes are fundamental to successful engineering practice. It is expected that students learn, and apply, the ability to express ideas in a well-ordered, clear, and concise manner, and to present material in a highly legible format. Students are expected to strive for these objectives in all items submitted for the course. Marks will be deducted if professionalism is lacking, e.g., homework is not identified, questions are answered out-of-order, papers are not stapled (single staple, upper left-hand corner) or stapled out-of-order, units are not specified, etc. All assignments should be typed.

Homework
Homework problems will be assigned regularly. Homework is intended to improve understanding of course material by providing an opportunity to apply the principles and techniques presented in the course.

Academic Integrity
Plagiarism in any form is unacceptable and will be dealt with according to the University's academic integrity policy. Please acquaint yourself with the policy as set forth in the student handbook. Note that plagiarism will **AT LEAST** result in failure on the assignment.

Attendance
Standard University policy.

Makeups
You are expected to turn in all assignments and be present for all tests. Late assignments will not be accepted. No make-up tests will be given. If an excused reason, such as illness, is accepted, the credit for missed tests will be added to the final exam.

Disability Accommodations
If you have a disability that qualifies you for academic accommodations, please provide a letter of verification from the Office of Counseling and Testing. If you would like to discuss your accommodations, please contact the instructor as soon as possible.

Grading
Your overall course grade will be determined using the university scale. Grades will be assigned based on performance using the following percentages.

Homework	25%
Test #1	25%
Test #2	25%
Final exam	25%
TOTAL	**100%**

Course content

Week	***Topic***	***Text Reading Assignment***
1	Introduction, course management; introduction to the industrial engineering program	Chapter 1
2	History and evolution of the industrial engineering profession	Chapters 1 and 2
3	Professionalism, ethics, and career skills	Course handout
4	Industrial processes and manufacturing	Chapter 3
5	Facility layout and location	Chapter 4
6	Material handling, distribution, and routing	Chapter 5
7	Work design and measurement	Chapter 6
8	Operations planning and control	Chapter 7
9	Quality control	Chapter 8
10	Human factors	Chapter 11
11	Deterministic mathematical models	Chapter 14
12	Probabilistic models	Chapter 15
13	Project management	Chapter 17
14	Systems concepts	Chapter 18
15	IE curriculum; educational and career opportunities	Course handout

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

Department/School__**Physics and Astronomy**_____Date_____**09/1/12**_____

Course No. or Level__**ENGR 201**_Title___**Engineering Graphics._**

Semester hours__**3**___Clock hours: Lecture____**3**_____Laboratory____**0**____

Prerequisites__**None**_____

Enrollment expectation_____**20**_____

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

modification_____**N/A**_____
(proposed change in course title, course description, course content or method of instruction)

substitute_____**N/A**_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate_____**N/A**_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description____**David Peterson**_____

Department Chairperson's/Dean's Signature_____

Provost's Signature_____

Date of Implementation_____**Spring 2014**_____

Date of School/Department approval_____

Catalog description:
This course introduces the student to the operation of a Computer Aided Drafting (CAD) system, with an emphasis on the design component, using AutoCAD as the computing tool. The course includes interaction with a CAD station to produce technical drawings. The student will independently learn to produce drawings using AutoCAD and will learn the value of CAD and design in both industrial and service environments.

Purpose

1. For Whom (generally?) **Majors in industrial engineering**
2. What should the course do for the student? **Industrial engineering students will learn the fundamentals of computer-aided design and learn to use the**

computer-based tools used to create those designs. Students will be able to use this knowledge in future courses such as manufacturing, facility planning, and human factors.

Teaching method planned
Lecture with significant in-class work. Each class will begin with a time of lecture, followed by student hands-on work on the platform (AutoCAD) with assistance from the course instructor.

Textbook and/or materials planned (including electronic/multimedia)
Book: Grabowski, Ralph. The illustrated AutoCAD Quick Reference: 2013 and Beyond. Autodesk Press, 2012. ISBN: 978-1133963875.

Lang, Kevin. AutoCAD Tutor for Engineering Graphics: 2013 and Beyond. Autodesk Press, 2012. ISBN: 978-1133960393.

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 introduces the student to the operation of a Computer Aided Drafting system, with an emphasis on the design component, using AutoCAD as the computing tool. The course includes interaction with a CAD station to produce technical drawings. The student will learn to independently produce drawings using AutoCAD and the value of CAD and design in both industrial and service environments.

When completed, forward to the Office of the Provost. 9/03

Course Syllabus
ENGR 201
Engineering Graphics.

Course Description
This course introduces the student to the operation of a Computer Aided Drafting (CAD) system, with an emphasis on the design component, using AutoCAD as the computing tool. The course includes interaction with a CAD station to produce technical drawings. The student will independently learn to produce drawings using AutoCAD and will learn the value of CAD and design in both industrial and service environments.

Course Objectives
Having successfully completed this course, the student will be able to

- describe the role of CAD in the industrial and service environments;
- describe the AutoCAD basics of views, drawing layout, position of dimensions, and text style;
- demonstrate familiarity with the commands and capabilities of AutoCAD; and
- produce two-dimensional drawings utilizing AutoCAD.

REQUIRED TEXTS
Grabowski, Ralph. **The illustrated AutoCAD Quick Reference: 2013 and Beyond**. Autodesk Press, 2012. ISBN: 978-1133963875.

Lang, Kevin. **AutoCAD Tutor for Engineering Graphics: 2013 and Beyond**. Autodesk Press, 2012. ISBN: 978-1133960393.

Course Requirements

Class Format
Basic information will be provided in a lecture atmosphere; then the instructor will act as a tutor with one-on-one help. Students will work on assignments in class and on their own time after class.

Class Participation
Paying close attention and active participation in class is essential. You will "learn as you do" in this class—there are no shortcuts. You should have no distractions during class (e.g., cell phones, e-mail, web surfing).

Drawings
The homework in this class consists of the drawings that are assigned each week. You will work on these both in class and on your own time, and they will be due, ordinarily, one or two weeks after they are assigned. Some of the drawings will get quite complex.

Neatness and following instructions are critical in the engineering profession. As you complete your assignments, you will print (plot) them. Each must contain your name, correct drawing number, and date. Failure to include these elements will result in your submission being considered late. You will take the drawings to the instructor for his/her

signature. That signature only indicates that the instructor has seen your work; it does not indicate any grade. (This serves as a basic-level design review, frequently seen in industry.) If the instructor refuses to sign the drawing that means it is totally unacceptable. If you don't bother to make changes to the drawing, so that the instructor will sign it, it will receive a grade of zero when it is turned in for grading.

Academic Integrity
Plagiarism in any form is unacceptable and will be dealt with according to the University's academic integrity policy. Please acquaint yourself with the policy as set forth in the student handbook. Note that plagiarism will **AT LEAST** result in failure on the assignment.

Attendance
Standard university policy. Regular attendance, punctuality, and attentiveness are expected. Absences in excess of the limit set by University policy (four absences, or twice the number of weekly class meetings) will result in the student's receiving a failing grade.

Makeups
You are expected to turn in all assignments and be present for all tests. Late drawings will not be accepted. No make-up tests will be given. If an excused reason, such as illness, is accepted, the credit for missed tests will be added to the final exam.

Grading
Standard university scale.

Grades will be assigned based on performance using the following percentages.

Drawings	60%
Test #1	20%
Final exam	20%
TOTAL	**100%**

Course content

Class Schedule

Week	***Topic***
1	Introduction, course management; accuracy standards; set snap and grid; using the mouse; drawing using Cartesian coordinates
2	Toggle; lines and arc; circles; redraw; editing; file handling; link types
3	Plotting; units; layers; inserting title blocks; orthographic projection
4	Scales; setting limits and units; ellipse, solid, polyline; copy; draw point; setting different types
5	Scales; polygons; selection windows; OOPS; inserting; dimensioning
6	More dimensioning; layers; line types and scales; colors
7	Edit move; copy; fillet; chamfer; break; offset
8	Edit divide; extend; measure; rotate
9	Scale; stretch; trim
10	Fonts for text; parallel lines; architectural techniques
11	Saving and copying files; edit change; mirror; hatch
12	Review line types; more on layers and insert; manufacturing needs and techniques
13	Explode; aperture and pickbox sizes
14	Dimension variables; part viewing; 3D considerations
15	Special considerations in service and manufacturing

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

Department/School__**Physics and Astronomy**_____Date_____**10/12/12**_____

Course No. or Level__**ENGR 220**_Title_____**Materials Engineering**_

Semester hours__**3**___Clock hours: Lecture____**3**_____Laboratory____**0**____

Prerequisites__**CHEM 101, PHYS 201**_____

Enrollment expectation_____**20**_____

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

modification_____**N/A**_____
(proposed change in course title, course description, course content or method of instruction)

substitute_____**N/A**_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate_____**N/A**_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description___David Peterson_____

Department Chairperson's/Dean's Signature_____

Provost's Signature_____

Date of Implementation_____**Spring 2015**_____

Date of School/Department approval_____

Catalog description:
This course is designed to introduce students to the structures and properties of metals, ceramics, polymers, and composites. In addition, students will gain an understanding of the processing and design limitations of these materials, as well as being introduced to new classes of materials being developed to meet the ever-expanding range of material requirements. Use in manufacturing is emphasized.
Purpose

1. For Whom (generally?) **Majors in industrial engineering.**
2. What should the course do for the student? **This course will cover basic materials engineering, providing industrial engineering students exposure to the materials used in engineering artifacts with an emphasis in**

materials used in manufacturing processes. Students will learn structures and properties of a variety of materials (metals, ceramics, polymers, composites). This prepares the students for the manufacturing processes they will learn in a later class.

Teaching method planned
Lecture with significant problem solving. Work with software as appropriate.

Textbook and/or materials planned (including electronic/multimedia)
Book: W.D. Callister, W.D. Materials Science and Engineering –An Introduction (8th Edition), Wiley, 2010.

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 is designed to introduce the student to the structures and properties of metals, ceramics, polymers, and composites. In addition, students will gain an understanding of the processing and design limitations of these materials, as well as being introduced to new classes of materials being developed to meet the ever-expanding range of material requirements. Use in manufacturing is emphasized.

When completed, forward to the Office of the Provost. 9/03

Course Syllabus
ENGR 220
Materials Engineering

Course Description
This course is designed to introduce the student to the structures and properties of metals, ceramics, polymers, and composites. In addition, students will gain an understanding of the processing and design limitations of these materials, as well as being introduced to new classes of materials being developed to meet the ever-expanding range of material requirements. Use in manufacturing is emphasized.

Course Objectives
Having successfully completed this course, the student will be able to

- describe structures and properties of metals, polymers, ceramics, and composites;
- describe the manufacturing properties of studied materials;
- describe diffusion; and
- select material for manufacturing based on desired properties;

REQUIRED TEXT
W.D. Callister, W.D. **Materials Science and Engineering –An Introduction** (8th Edition), Wiley, 2010.

