ENGR-ENGINEERING (ENGR)

ENGR 100G. Introduction to Engineering
3 Credits (2+3P)
An introduction to the various engineering disciplines, the engineering approach to problem solving, and the design process. Projects emphasize the importance of teamwork, written & oral communication skills, as well as ethical responsibilities. May be repeated up to 3 credits.
Prerequisite(s)/Corequisite(s): MATH 1220G or above.
Learning Outcomes
1. Analyze the engineering road maps and have a solid curriculum plan for each semester including summers.
2. Discuss the importance of information on engineering student organizations.
3. Demonstrate an understanding of the design process from initial conception to final solution through the application of critical thinking while learning important team building skills approaches to problem solving.
4. Identify the different engineering fields,the engineering profession, career paths open to engineers, and the process to professional licensure.
5. Apply clear communication and critical thinking skills by collecting, organizing, and analyzing data in a complete, clearly written, and oral presentation of their work.
6. Make use of basic knowledge and skills in Microsoft Excel to complete engineering assignments.
7. Identity, compute, and apply how dimensions, length, time, mass, force, temperature, electric current, energy and power, and related parameters are related to the different fields of engineering.
8. recognize ethical and professional responsibilities in engineering situations and make informed judgements.

ENGR 100GH. Introduction to Engineering Honors
3 Credits (2+3P)
An introduction to the various engineering disciplines, the engineering approach to problem solving, and the design process. Projects emphasize the importance of teamwork, written & oral communication skills, as well as ethical responsibilities. May be repeated up to 3 credits. Crosslisted with: ENGR 100.
Prerequisite(s)/Corequisite(s): MATH 1220G or above.
Learning Outcomes
1. Analyze the engineering road maps and have a solid curriculum plan for each semester including summers.
2. Discuss the importance of information on engineering student organizations.
3. Demonstrate an understanding of the design process from initial conception to final solution through the application of critical thinking while learning important team building skills approaches to problem solving.
4. Identify the different engineering fields,the engineering profession, career paths open to engineers, and the process to professional licensure.
5. Apply clear communication and critical thinking skills by collecting, organizing, and analyzing data in a complete, clearly written, and oral presentation of their work.
6. Make use of basic knowledge and skills in Microsoft Excel to complete engineering assignments.
7. Identity, compute, and apply how dimensions, length, time, mass, force, temperature, electric current, energy and power, and related parameters are related to the different fields of engineering.
8. recognize ethical and professional responsibilities in engineering situations and make informed judgements.

ENGR 110. Introduction to Engineering Design
3 Credits (2+3P)
Sketching and orthographic