Course Requirements

Class Format
Class sessions will be lecture, with some in-class hands-on demonstrations. This course is engineering analysis in nature and includes the application of physics and basic chemistry.

Class Participation
Taking notes and active participation in problem solving exercises is important for success in this class. Come prepared to ask questions, participate in class discussions, and solve in-class problems as they are given. You should have no distractions during class (e.g., cell phones, e-mail, web surfing).

Homework
Homework problems will be assigned frequently. Homework is intended to improve your understanding of course material by giving you an opportunity to apply the principles and techniques presented in the course. Besides constituting 25% of your final grade, this will really help at test time—test questions are very similar to homework questions. Re-grading considerations on tests 1 and 2 will be limited to the 1-week period following the return of each test. Tests submitted for re-grading are subject to points being added or subtracted.

Academic Integrity
Plagiarism in any form is unacceptable and will be dealt with according to the University's academic integrity policy. Please acquaint yourself with the policy as set

forth in the student handbook. Note that plagiarism will **AT LEAST** result in failure on the assignment.

Attendance
Standard University attendance policy. Regular attendance, punctuality, and attentiveness are expected.

Makeups
You are expected to turn in all assignments and be present for all tests. Late homework will not be accepted. No make-up tests will be given. If an excused reason, such as illness, is accepted, the credit for missed tests will be added to the final exam.

Grading
Standard University scale.

Grades will be assigned based on performance using the following percentages.

Homework	25%
Test #1	25%
Test #2	25%
Final exam	25%
TOTAL	**100%**

Course content

Class Schedule

Week	***Topic***	***Text Reading Assignment ****
1	Introduction, course management; atomic structure; bonding; crystal structures	Chapters 1, 2, 3
2	Crystal structures; imperfections in solids	Chapter 4
3	Diffusion	Chapter 5
4	Mechanical properties of metals	Chapter 6
5	Dislocations, strengthening mechanisms	Chapter 7
6	Introduction to failure; fracture mechanics; impact testing	Chapter 8
7	Fatigue; creep; impact tests	Chapter 8
8	Phase diagrams, the Iron-Carbon system	Chapter 9
9	Phase transformation in metals; thermal processing of alloys	Chapters 10, 11
10	Thermal processing of alloys; ceramic materials	Chapters 11, 12
11	Ceramic materials; materials selection	Chapter 13
12	Polymeric materials	Chapters 14,15
13	Composite materials	Chapter 16
14	Composite materials; environmental degradation	Chapters 16, 17
15	Environmental degradation; review	Chapter 17

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

Department/School__**Physics and Astronomy** Date_____October 2012_____

Course No. or Level **ENGR 301** Title__**Engineering Mechanics**_____

Semester hours__**3**___Clock hours: Lecture____**3**_____Laboratory____**0**____

Prerequisites__**PHYS 201, MATH 202**_____
Corequisite _____

Enrollment expectation_____**20**_____

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

modification_____**N/A**_____
(proposed change in course title, course description, course content or method of instruction)

substitute_____**N/A**_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate_____**N/A**_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description__**R. Seth Smith**_____

Department Chairperson's/Dean's Signature_____

Provost's Signature_____

Date of Implementation_____**Fall 2015**_____

Date of School/Department approval_____

Catalog description:

301 Engineering Mechanics (3) (Prerequisite: PHYS 201 and MATH 202) F. An introduction to statics and dynamics. Topics include static equilibrium of particles, rigid bodies, and trusses; rotational motion; torque; moment of inertia; Newton's Laws of Motion; linear and angular momentum methods; work and energy methods; kinematics of particles and rigid bodies; applications of vector analysis; and structural analysis of joints and trusses.

Purpose

1. For Whom (generally?) **Majors in industrial engineering**.
2. What should the course do for the student? **By focusing on both theory and applications, the Engineering Mechanics course is designed to help students to develop a mastery at the elementary level of both the concepts and details of statics and dynamics. Since Engineering Mechanics involves the application of scientific principles to engineering analysis and design, it is fundamental to industrial engineering.**

Teaching method planned
Lecture with frequent in-class demonstrations and problems.

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

Bedford and Fowler, Engineering Mechanics: Statics and Dynamics, 5th Edition, Pearson Prentice Hall, 2008.

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.) **Engineering Mechanics will provide an introduction to statics and dynamics. Students will learn methods for analyzing particles, rigid bodies, trusses, and joints. The methods will include static equilibrium techniques, Newton's Laws of Motion, momentum methods, and energy methods. This course provides the basic foundation for analyzing many of the mechanical structures that are encountered in engineering. As such, Engineering Mechanics is fundamental to the training of industrial engineers.**

When completed, forward to the Office of the Provost. 9/03

ENGR 301 Engineering Mechanics Syllabus

Course Description
ENGR 301 Engineering Mechanics (3) (Prerequisite: PHYS 201 and MATH 202) F. An introduction to statics and dynamics, including the following: static equilibrium for particles, rigid bodies, and trusses; rotational motion; torque; moment of inertia; Newton's Laws of Motion; linear and angular momentum; work and energy; kinematics of particles and rigid bodies; applications of vector analysis; and structural analysis of joints and trusses.

Course Objectives
Having successfully completed this course, the student will be able to do the following:

- Model and analyze simple static mechanical systems, including particle and rigid body equilibrium in 2D and 3D, 2D trusses, and dry friction,
- Model and analyze simple dynamic mechanical systems, including single particle curvilinear motion and two particle impact,
- Appropriately diagram a mechanical system, including the use of free body diagrams, and
- Select the appropriate analysis methods for mechanical systems, including static equilibrium techniques, Newton's Laws of Motion, energy and momentum methods, and combinations of methods for multi-stage problems.

Textbook
Bedford and Fowler, Engineering Mechanics: Statics and Dynamics, 5th Edition, Pearson Prentice Hall, 2008.

Class Format
Class sessions will be primarily lecture, with heavy reliance on example problems and in-class problem solving. This course is primarily engineering analysis in nature and involves the application of mathematics, including derivative and integral calculus.

Class Participation
Taking notes and active participation in problem solving exercises is important for success in this class. Come prepared to ask questions, participate in class discussions, and solve in-class problems as they are given. You should have no distractions during class (e.g., cell phones, e-mail, web surfing).

Homework
Homework problems will be assigned regularly. Homework is intended to improve understanding of course material by providing an opportunity to apply the principles and techniques presented in the course.

Academic Integrity
Plagiarism in any form is unacceptable and will be dealt with according to the University's academic integrity policy. Please acquaint yourself with the policy as set forth in the student handbook. Note that plagiarism will **AT LEAST** result in failure on the assignment.

Attendance
Standard University policy.

Makeups
You are expected to turn in all assignments and be present for all tests. Late assignments will not be accepted. No make-up tests will be given. If an excused reason, such as illness, is accepted, the credit for missed tests will be added to the final exam.

Grading
Your overall course grade will be determined using the university scale.
Grades will be assigned based on performance using the following percentages.

Homework	25%
Test #1	25%
Test #2	25%
Final exam	25%
TOTAL	**100%**

Course content

Week	***Topic***	***Text Reading Assignment***
1	Introduction, course management; foundations of engineering mechanics	Chapter 1
2	Statics of particles	Chapter 2
3	Statics of particles	Chapter 3
4	Rigid bodies: Equivalent systems of forces	Chapter 4
5	Rigid bodies: Equivalent systems of forces	
6	Equilibrium of rigid bodies	Chapter 5
7	Trusses	Chapter 6
8	Friction	Chapter 9
9	Kinematics of particles	Chapter 13
10	Kinematics of particles	
11	Kinematics of particles: Newton's second law	Chapter 14
12	Kinematics of particles: Energy and momentum methods	Chapter 15
13	Kinematics of particles: Energy and momentum methods	Chapter 16
14	Kinematics of particles: Energy and momentum methods	
15	Review	

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

Department/School__**Physics and Astronomy**_____Date__**October 2012**_____

Course No. or Level __**ENGR 310**___Title **Electronics and Instrumentation**

Semester hours__**4**___Clock hours: Lecture____**3**_____Laboratory____3____

Prerequisites__**PHYS 202, PHYS 220**_____

Enrollment expectation_____**20**_____

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

modification_____**N/A**_____
(proposed change in course title, course description, course content or method of instruction)

substitute_____**N/A**_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate_____**N/A**_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description___Philip C. Fulmer_____

Department Chairperson's/Dean's Signature_____

Provost's Signature_____

Date of Implementation_____**Fall 2015**_____

Date of School/Department approval_____

Catalog description:
310 Electronics and Instrumentation (4) (Prerequisites: Phys 202 and Phys 220) F. This class provides an introduction to analog and digital electronics with specific application to instrumentation used in scientific and engineering applications. Topics include analog signal processing, power supplies, sensors (theory and interpretation of sensor data), and microcontrollers with heavy emphasis on design projects to achieve practical results and give insights on troubleshooting electronic equipment used in the workplace. Credit cannot be received for ENGR 310 and PHYS 310.

Purpose

1. For Whom (generally?) **Majors in industrial engineering**
2. What should the course do for the student? **Every engineering environment involves the use of electronic equipment for process control, measurements, or some other purpose. This class will teach the basics of electronics and troubleshooting from a practical perspective. Basics of microcontrollers and sensors, considerations of electrical requirements, and the use of sensor measurements to control electrical systems will be explored and developed. Design of circuitry and equipment with attention to practical details will be an integral part of the course; interpretation of sensor measurements, understanding how sensors work, and calibration of the sensors will be emphasized.**

Teaching method planned

Lecture with frequent in-class demonstrations and problems. Circuit simulation software demonstrated in class and used to explain circuit behavior. Microcontroller-based laboratory experiments and design projects to develop student understanding of engineering principles.

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

Book: Paul Scherz and Simon Monk, *Practical Electronics for Inventors*, 3rd edition, McGraw-Hill/TAB Electronics, 2013.

Microcontroller: Arduino open source hardware with IDE and associated components.

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.)

Industrial engineers will work in facilities where electronics are used for a variety of purpose. Whether the electronics are used for power supplies for equipment or for computer-based control of process flow, understanding how these function will aid the engineer in (a) troubleshooting equipment, (b) questioning the accuracy of electronic controls, and (c) making decisions on purchase of new equipment. This class and laboratory is intended to give the industrial engineer a practical functional experience in understanding the basics of circuits, electrical measurements, and use of instrumentation. Heavy emphasis will be placed on design of circuits to achieve a particular goal and on basic troubleshooting tips and techniques.

When completed, forward to the Office of the Provost. 9/03

Course Syllabus
ENGR 310
Electronics and Instrumentation

Course Description
This class provides an introduction to analog and digital electronics with specific application to instrumentation used in scientific and engineering applications. Topics include analog signal processing, power supplies, sensors (theory and interpretation of sensor data), and microcontrollers with heavy emphasis on design projects to achieve practical results and give insights on troubleshooting electronic equipment used in the workplace. Credit cannot be received for ENGR 310 and PHYS 310.

Course Objectives
Having successfully completed this course, the student will be able to

- Analyze basic direct current circuits as combinations of parallel and series resistances
- Use capacitors in a circuit to provide timing characteristics and to store electric charge to inject into a circuit when needed
- Design and troubleshoot AC-to-DC power supply circuits
- Evaluate transducers/sensors for use in instrumentation and make judgment decisions on the appropriate sensor to use for a particular application
- Design input/output circuitry for physical computing using the Arduino open-source hardware, including communicating with computer systems and sending output to standalone displays such as LCD screens

Textbook
Paul Scherz and Simon Monk, *Practical Electronics for Inventors*, 3rd edition, McGraw-Hill/TAB Electronics, 2013.

Class Format
Class sessions will be primarily lecture, with heavy reliance on example problems and in-class problem solving. This course is primarily electronic engineering analysis in nature and includes the application of mathematics and computer-based solution tools. Individual design projects will be required throughout the semester for the student to demonstrate proficiency in designing the solution a problem. The design will include successful demonstration of the circuit in addition to an engineering design package that describes the assumptions and methods used in the design.

Class Participation
Taking notes and active participation in problem solving exercises is important for success in this class. Come prepared to ask questions, participate in class discussions, and solve in-class problems as they are given. You should have no distractions during class (e.g., cell phones, e-mail, web surfing).

Design Projects
Individual design projects will be an integral part of the class. In addition to guided laboratory exercises, you will be given basic real-world problems to solve with a circuit design. There may be more than one solution to achieve the desired end result; consequently, your design must include a write-up that (a) describes the problem; (b) lists any assumptions and decisions that affect how the design is achieved; and (c) documents the results of the circuit.

Academic Integrity
Plagiarism in any form is unacceptable and will be dealt with according to the University's academic integrity policy. Please acquaint yourself with the policy as set forth in the student handbook. Note that plagiarism will **AT LEAST** result in failure on the assignment.

Attendance
Standard University policy.

Makeups
You are expected to turn in all assignments and be present for all tests. Late assignments will not be accepted. No make-up tests will be given. If an excused reason, such as illness, is accepted, the credit for missed tests will be added to the final exam.

Grading
Your overall course grade will be determined using the university scale.
Grades will be assigned based on performance using the following percentages.

Laboratory Grade	40%
Tests/Design Projects	40%
Final Exam/Project	20%
TOTAL	**100%**

Course content
- Circuit symbols and diagrams; Ohm's Law and Power Law
- Resistances in series and parallel
- Voltage divider circuits
- Capacitors in direct current circuits
- Diodes and applications
- AC-to-DC power supplies, including transformers, diode bridges, and filtering
- Self-powered and external powered sensors/transducers
- Digital electronics basics; binary and hexadecimal numbering systems
- Physical computing fundamentals
- Input sensors for microcontrollers
- Output signals from microcontrollers
- Instrumentation design and troubleshooting

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

Department/School__**Physics and Astronomy**_____Date_____**09/1/12**_____

Course No. or Level__**ENGR 320**_Title__**Workplace Data Acquisition and Analysis**

Semester hours__**3**___Clock hours: Lecture____**3**_____Laboratory____**0**____

Prerequisites__**ENGR 101, ENGR 355**_____

Prerequisites/Corequisites **MATH 202, PHYS 220**

Enrollment expectation_____**20**_____

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

modification_____**N/A**_____
(proposed change in course title, course description, course content or method of instruction)

substitute_____**N/A**_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate_____**N/A**_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description____**David Peterson**_____

Department Chairperson's/Dean's Signature_____

Provost's Signature_____

Date of Implementation_____**Fall 2015**_____

Date of School/Department approval_____

Catalog description:
Methods for assessing the performance of both individuals and groups within a system. Data acquisition techniques include basic industrial engineering tools such as work analysis, work sampling, and work measurement, as well as automated procedures. Data storage and retrieval techniques are introduced. Variation in data, including an introduction to probability and statistics for proper analysis of data.

Purpose

1. For Whom (generally?) **Majors in industrial engineering.**
2. What should the course do for the student? **This course will provide industrial engineers initial exposure to the fundamental tasks of the profession—understanding the industrial workplace, acquiring and analyzing data from the workplace, particularly human performance data, and making decision recommendations based on their analysis. Students completing this class will be prepared to enter internship positions with industry.**

Teaching method planned

Lecture with significant problem solving of real-world examples. In-class discussion of current events related to class material. Work with software as appropriate.

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

Book: Niebel, B.N. and A. Freivalds. Methods, Standards, and Work Design (12th edition). McGraw-Hill, 2008. (Customized edition, selected chapters only.)

Montgomery, D.C. and G.C. Runger. Applied Statistics and Probability for Engineers (3rd edition). John Wiley and Sons, 2003. (Customized edition, selected chapters only.)

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 introduced methods for assessing and analyzing data on system performance, both of individuals and groups. Data are the key to assessment of any system, and this course will cover acquisition techniques including basic industrial engineering tools such as work analysis, work sampling, and work measurement, as well as automated procedures. Data storage and retrieval techniques using spreadsheets are introduced. It is important for students to understand data variation, so this class introduces probability concepts, probability distributions, and statistics for proper data analysis.

When completed, forward to the Office of the Provost. 9/03

Course Syllabus
ENGR 320
Workplace Data Acquisition and Analysis

Course Description
Methods for assessing the performance of both individuals and groups within a system. Data acquisition techniques include basic industrial engineering tools such as work analysis, work sampling, and work measurement, as well as automated procedures. Data storage and retrieval techniques are introduced. Variation in data, including an introduction to probability and statistics for proper analysis of data.

Course Objectives
Having successfully completed this course, the student will be able to

- describe the role of work measurement in the workplace, conduct a methods engineering study of a particular job, including methods analysis, time studies, and work sampling studies;
- acquire workplace data;
- adequately store and retrieve workplace data;
- describe data in terms of probabilities;
- solve problems in basic probability;
- determine proper probability distributions from workplace data;
- statistically reduce workplace data; and
- statistically analyze workplace data.

REQUIRED TEXTS
Niebel, B.N. and A. Freivalds. **Methods, Standards, and Work Design** (12th edition). McGraw-Hill, 2008. (Customized edition, selected chapters only.)

Montgomery, D.C. and G.C. Runger. **Applied Statistics and Probability for Engineers** (3rd edition). John Wiley and Sons, 2003. (Customized edition, selected chapters only.)

Course Requirements

Class Format
Class sessions will be primarily lecture, with the use of example problems using data from the workplace. This course is primarily engineering analysis in nature and includes the application of basic mathematics and elementary calculus. It is appropriate to have class discussion and guest speakers from industry to describe the data found in the workplace and its analysis.

Class Participation
Taking notes and active participation in problem solving exercises is important for success in this class. Come prepared to ask questions, participate in class discussions, and solve in-class problems as they are given. You should have no distractions during class (e.g., cell phones, e-mail, web surfing).

Homework
Homework problems will be assigned frequently. Homework is intended to improve your understanding of course material by giving you an opportunity to apply the principles and techniques presented in the course. Besides constituting 25% of your final grade, this will really help at test time—test questions are very similar to homework questions. Re-grading considerations on tests 1 and 2 will be limited to the 1-week period following the return of each test. Tests submitted for re-grading are subject to points being added or subtracted.

Academic Integrity
Plagiarism in any form is unacceptable and will be dealt with according to the University's academic integrity policy. Please acquaint yourself with the policy as set forth in the student handbook. Note that plagiarism will **AT LEAST** result in failure on the assignment.

Attendance
Standard university policy

Makeups
You are expected to turn in all assignments and be present for all tests. Late homework will not be accepted. No make-up tests will be given. If an excused reason, such as illness, is accepted, the credit for missed tests will be added to the final exam.

Grading
Your overall course grade will be determined using the university scale.

Grades will be assigned based on performance using the following percentages.

Homework	25%
Test #1	25%
Test #2	25%
Final exam	25%
TOTAL	**100%**

Course content

Class Schedule

Week	***Topic***	***Text Reading Assignment ****
1	Introduction, course management; introduction to the workplace and the criticality of data in decision making; introduction to probability	N: Chapter 1 M: Chapter 1
2	Probability	M: Chapter 2
3	Discrete random variables and probability distributions	M: Chapter 3
4	Continuous random variables and probability distributions	M: Chapter 4
5	Visualizing data and finding distributions	M: Chapter 6, handouts
6	Conducting statistical tests	M: Chapter 8
7	Conducting statistical tests	M: Chapter 9
8	Applications in workplace data analysis	Handouts
9	Time study	N: Chapter 10
10	Performance rating and allowances; standard data systems	N: Chapters 11, 12
11	Predetermined time systems	N: Chapter 13
12	Work sampling	N: Chapter 14
13	Work methods improvement	N: Chapters 3, 7
14	Automated acquisition of workplace data; using spreadsheets for data collection and storage	Handouts
15	Workplace data case study and solution presentations	Handouts

* N: Niebel text; M: Montgomery text

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

Department/School_**Physics and Astronomy** Date__October 2012

Course No. or Level__**ENGR 330**_Title_**Engineering Economy**_____

Semester hours__**3**___Clock hours: Lecture____**3**_____Laboratory____**0**____

Prerequisites__**MATH 201, ENGR 101, ENGR 355**_____

Enrollment expectation_____**20**_____

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

modification_____**N/A**_____
(proposed change in course title, course description, course content or method of instruction)

substitute_____**N/A**_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate_____**N/A**_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description___Dr. David Peterson_____

Department Chairperson's/Dean's Signature_____

Provost's Signature_____

Date of Implementation_____**Spring 2016**_____

Date of School/Department approval_____

Catalog description:
Concepts and techniques of analysis for evaluating the value of products/services, projects, and systems in relation to their cost. Economic and cost concepts, calculating economic equivalence, comparison of alternatives, purchase versus lease decisions, financial risk evaluation, cash flow sensitivity analysis, and after-tax analysis.

Purpose

1. For Whom (generally?) **Majors in industrial engineering**
2. What should the course do for the student? **This course will provide students with concepts and techniques of analysis for evaluating the value of products/services, projects, and systems in relation to their cost. Students will learn the basics of making engineering-related financial decisions in a business environment.**

Teaching method planned

Lecture with significant problem-solving examples. In-class discussion of current events related to class material. Work with spreadsheets for solving engineering economy problems.

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

Book: Sullivan, W., E. Wicks, and C. Koelling (2012). Engineering Economy, (15th edition), Pearson/Prentice-Hall.

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 engineering activities of analysis and design are not ends in themselves but are a means for meeting human needs. These activities are incomplete until the costs and value of the designs are characterized and the economic impacts of these activities are properly evaluated. Engineers must work within constraints on resources so it is essential that they be able to quantify the costs, consequences, and risks of proposed designs relative to time and the alternate investment opportunities available resources may provide.**

When completed, forward to the Office of the Provost. 9/03

Course Syllabus
ENGR 330
Engineering Economy

Course Description
Concepts and techniques of analysis for evaluating the value of products/services, projects, and systems in relation to their cost. Economic and cost concepts, calculating economic equivalence, comparison of alternatives, purchase versus lease decisions, financial risk evaluation, cash flow sensitivity analysis, and after-tax analysis.

Course Objectives
Having successfully completed this course, the student will be able to

- Perform equivalence calculations involving the present worth, annual worth, and Internal rate of return metrics of project profitability,
- Calculate effective interest rates,
- Compare mutually exclusive investment alternatives,
- Perform equipment replacement analysis,
- Evaluate the effect of depreciation and taxes on cash flows,
- Evaluate the effect of uncertainty through appropriate sensitivity analysis, and
- Describe product, process, and cost elements: fixed vs. variable and direct vs. indirect.

Text
Sullivan, W., E. Wicks, and C. Koelling (2012). Engineering Economy, (15th edition), Pearson/Prentice-Hall.

Class Format
Class sessions will be primarily lecture, with heavy reliance on example problems and in-class problem solving. This course is primarily engineering analysis in nature and includes the application of basic mathematics and elementary calculus. It is appropriate to have class discussion of real applications in the business world, including ethical considerations.

Class Participation
Taking notes and active participation in problem solving exercises is important for success in this class. Come prepared to ask questions, participate in class discussions, and solve in-class problems as they are given. You should have no distractions during class (e.g., cell phones, e-mail, web surfing).

Homework
Homework problems will be assigned weekly. Homework is intended to improve your understanding of course material by giving you an opportunity to apply the principles and techniques presented in the course. Besides constituting 25% of your final grade, this will really help at test time—test questions are very similar to homework questions.

Quizzes
Short quizzes will be given at least once each week during the semester on any topics covered in the previous lectures or assigned reading material for the day. Quizzes may take place at any time in the class period. **Make up quizzes will not be given, and points from missed quizzes cannot be recovered—there are no exceptions to this policy. We will drop the lowest two quiz scores in calculating your semester quiz grade.**

Academic Integrity
Plagiarism in any form is unacceptable and will be dealt with according to the University's academic integrity policy. Please acquaint yourself with the policy as set forth in the student handbook. Note that plagiarism will **AT LEAST** result in failure on the assignment.

Attendance
Standard University policy.

Makeups
You are expected to turn in all assignments and be present for all tests. Late homework will not be accepted. No make-up tests will be given. If an excused reason, such as illness, is accepted, the credit for missed tests will be added to the final exam.

Grading
Your overall course grade will be determined using the university scale.
Grades will be assigned based on performance using the following percentages.

Homework	25%
Test #1	20%
Test #2	20%
Quizzes	10%
Final exam	25%
TOTAL	**100%**

Course content

Class Schedule

Week	***Topic***	***Text Reading Assignment***
1	Introduction, course management; foundations of engineering econ; cost concepts	Chapter 1
2	Cost concepts (continued); present economy studies	Chapter 2
3	Cost estimation	Chapter 3
4	Time value of money; economic equivalence; interest factors	Chapter 4
5	Gradients; advanced cash flows; changing interest rates	Chapter 4
6	Nominal and effective interest; compounding and cash flow timing	Chapter 4
7	Evaluating a single investment project; equivalent worth and rate of return methods	Chapter 5
8	Comparison and selection from among multiple alternatives	Chapter 6
9	Comparison and selection from among multiple alternatives (cont.)	Chapter 6
10	Depreciation and taxes	Chapter 7
11	After-tax analysis	Chapter 7
12	Replacement evaluation and decision making	Chapter 9
13	Evaluating public projects: cost-benefit analysis	Chapter 10
14	Breakeven and sensitivity analysis	Chapter 11
15	Risk analysis	Chapter 12

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

Department/School_Physics and Astronomy_____Date_October 2012

Course No. or Level__**ENGR 350**_Title_____**Manufacturing Processes**_

Semester hours__**4**___Clock hours: Lecture____**3**_____Laboratory____**3**____

Prerequisites__**MATH 202, ENGR 220, ENGR 301**_____

Enrollment expectation_____**20**_____

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

modification_____**N/A**_____
(proposed change in course title, course description, course content or method of instruction)

substitute_____**N/A**_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate_____**N/A**_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description__Dr. David Peterson_____

Department Chairperson's/Dean's Signature_____

Provost's Signature_____

Date of Implementation_____**Fall 2015**_____

Date of School/Department approval_____

Catalog description:
An overview of manufacturing processes primarily for metals and alloys, focusing on fabrication and joining processes. Emphasis will be placed on process capabilities and limitations, with calculation of process parameters for select processes. Also includes topics in additive manufacturing, heat treatment, product design and process planning, design-for-manufacture/assembly, numerical control, and inspection. The laboratory experience will provide manual and computer-aided process techniques, including assembly, machining, casting, welding, sheet metal forming, powder metallurgy, and inspection.

Purpose

1. For Whom (generally?) **Majors in industrial engineering**
2. What should the course do for the student? **Industrial engineers often work in the manufacturing sector and this class will help prepare them with knowledge and laboratory experience in the area of manufacturing, particularly using metals and alloys. Students completing this course will have hands-on knowledge of how some common manufacturing processes are performed. They should also have a rudimentary understanding of how manufacturing facilities operate to obtain manufactured goods via such processes.**

Teaching method planned

Lecture with in-class examples and an extended laboratory experience. In-class discussion of current events related to class material. Students will receive hands-on experience in the laboratory sessions.

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

Book: Groover, M., *Fundamentals of Modern Manufacturing, Materials, Processes, and Systems,* 4th Ed. Wiley, 2010.

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 provides an overview of manufacturing processes, primarily for metals and alloys, focusing on fabrication processes (casting, bulk deformation, sheet metal forming, machining) and joining processes (welding, adhesive bonding, mechanical fastening). Students will learn process capabilities and limitations, with calculation of process parameters (force, power, etc.) for select processes. Additional topics are additive manufacturing, heat treatment, product design and process planning, design-for-manufacture/assembly, numerical control, and inspection. The included laboratory experience, conducted on the advanced manufacturing equipment available at the SiMT, will provide students with hands-on use of manual and computer-aided process manufacturing techniques, including assembly, machining, casting, welding, sheet metal forming, powder metallurgy, inspection, and 3D printing.**

When completed, forward to the Office of the Provost. 9/03

COURSE SYLLABUS
ENGR 350
Manufacturing Processes

Course Description

Overview of manufacturing processes primarily for metals and alloys, focusing on fabrication and joining processes. Emphasis will be placed on process capabilities and limitations, with calculation of process parameters for select processes. Also includes topics in additive manufacturing, heat treatment, product design and process planning, design-for-manufacture/assembly, numerical control, and inspection. The laboratory experience will provide manual and computer-aided process techniques, including assembly, machining, casting, welding, sheet metal forming, powder metallurgy, and inspection.

Course Objectives

Having successfully completed this course, the student will be able to

- describe the key concepts of material plasticity,
- apply critical thinking to analyze and interpret data,
- interpret the uncertainty of quantitative measurement,
- describe traditional metal-products manufacturing processes,
- evaluate and select appropriate manufacturing processes, and
- perform manufacturing operations as covered in the laboratory.

Textbook

Groover, M., *Fundamentals of Modern Manufacturing, Materials, Processes, and Systems,* 4th Ed. Wiley, 2010.

Class Format
Class sessions will be primarily lecture, with a separate laboratory experience coordinated with the Southeastern Institute of Manufacturing and Technology. Laboratory exercises will be timed to support material delivered in the lecture portion of the class. The lecture provides the theory that is then demonstrated, with hands-on experiences, in the laboratory portion.

Class Participation
Taking notes and active participation in problem solving exercises is important for success in this class. Come prepared to ask questions, participate in class discussions, and solve in-class problems as they are given. You should have no distractions during class (e.g., cell phones, e-mail, web surfing). Participation in the laboratory experiences is essential to understanding the material in this class.

Homework
Homework problems will be assigned frequently. Homework is intended to improve your understanding of course material by giving you an opportunity to apply the principles and techniques presented in the course.

Academic Integrity
Plagiarism in any form is unacceptable and will be dealt with according to the University's academic integrity policy. Please acquaint yourself with the policy as set forth in the student handbook. Note that plagiarism will **AT LEAST** result in failure on the assignment.

Attendance
Standard University policy.

Makeups
You are expected to turn in all assignments and be present for all tests. Late homework will not be accepted. No make-up tests will be given. If an excused reason, such as illness, is accepted, the credit for missed tests will be added to the final exam.

Grading
Your overall course grade will be determined using the university scale.
Grades will be assigned based on performance using the following percentages.

Homework and lab reports	35%
Test #1	20%
Test #2	20%
Final exam	25%
TOTAL	**100%**

Course content

Week	***Topic***	***Text Reading Assignment***
1	Introduction, course management; mechanical behavior of materials	Chapter 1
2	Tension, compression, and residual stresses	Chapter 3
3	Structure and manufacturing properties of materials; surfaces and tribology	Chapter 2
4	Inspection and quality assurance; fundamentals of metal casting	Chapters 5, 10, 11
5	Heat treatment	Chapter 27
6	Bulk deformation: rolling; forging	Chapters 18, 19
7	Extrusion and wire drawing; sheet metal forming (bending)	Chapters 19, 20
8	Deep drawing; sheet metal forming considerations	Chapter 20
9	Machining: overview	Chapter 21
10	Turning related processes; drilling and milling	Chapter 22
11	Abrasive machining: grinding; other machining processes	Chapter 25
12	Non-traditional machining; rapid prototyping: additive manufacturing	Chapters 26, 33
13	Joining: welding, adhesive bonding, fastening	Chapter 30
14	Micromanufacturing	Chapter 36
15	Nanomanufacturing	Chapter 37

Laboratory session
Each lab requires the completion of an in-lab assignment or a formal lab report. Assignments are done individually or in groups (per the lab instructions), and are completed during the lab period in which they are performed. Lab reports are done in assigned teams of 2-3 students: data are collected during the lab and the report is due at the start of the following lab. Some labs begin from scratch, while others build upon what was done in the previous lab.

Laboratory schedule (tentative, based on availability and timing at SiMT)

Week	***Topic***
1	Switch box—assembly
2	Casting
3	Machining
4	Inspection
5	Milling and related processes
6	NC machining via manual part programming
7	NC machining via CAM software
8	Inspection—coordinate measurement machine
9	Manual arc welding
10	Robotic arc welding
11	Sheet metal forming and powder metallurgy
12	Electrical discharge machining
13	Cutting force and temperature in turning
14	Rapid prototyping
15	Rapid prototyping

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

Department/School__**Physics and Astronomy**_____Date_____**October 2012**

Course No. or Level **ENGR 355**_Title **Production and Operations Management**

Semester hours__**3**___Clock hours: Lecture____**3**_____Laboratory____**0**____

Prerequisites__**ENGR 101 and ENGR 201**_____

Enrollment expectation_____**20**_____

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

modification_____**N/A**_____
(proposed change in course title, course description, course content or method of instruction)

substitute_____**N/A**_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate_____**N/A**_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description_Hari K Rajagopalan, Ph.D._____

Department Chairperson's/Dean's Signature_____

Provost's Signature_____

Date of Implementation_____**Spring 2015**_____

Date of School/Department approval_____

Catalog Description:
Study of the production and operations component of companies. Topics include capacity and location planning, inventory management, scheduling of jobs and projects, and quality assurance and control. Use of quantitative methods. Credit cannot be received for ENGR 355 and MGT 355.

Purpose: 1. For Whom (generally)
This course is for Industrial Engineering students who wish to pursue a career in Manufacturing or Operations.

2. What should the course do for the student?
Students will learn and put into practice skills and techniques improve production, manufacturing and operations of companies.

Teaching method planned:
This course is a combination of lecture, in-class work and field trips to companies. Apart from lectures students will be provided with a significant number of example problem solutions, example projects, text materials, etc. from which they are expected to learn.

Textbook and/or material planned (including electronic/multimedia):
Operations Management 4th Edition by Reid and Sanders. Wiley Publishing

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.)

1. Operations Strategy and Competitiveness
2. Product Design and Process Selection
3. Total Quality Management
4. Statistical Quality Control
5. Just in Time and Lean Systems
6. Scheduling
7. Project Management
8. Forecasting
9. Capacity Planning and Facility Location
10. Independent Demand Inventory Management
11. Supply Chain Management
12. Facility Layout

A sample syllabus is included with the proposal.

COURSE SYLLABUS
ENGR 355: PRODUCTION AND OPERATIONS MANAGEMENT

Course Description
Study of the production and operations management component of companies. Topics include capacity and location planning, inventory management, scheduling of jobs and quality assurance and control. Use of quantitative methods. Credit cannot be received for ENGR 355 and MGT 355.

Course Objectives
1. To provide students with an understanding of the concepts and practices involved in the management of systems that create products or services in an increasingly globally competitive environment.
2. To provide instruction in the use of quantitative models and methods for solving problems related to managing the operations of business, government and not for profit organizations.

Text
Operations Management 4th Edition by Reid and Sanders. Wiley Publishing

Class Format
This course is a combination of lecture, in-class work and field trips to companies. Apart from lectures students will be provided with a significant number of example problem solutions, example projects, text materials, etc. from which they are expected to learn.

Class Participation
Taking note and active participation in exercises is important for success in this class. Come prepared to ask questions, participate in class discussions, and solve in-class problems as they are given. You should have no distractions during class (e.g., cell phones, e-mail, web surfing).

Academic Integrity

Plagiarism or cheating in any form is unacceptable and will be dealt with according to the university's academic integrity policy. Please acquaint yourself with the policy as set forth in the student handbook. Note that plagiarism or cheating will **AT LEAST** result in failure on the assignment.

Grading

Your overall course grade will be determined using the university scale

Grade will be assigned on the following basis:
Three exams and a final each worth 100 points. The final exam will replace one of the tests.

Course Schedule:

Lecture	Chapter
1	Introduction Chapter 2 Operations Strategy and Competitiveness
2	Chapter 3: Product Design and Process Selection
3	Chapter 5 Total Quality Management
4	Chapter 6 Statistical Quality Control
5	Chapter 6 Statistical Quality Control
6	Test 1
7	Chapter 7: Just in Time and Lean Systems
8	Chapter 15: Scheduling
9	Chapter 16: Project Management
10	Chapter 16: Project Management
11	Chapter 16: Project Management
12	Test 2
13	Chapter 8 Forecasting
14	Chapter 8: Forecasting
15	Chapter 9: Capacity Planning and Facility Location
16	Chapter 9: Capacity Planning and Facility Location
17	Chapter 12: Independent Demand Inventory Management
18	Chapter 12: Independent Demand Inventory Management
19	Test 3
20	Final Exam

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

Department/School__**Physics and Astronomy**_____Date_____**October 2012**

Course No. or Level **ENGR 356**_Title **Quality Control**

Semester hours__**3**___Clock hours: Lecture____**3**_____Laboratory____**0**____

Prerequisites__**ENGR 355**_____

Enrollment expectation_____**20**_____

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

modification_____**N/A**_____
(proposed change in course title, course description, course content or method of instruction)

substitute_____**N/A**_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate_____**N/A**_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description_Hari K Rajagopalan, Ph.D._____

Department Chairperson's/Dean's Signature_____

Provost's Signature_____

Date of Implementation_____**Spring 2017**_____

Date of School/Department approval_____

Catalog Description:
A study of engineering philosophy, practices and analytical processes implemented in quality planning and administration of products and services. Topics include corporate culture, quality design, human factors and motivation, quality auditing, service quality, quality assurance, quality circles, and conformance to design. Credit cannot be received for ENGR 356 and MGT 356.

Purpose: 1. For Whom (generally)
This course is for Industrial Engineering students who wish to pursue a career in Production or Service Operations Management to prepare them for techniques used in Quality control.

2. What should the course do for the student?

Students will learn and put into practice skills and techniques to improve processes and to control for quality.

Teaching method planned:

This course is a combination of lecture, in-class work and field trips to companies. Apart from lectures students will be provided with a significant number of example problem solutions, example projects, text materials, etc. from which they are expected to learn.

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

Quality Function Deployment and Six Sigma, Second Edition: A QFD Handbook (2nd Edition) by Joseph P. Ficalora and Louis Cohen

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)

Chapter 1: What Are QFD and Six Sigma?
Chapter 2: How QFD Fits in the Organization
Chapter 3: Tying QFD to Design, Marketing, and Technology
Chapter 4: Support Tools for QFD
Chapter 5: Overview of the House of Quality
Chapter 6: Customer Needs and Benefits Matrix
Chapter 7: The Product Planning Matrix.
Chapter 8: Substitute Quality Characteristics (Technical Response)
Chapter 9: Impacts, Relationships, and Priorities
Chapter 10: Technical Correlations
Chapter 11: Technical Benchmarks
Chapter 12: Targets
Chapter 13: The Larger Picture: QFD and Its Relationship to the Product Development Cycle
Chapter 14: QFD in an Imperfect World
Chapter 15: Introduction to the Handbook
Chapter 16: Phase 0: Planning QFD
Chapter 17: Phase 1: Gathering the Voice of the Customer
Chapter 18: Phase 2 and Phase 3: Building the House and Analysis

A sample syllabus is included with the proposal.

Course Syllabus
ENGR 356 QUALITY CONTROL

Catalog Description

A study of engineering philosophy, practices and analytical processes implemented in quality planning and administration of products and services. Topics include corporate culture, quality design, human factors and motivation, quality auditing, service quality, quality assurance, quality circles, and conformance to design. Credit cannot be received for ENGR 356 and MGT 356.

Text and References

Text: Joseph P. Ficalora *Quality Function Deployment and Six Sigma, Second Edition: A QFD Handbook (2nd Edition)*.

Class Format

This course is a combination of lecture, in-class work and field trips to companies. Apart from lectures students will be provided with a significant number of example problem solutions, example projects, text materials, etc. from which they are expected to learn.

Class Participation

Taking note and active participation in exercises is important for success in this class. Come prepared to ask questions, participate in class discussions, and solve in-class problems as they are given. You should have no distractions during class (e.g., cell phones, e-mail, web surfing).

Academic Integrity

Plagiarism or cheating in any form is unacceptable and will be dealt with according to the university's academic integrity policy. Please acquaint yourself with the policy as set forth in the student handbook. Note that plagiarism or cheating will **AT LEAST** result in failure on the assignment.

Grading

Your overall course grade will be determined using the university scale
Grade will be assigned on the following basis:

Two exams	50%
Group project	25%
10 Quizzes	10%
Chapter Outlines	15%

Course Schedule

Week 1/2 ABOUT QUALITY FUNCTION DEPLOYMENT AND SIX SIGMA (Chapter 1, 2, 3)
Week 3 - 6 QFD AT GROUND LEVEL (Chapter 4 – 9)
Week 7 – 8 QFD AT GROUND LEVEL, part II (Chapters 10 – 12)
Week 9 - 10 QFD FROM 10,000 FEET (Chapter 13 – 14)
Week 11 – 13 QFD HANDBOOK (Chapter 15 – 18)

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

Department/School__**Physics and Astronomy**_____Date_____**October 2012**

Course No. or Level **ENGR 373**_Title **Operations Research**

Semester hours__**3**___Clock hours: Lecture____**3**_____Laboratory____**0**____

Prerequisites__**ENGR 355**_____

Enrollment expectation_____**20**_____

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

modification_____**N/A**_____
(proposed change in course title, course description, course content or method of instruction)

substitute_____**N/A**_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate_____**N/A**_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description_Hari K Rajagopalan, Ph.D._____

Department Chairperson's/Dean's Signature_____

Provost's Signature_____

Date of Implementation_____**Spring 2016**_____

Date of School/Department approval_____

Catalog Description:
Applications of hypothesis testing, simple linear regression, and multiple linear regression. Coverage of mathematical structures, solution procedures, and applications of basic management science models, including linear programming, network modeling and simulation. Study of project management methods and techniques. Computer software is used to solve problems. Credit cannot be received for ENGR 373 and MGT 373.

Purpose:
1. For Whom (generally)
This is a course for Industrial Engineering students who wish to understand how to make decisions using data. It can also be called Decision Analysis.

2. What should the course do for the student?
Students will learn analyze data, model them mathematically and use statistics and simulation to make good decisions.

Teaching method planned:
This course is lecture based but includes hands-on mathematical modeling of in Excel. Apart from lectures students will be provided with a significant number of example problem solutions, example projects, text materials, etc. from which they are expected to learn.

Textbook and/or material planned (including electronic/multimedia):
Spreadsheet Modeling and Decision Analysis: A Practical Introduction to Management Science, Cliff T. Ragsdale, South-Western College Publishing, 6th Ed**.**,

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 looks at modeling the supply chain from start to finish, from the point of procuring raw materials, manufacturing, selling and then finally getting it to the customers. The course is divided into two phases, first phase teaches the theory and the tools and the second phase the application

Some of the topics covered in the course will include

1. Key Excel Concepts
2. Statistics (Test of Hypothesis)
3. ANOVA
4. Chi Square
5. Regression Analysis
6. Discriminant Analysis
7. Time Series Forecasting
8. Simulation
9. Decision Analysis
10. Linear Programming
11. Network Modeling
12. Integer Linear Programming
13. Project Management

A sample syllabus is included with the proposal.

COURSE SYLLABUS
ENGR 373 OPERATIONS RESEARCH

Catalog Description

Applications of hypothesis testing, simple linear regression, and multiple linear regression. Coverage of the mathematical structure, solution procedures, and applications of basic management science models, including linear programming, network modeling and simulation. Study of project management methods and techniques. Computer software is used to solve problems. Credit cannot be received for ENGR 373 and MGT 373.

Course Objectives

1. To provide engineering students with a sound conceptual understanding of the role management science plays in the decision making process. Emphasis is placed on quantitative approaches to decision making as well as how they can be applied and interpreted.
2. Specific topics covered in this course include fundamental techniques such as linear programming, integer programming, queuing theory, and simulation.
3. All students must be able to effectively:
    a. utilize forecasting (predictive) systems utilizing statistical techniques,
    b. perform decision analysis using quantitative methods, including simulation, linear programming, and queuing theory, to solve operational problems, and
    c. apply heuristic and optimization methods to scheduling and staffing problems in both service and manufacturing sectors.

Text

Spreadsheet Modeling and Decision Analysis: A Practical Introduction to Management Science, Cliff T. Ragsdale, South-Western College Publishing, 6th Ed.,

Class Format

This course is lecture based but includes hands-on mathematical modeling of in Excel. Apart from lectures students will be provided with a significant number of example problem solutions, example projects, text materials, etc. from which they are expected to learn.

Class Participation

Taking note and active participation in exercises is important for success in this class. Come prepared to ask questions, participate in class discussions, and solve in-class problems as they are given. You should have no distractions during class (e.g., cell phones, e-mail, web surfing).

Academic Integrity

Plagiarism or cheating in any form is unacceptable and will be dealt with according to the university's academic integrity policy. Please acquaint yourself with the policy as set forth in the student handbook. Note that plagiarism or cheating will **AT LEAST** result in failure on the assignment.

Grading

Your overall course grade will be determined using the university scale

Grade will be assigned on the following basis:

Four exams (lowest dropped)	30 points each
Unannounced homework presentation	10 points

Course Schedule

(Subject to modification)

Date	Topic	Materials
Week 1	Statistics (Test of Hypothesis, ANOVA, Chi Square)	Handout
Week 2,63	Regression Analysis	Chapter 9
Week 4	Discriminant Analysis	Chapter 10
Week 5	Forecasting	Chapter 11
Week 6,7	Simulation	Chapter 12
Week 8	Decision Analysis	Chapter 15
Week 9	Linear Programming	Chapter 3
Week 10	Network Modeling	Chapter 5
Week 11, 12	Integer Linear Programming	Chapter 6
Week 13, 14	Project Management	Chapter 14

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

Department/School__**Physics and Astronomy**_____Date___October 2012_____

Course No. or Level__**ENGR 420**_Title___**Human Factors Engineering**___

Semester hours__**3**___Clock hours: Lecture____**3**_____Laboratory____**0**____

Prerequisites__**MATH 201, ENGR 320, ENGR 373**_____

Enrollment expectation_____**15**_____

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

modification_____**N/A**_____
(proposed change in course title, course description, course content or method of instruction)

substitute_____**N/A**_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate_____**N/A**_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description___Dr. David Peterson_____

Department Chairperson's/Dean's Signature_____

Provost's Signature_____

Date of Implementation_____**Fall 2016**_____

Date of School/Department approval_____

Catalog description:
A survey of human factors engineering emphasizing the systems approach to workplace and machine design. Discussion of basic human factors research and design methods, visual processes and design methods, selection of statistical techniques for application to human factors data, visual and auditory processes, display and control design, and effects of environmental stressors on humans.

Purpose

1. For Whom (generally?) **Majors in industrial engineering**
2. What should the course do for the student? **This course will provide students with an understanding of the issues related to the integration of humans and the workplace, to include proper workplace design, including displays and controls, and safety. Students completing this class will better understand how humans interact with the world around them, particularly in the workplace, and be prepared to apply their knowledge in an organizational setting. Other relevant terms used for similar study are human factors and ergonomics.**

Teaching method planned

Lecture with significant in-class demonstration of concepts and experiences in human performance. In-class discussion of current events related to class material. Hands on experience with physical measurement apparatus (e.g., sound level meters).

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

Book: McCormick, E. and Sanders, M. Human Factors in Engineering and Design (7th ed.). McGraw-Hill: New York, NY.

Book: Norman, D. (2002). The Design of Everyday Things. First Basic Paperback: New York, NY.

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 is a survey of human factors engineering, emphasizing the systems approach to workplace and machine design. Also included is are discussions of basic human factors research and design methods, visual processes and design methods, selection of statistical techniques for application to human factors data, visual and auditory processes, display and control design, and effects of environmental stressors on humans.**

When completed, forward to the Office of the Provost. 9/03

Course Syllabus
ENGR 420
Human Factors Engineering

Course Description
A survey of human factors engineering emphasizing the systems approach to workplace and machine design. Discussion of basic human factors research and design methods, visual processes and design methods, selection of statistical techniques for application to human factors data, visual and auditory processes, display and control design, and effects of environmental stressors on humans.

Course Objectives
Having successfully completed this course, the student will be able to

- describe the meaning and importance of human factors engineering inclusive of understanding its role in the design lifecycle of products and systems,
- describe the major human factors engineering design principles for products and systems,
- apply major human factors engineering design principles to the design of products and systems,
- apply statistical techniques to the analysis of human factors engineering data, and
- evaluate the compatibility of products and systems with human capacities and limitations.

Texts
McCormick, E. and Sanders, M. Human Factors in Engineering and Design (7th ed.). McGraw-Hill: New York, NY.

Norman, D. (2002). The Design of Everyday Things. First Basic Paperback: New York, NY.

Class Format
Class sessions will be primarily lecture, with significant class discussion and in-class lab demonstrations. This nature of this course requires significant memorization of material. Class discussion is essential to assist understanding of the material.

Class Participation
Taking notes and active participation in problem solving exercises is important for success in this class. Come prepared to ask questions and participate in class discussions. You should have no distractions during class (e.g., cell phones, e-mail, web surfing).

Homework
Homework assigned will consist of short assignments and reports of the in-class laboratory demonstrations. Laboratory reports will be completed in a group format (3-4 students).

Semester Project
A team-based project is required. Each student group (3-4) will be required to complete a semester project. Projects require the completion of a written report and oral presentation. The actual project will be determined early in the semester.

Academic Integrity
Plagiarism in any form is unacceptable and will be dealt with according to the University's academic integrity policy. Please acquaint yourself with the policy as set forth in the student handbook. Note that plagiarism will **AT LEAST** result in failure on the assignment.

Attendance
Standard University policy.

Makeups
You are expected to turn in all assignments and be present for all tests. Late assignments will not be accepted. No make-up tests will be given. If an excused reason, such as illness, is accepted, the credit for missed tests will be added to the final exam.

Grading
Your overall course grade will be determined using the university. Grades will be assigned based on performance using the following percentages.

Homework	15%
Test #1	20%
Test #2	20%
Semester project	25%
Final exam	20%
TOTAL	**100%**

Course content

Week	***Topic***	***Text Reading Assignment****
1	Course management; introduction to human factors	Chapters 1 & 2 (N) Chapter 1 (SM)
2	Design in human factors and ergonomics	Chapters 6 & 7 (N) Chapters 2 & 22 (SM)
3	Human factors research methods; initial discussion of semester project	Readings provided
4	Human subjects of experimentation; Human information processing	Chapter 3 (N) Chapter 3 (SM)
5	Human information processing; in-class lab	
6	Human information processing (concluded)	Chapter 4 (N) Chapters 4 & 5 (SM)
7	Visual displays; displays for other senses; speech communication	Chapter 6 (SM)
8	Displays; display design; in-class lab	Chapter 7 (SM)
9	Work and workplace design; in-class lab	Chapters 8-11 (SM)
10	Anthropometry	Chapters 13-15 (SM)
11	Anthropometry; in-class lab	
12	Workplace design—environmental conditions	Chapter 5 (N) Chapters 16 & 17 (SM)
13	Safety and human behavior	Chapters 18-20 (SM)
14	Safety and human behavior	
15	Final project presentations; review for final	

* SM: Sanders and McCormick text
N: Norman text

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

Department/School__**Physics and Astronomy**_____Date_____**October 2012**

Course No. or Level **ENGR 467**_Title **Supply Chain Design**

Semester hours__**3**___Clock hours: Lecture____**3**_____Laboratory____**0**____

Prerequisites__**ENGR 355**_____

Enrollment expectation_____**15**_____

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

modification_____**N/A**_____
(proposed change in course title, course description, course content or method of instruction)

substitute_____**N/A**_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate_____**N/A**_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description_Hari K Rajagopalan, Ph.D._____

Department Chairperson's/Dean's Signature_____

Provost's Signature_____

Date of Implementation_____**Fall 2016**_____

Date of School/Department approval_____

Catalog Description:
Supply chain design is concerned with the activities performed from initial raw materials to the finished product. The course examines the analytical modeling of various aspects of a supply chain including product flows, information flows, and relationships among supply chain participants. Credit cannot be received for ENGR 467 and MGT 467.

Purpose:
1. For Whom (generally)
The supply chain design course is designed for Industrial Engineering students to foster students understanding of overall processes and provide tools and techniques for handling

complex industrial problems which enables them to better understand the systems they will be designing.

2. What should the course do for the student?
Students will learn and put into practice skills and techniques to understand supply chains, model them mathematically and help make data driven decisions about supply chains.

Teaching method planned:
This course is lecture based but includes hands-on mathematical modeling of various parts of the supply chain in Excel. Apart from lectures students will be provided with a significant number of example problem solutions, example projects, text materials, etc. from which they are expected to learn.

Textbook and/or material planned (including electronic/multimedia):
Supply Chain Management Strategy, Planning and Operations 4th Edition by Sunil Chopra and Peter Meindl. ISBN 0-13-608040-5

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 looks at modeling the supply chain from start to finish, from the point of procuring raw materials, manufacturing, selling and then finally getting it to the customers. The course is divided into two phases, first phase teaches the theory and the tools and the second phase the application

Some of the topics covered in the course will include
Part I: Building a Strategic Framework to Analyze Supply Chains
Chapter 1: Understanding the Supply Chain
Chapter 2: Supply Chain Performance: Achieving Strategic Fit and Scope
Chapter 3: Supply Chain Drivers and Metrics
Part II: Designing the Supply Chain Network
Chapter 4: Designing Distribution Networks and Applications to e-Business
Chapter 5: Network Design in the Supply Chain
Chapter 6: Designing Global Supply Chain Networks
Part III: Planning and Coordinating Demand and Supply in a Supply Chain
Chapter 7: Demand Forecasting in a Supply Chain
Chapter 8: Aggregate Planning in a Supply Chain
Chapter 9: Sales & Operations Planning: Planning Supply and Demand in a Supply Chain
Chapter 10: Coordination in a Supply Chain
Part IV: Planning and Managing Inventories in a Supply Chain
Chapter 11: Managing Economies of Scale in a Supply Chain: Cycle Inventory
Chapter 12: Managing Uncertainty in a Supply Chain: Safety Inventory
Chapter 13: Determining the Optimal Level of Product Availability
Part V: Designing and Planning Transportation Networks
Chapter 14: Transportation in a Supply Chain

A sample syllabus is included with the proposal.

Course Syllabus
ENGR 467: Supply Chain Design

Course Description:
Supply chain design is concerned with the activities performed from initial raw materials to the finished product. The course examines the analytical modeling of various aspects of a supply chain including product flows, information flows, and relationships among supply chain participants. Credit cannot be received for ENGR 467 and MGT 467.

Course Objectives
To develop student understanding of activities performed in supply chain management and show them how to model this system mathematically and enable them to make data driven decisions in a supply chain.

Text:
Supply Chain Management Strategy, Planning and Operations 4th Edition by Sunil Chopra and Peter Meindl. ISBN 0-13-608040-5

Class Format
This course is lecture based but includes hands-on mathematical modeling of various parts of the supply chain in Excel. Apart from lectures students will be provided with a significant number of example problem solutions, example projects, text materials, etc. from which they are expected to learn.

Class Participation
Taking note and active participation in exercises is important for success in this class. Come prepared to ask questions, participate in class discussions, and solve in-class problems as they are given. You should have no distractions during class (e.g., cell phones, e-mail, web surfing).

Academic Integrity
Plagiarism or cheating in any form is unacceptable and will be dealt with according to the university's academic integrity policy. Please acquaint yourself with the policy as set forth in the student handbook. Note that plagiarism or cheating will **AT LEAST** result in failure on the assignment.

Grading

Your overall course grade will be determined using the university scale

Grade will be assigned on the following basis:

Projects and assignments	40%
Exams	60%

Class Schedule

Date	Description
Week 1	Chapter 1: Understanding the Supply Chain Chapter 2: Supply Chain Performance: Achieving Strategic Fit and Scope Chapter 3: Supply Chain Drivers and Metrics
Week 2	Chapter 4: Designing Distribution Networks and Applications to e-Business
Week 3	Chapter 5: Network Design in the Supply Chain Chapter 6: Designing Global Supply Chain Networks
Week 4	**Exam 1 and Presentation**
Week 5	Chapter 7: Demand Forecasting in a Supply Chain
Week 6	Chapter 8: Aggregate Planning in a Supply Chain
Week 7	Chapter 9: Sales and Operations Planning: Planning Supply and Demand in a Supply Chain Chapter 10: Coordination in a Supply Chain
Week 8	**Exam 2 and Presentation**
Week 9	Chapter 11: Managing Economies of Scale in a Supply Chain: Cycle Inventory
Week 10	Chapter 12: Managing Uncertainty in a Supply Chain: Safety Inventory
Week 12	Chapter 13: Determining the Optimal Level of Product Availability
Week 13	**Exam 3 and Presentation**
Week 14	**Final Exam**

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

Department/School__**Physics and Astronomy**_____Date_____**October 2012**

Course No. or Level **ENGR 468**_Title **Production Planning**

Semester hours__**3**___Clock hours: Lecture____**3**_____Laboratory____**0**____

Prerequisites__**ENGR 355**_____

Enrollment expectation_____**15**_____

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

modification_____**N/A**_____
(proposed change in course title, course description, course content or method of instruction)

substitute_____**N/A**_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate_____**N/A**_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description_Hari K Rajagopalan, Ph.D._____

Department Chairperson's/Dean's Signature_____

Provost's Signature_____

Date of Implementation_____**Fall 2016**_____

Date of School/Department approval_____

Catalog Description:
This course provides an in-depth study of the full spectrum of activities of production managers. Topics covered include forecasting, independent demand inventory management, just-in-time inventory management, materials requirement planning, capacity planning, production activity control, and master production scheduling. Emphasis will be given to the use of personal computers to support decision making. Credit cannot be received for ENGR 468 and MGT 468.

Purpose: 1. For Whom (generally)
The production, planning and control course is designed for Industrial Engineering students to foster students understanding of overall business processes and provide tools and techniques for handling complex problems faced by manufacturing companies.

2. What should the course do for the student?
Students will learn and put into practice skills and techniques to understand production process and control mechanisms and make decisions for a manufacturing firm.

Teaching method planned:
This course is lecture based but includes hands-on mathematical modeling of various parts of the production and control in Excel. Apart from lectures students will be provided with a significant number of example problem solutions, example projects, text materials, etc. from which they are expected to learn.

Textbook and/or material planned (including electronic/multimedia):
Vollman, T. E., W. L. Berry, D. C. Whybark, and Jacobs, F. R. *Manufacturing Planning and Control for Supply Chain Management*, Irwin., Boston, 5th edition, 2005.

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 focuses on the problems that arise in planning production and manage inventory and capacity, and provides an overview of the techniques used to plan an efficient and smooth production. Some of the topics covered in the course will include:

1. Manufacturing Planning and Control
2. Demand Management
3. Sales and Operations Planning
4. Advanced Concepts in Sales and Operations Planning
5. Supply Chain Management, Independent-Demand Items
6. Master Production Scheduling
7. Advanced Concepts in Scheduling
8. Material Requirement Planning
9. Advanced Concepts in Materials Requirements Planning
10. Distribution Requirements Planning
11. Capacity Planning and Utilization
12. Just-in-time
13. Advanced Concepts in Just in Time

A sample syllabus is included with the proposal.

Course Syllabus
ENGR 468: Production Planning

Course Description:
This course provides an in-depth study of the full spectrum of activities of production managers. Topics covered include forecasting, independent demand inventory management, just-in-time inventory management, materials requirement planning, capacity planning, production activity control, and master production scheduling. Emphasis will be given to the use of personal computers to support decision making. Credit cannot be received for ENGR 468 and MGT 468.

Course Objectives
The objectives of the course are:

1. to familiarize students with the problems that arise in planning production and manage inventory and capacity,
2. to provide an overview of the techniques used to plan an efficient and smooth production,
3. to provide the students with working knowledge of the use of computers for production planning and control.

Text:
Vollman, T. E., W. L. Berry, D. C. Whybark, and Jacobs, F. R. *Manufacturing Planning and Control for Supply Chain Management*, Irwin., Boston, 5th edition, 2005.

Class Format
This course is lecture based but includes hands-on mathematical modeling of various parts of the supply chain in Excel. Apart from lectures students will be provided with a significant number of example problem solutions, example projects, text materials, etc. from which they are expected to learn.

Class Participation

Taking note and active participation in exercises is important for success in this class. Come prepared to ask questions, participate in class discussions, and solve in-class problems as they are given. You should have no distractions during class (e.g., cell phones, e-mail, web surfing).

Academic Integrity

Plagiarism or cheating in any form is unacceptable and will be dealt with according to the university's academic integrity policy. Please acquaint yourself with the policy as set forth in the student handbook. Note that plagiarism or cheating will **AT LEAST** result in failure on the assignment.

Grading

Your overall course grade will be determined using the university scale

Grade will be assigned on the following basis:

Projects and assignments	40%
Exams	60%

Weekly Class Schedule

Week 1	Chapter 1 Manufacturing Planning and Control
Week 2	Chapter 2 Demand Management
Week 3	Chapter 3 Sales and Operations Planning
Week 4	Chapter 12 Advanced Concepts in Sales and Operations Planning
Week 5	Chapter 5 Supply Chain Management, Independent-Demand Items
Week 6	Chapter 6 Master Production Scheduling
Week 7	Chapter 16 Advanced Concepts in Scheduling
Week 8	Chapter 7 Material Requirement Planning
Week 9	Chapter 14 Advanced Concepts in Materials Requirements Planning
Week 10	Chapter 8 Distribution Requirements Planning
Week 11	Chapter 10 Capacity Planning and Utilization
Week 12	Chapter 9 Just-in-Time
Week 13	Chapter 15 Advanced Concepts in Just-in-Time
Week 14	Chapter 4 Enterprise Resource Planning (ERP)
Week 15	Final Exam

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

Department/School__**Physics and Astronomy** Date_ October 2012_____

Course No. or Level__**ENGR 470**_Title_____**Facility Design**_____

Semester hours__**3**___Clock hours: Lecture____**3**_____Laboratory____**0**____

Prerequisites__**ENGR 320, ENGR 373**_____

Enrollment expectation_____**15**_____

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

modification_____**N/A**_____
(proposed change in course title, course description, course content or method of instruction)

substitute_____**N/A**_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate_____**N/A**_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description___Dr. David Peterson_____

Department Chairperson's/Dean's Signature_____

Provost's Signature_____

Date of Implementation_____**Spring 2017**_____

Date of School/Department approval_____

Catalog description:
Theory and concepts involved in model formulation for design and analysis of facility plans. Includes facility layout, facility location and material handling system design. Application of quantitative tools and techniques for flow analysis, layout planning, and automated material handling system design.

Purpose

1. For Whom (generally?) **Majors in industrial engineering**
2. What should the course do for the student? **Many industrial engineering graduates perform facility design or layout at some point in their career. This course will provide students with concepts techniques, and tools for analyzing and design physical layouts of facilities, including material flow and handling. Students will learn state-of-the-art software tools in addition to the basics of building mathematical models for material flow. After this class students are prepared to apply their knowledge in an organizational setting.**

Teaching method planned

Lecture with frequent in-class demonstrations and problems. Software demonstrated in class and utilized for the myriad assignments. Discussion and presentation periods planned for the semester-long project.

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

Book: J.A. Tompkins, J.A. White, Y.A. Bozer, J. M. A. Tanchoco, *Facilities Planning*, 4th Edition, John Wiley & Sons, 2003.

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.) **Industrial engineers are often called upon the design physical layouts of facilities, including the location of equipment and the flow of materials from one place to another. It is important to consider cost, time, quality, and flexibility in these designs. This course teaches the student the mathematical models available for designing such systems. Computer-based tools will be used to effectively and efficiently implement the mathematical models. Analytical and computational practices are incorporated throughout the course. Designs and analyses are communicated in both written and oral form.**

When completed, forward to the Office of the Provost. 9/03

Course Syllabus
ENGR 470
Facilities Design

Course Description
Theory and concepts involved in model formulation for design and analysis of facility plans. Includes facility layout, facility location and material handling system design. Application of quantitative tools and techniques for flow analysis, layout planning, and automated material handling system design.

Course Objectives
Having successfully completed this course, the student will be able to

- design and justify a facility based on the College Industry Council on Material Handling Education (CIC/MHE) case study using techniques from class,
- identify seven factors influencing facility location decisions,
- apply queuing theory to design and analyze facility operations,
- evaluate a facility location using MINIMAX, MINISUM, and MAXIMIN models, and
- develop optimization models to analyze facility location and layout.
- distinguish algorithm differences between Pairwise Exchange, Graph-Based, CRAFT, BLOCPLAN, MIP, and MULTIPLE and explain the impact on resulting facility layouts,
- create from-to charts and activity relationships that describe product flow in a facility,
- explain what a unit load is and its function in a facility/warehouse,
- evaluate and determine storage options, order picking operations, material handling methods, and docking operations in a warehouse, including
    - estimate warehouse storage space requirements
    - select and justify an order picking plan
    - create warehouse docking structures
- optimize facility layouts based on Pairwise Exchange, Graph-Based, CRAFT, BLOCPLAN, and MULTIPLE,

Textbook
J.A. Tompkins, J.A. White, Y.A. Bozer, J. M. A. Tanchoco, *Facilities Planning*, 4th Edition, John Wiley & Sons, 2003.

Class Format
Class sessions will be primarily lecture, with heavy reliance on example problems and in-class problem solving. This course is primarily engineering analysis in nature and includes the application of mathematics, including calculus, and computer-based solution tools. A team-based semester project provides the opportunity for the students to use real-life situations to design actual facility layouts, including elements of material handling.

Class Participation
Taking notes and active participation in problem solving exercises is important for success in this class. Come prepared to ask questions, participate in class discussions, and solve in-class problems as they are given. You should have no distractions during class (e.g., cell phones, e-mail, web surfing).

Homework
Homework problems will be assigned regularly. Homework is intended to improve understanding of course material by providing an opportunity to apply the principles and techniques presented in the course. Homework problems are design-oriented so they are not the "typical" end-of-chapter problem. Rather each one will take significant time to develop a proper solution.

Semester Project
A team-based semester project is required. This project may be one that is designed specifically for material handling education, or may be an actual layout problem from industry. The actual project will be determined each semester. In addition to your written final report, you will deliver an oral presentation of your project, to the class and to industrial representatives.

Academic Integrity
Plagiarism in any form is unacceptable and will be dealt with according to the University's academic integrity policy. Please acquaint yourself with the policy as set forth in the student handbook. Note that plagiarism will **AT LEAST** result in failure on the assignment.

Attendance
Standard University policy.

Makeups
You are expected to turn in all assignments and be present for all tests. Late assignments will not be accepted. No make-up tests will be given. If an excused reason, such as illness, is accepted, the credit for missed tests will be added to the final exam.

Grading
Your overall course grade will be determined using the university scale.
Grades will be assigned based on performance using the following percentages.

Homework	15%
Test #1	20%
Test #2	20%
Semester project	25%
Final exam	20%
TOTAL	**100%**

Course content

Week	***Topic***	***Text Reading Assignment***
1	Introduction, course management; foundations of facilities design; elements of facilities design	Chapter 1
2	Facilities planning and design fundamentals, including flow and unit load	Chapter 2 and Chapter 5, sections 5.1-5.5
3	Material handling and man systems	Chapter 3
4	Warehouse operations; warehouse storage	Chapter 7
5	Warehouse docking operations	Chapter 7
6	Warehousing summary and team presentations	Chapter 7
7	Introduction to layout models and tools	Chapter 6
8	Algorithms, pairwise exchange, graph-based models	Chapter 6
9	CRAFT, MCRAFT, BLOCPLAN	Chapter 6
10	Using MULTIPLE: simulated annealing	Chapter 6
11	MIP, QAP; conclude facility layout	Chapter 6
12	Introduction to facility location and location models	Chapter 10
13	Rectilinear and Euclidean; single facility	Chapter 10
14	Euclidean and Rectilinear; multiple facility	Chapter 10
15	Presentation of final layouts from semester project	

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

Department/School__**Physics and Astronomy**_____Date__October 2012

Course No. or Level__**ENGR 480**_Title___**Senior Design**_____

Semester hours__**4**___Clock hours: Lecture____**4**_____Laboratory____**0**____

Prerequisites__**ENGR 420, ENGR 468**_____

Prerequisites/Corequisites__**ENGR 356, ENGR 470**_____

Enrollment expectation_____**15**_____

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

modification_____**N/A**_____
(proposed change in course title, course description, course content or method of instruction)

substitute_____**N/A**_____
(The proposed new course replaces a deleted course as a General Education or program requirement.)

alternate_____**N/A**_____
(The proposed new course can be taken as an alternate to an existing course.)

Name of person preparing course description___David Peterson_____

Department Chairperson's/Dean's Signature_____

Provost's Signature_____

Date of Implementation_____**Spring 2017**_____

Date of School/Department approval_____

Catalog description:
The capstone design sequence 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?) **Majors in industrial engineering**
2. What should the course do for the student? **This course provides the capstone design experience required by ABET. It provides a real world problem solving experience with local industry, in a team-based environment. Students apply all they have learned in the industrial engineering curriculum, experience the value of professional communication, write professional documents, make project presentations to their industrial sponsors, peers, and faculty, and generally demonstrate their professionalism as a future practicing engineer.**

Teaching method planned

This is largely a project-based course. There will be lectures on critical thinking, communication, and project management. Students will make presentations in class and will turn in various reports.

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

Book: Meredith, Jack R. and Mantel, Samuel J. Jr. (2010). Project Management: A Managerial Approach. Eighth Edition. Hoboken, NJ: John Wiley & Sons, Inc.

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 sequence 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.

When completed, forward to the Office of the Provost. 9/03

COURSE SYLLABUS
ENGR 480
Senior Design

Course Description
The capstone design sequence 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.

Course Objectives

Having successfully completed this course, the student will be able to

- integrate and focus relevant technical aspects of industrial engineering knowledge;
- identify, describe and evaluate the specific life-cycle stages and features of a project;
- implement an appropriate data collection and analysis plan to support project goals;
- apply project management methods, tools and techniques to actual projects from manufacturing and service industries;
- develop and apply evaluation criteria to select the best solution given the unique context for the project;
- work effectively in a team environment on a real-world project and interacting with external stakeholders;
- communicate written and verbal proposals and briefings that successfully convey both the technical and managerial aspects of a project; and
- improve technical performance, project management and customer satisfaction.

Required Text
Meredith, Jack R. and Mantel, Samuel J. Jr. (2010). **Project Management: A Managerial Approach.** Eighth Edition. Hoboken, NJ: John Wiley & Sons, Inc.

Course Requirements

Class Format
Class sessions will be a mix of lecture, discussion, and presentations. The lecture portion will be on critical thinking, communication, and project management. Students will share their experiences with their company sponsors and will make presentations related to their statement of work for their sponsors, progress made, and their final report. Additionally, company sponsors may visit class to provide additional insight into their organizations.

Senior Design Orientation
Industrial engineers have project management responsibilities. Whether working as an internal industrial engineer, internal or external consultant, it is imperative that the industrial engineer has the skills and knowledge associated with the technical, project management and customer components of technical projects. Project management is also a stepping-stone to engineering or general management.

Thus, most professional work will include project involvement, either as a project leader, project sponsor, or as project member. Industry has also shifted from hierarchical structures to flexible, flat, team-based structures. In this class you will have an integrative experience that provides the basic skills needed to effectively identify, plan, manage, control, and "solve" technical projects. You will work in teams to apply the skills learned to develop a project proposal for a real-world problem from a manufacturing or service industry.

Industrial engineering, like the other engineering disciplines, is concerned with both analysis and design. In this class you will concentrate on developing a technical proposal as well as performing technical analyses related to a client's project. Depending on the project your focus may shift to design and implementation aspects of projects this semester, for some projects this will come next semester. Technical writing and verbal presentation skills are emphasized.

In this class we value

- Professionalism and ethical behavior
- Leadership and teamwork
- High-quality work on assigned tasks
- Mutual respect
- Direct and constructive communication

Roles and Responsibilities

Your projects will apply technical, administrative/organizational and customer components in technical projects. The projects provide technical integration and engineering management practice.

Project Team: Provide inputs for project selection. Manage team process and resolve conflicts. Manage all aspects of project (technical, project management, customer satisfaction). Communicate with your customers. Visit client as expected according to distance-based guidelines. Attend class and be expected to provide project status reports as requested.

Technical Advisor: Guide, mentor, and evaluate team on technical, management, and administrative issues. Ensure project complexity and validity. Help team integrate relevant components of industrial engineering. Visit project client multiple times during the semester.

Customer: Guide and mentor team on customer issues. Evaluate customer satisfaction and value of team's work. Be accessible to assist team. Provide necessary and appropriate data. Identify proprietary data to ensure client protection.

Class Participation
Taking notes and active participation in class discussions is important for success in this class. Come prepared to ask questions and share experiences. You should have no distractions during class (e.g., cell phones, e-mail, web surfing).

Homework
There will be reading assignments, but no homework beyond applying the material to your project (which will be expected and inspected).

Academic Integrity
Plagiarism in any form is unacceptable and will be dealt with according to the University's academic integrity policy. Please acquaint yourself with the policy as set forth in the student handbook. Note that plagiarism will **AT LEAST** result in failure on the assignment.

Attendance
Standard university policy

Grading
Your overall course grade will be determined using the university scale
Grades will be assigned based on performance using the following percentages.

Progress report #1	10%
Progress report #2	10%
Statement of Work	30%
Final report	50%
TOTAL	**100%**

Course content
Class Schedule

Week	***Topic***	***Text Reading Assignment***
1	Introduction, course management; discussion and selection of projects	
2	Critical thinking and communication	Handout material
3	Communication (continued); review of project scope and problem definition	Handout material; Chapter 3—The project manager
4	Team dynamics and relationship with customer	Chapter 4—Managing conflict and the art of negotiation
5	Intensive work with customer	
6	Project management—using Microsoft Project Presentations: Statement of work	
7	Project management—activities and risk	Chapter 6—Project activity and risk planning
8	Project management—budgets First progress report	Chapter 7—Budgeting: estimating costs and risks
9	Project management—project plans and Gantt charts	Chapter 8—Scheduling
10	Project management—properly allocating limited resources	Chapter 9—Resource allocation
11	Intensive work with customer	
12	Project management—controlling and tracking Second progress report	Chapter 11—Project control
13	Project management—implementation and project termination	Chapter 13—Project termination
14	Final project closeout with customer	
15	Final presentation to class, advisor, customer	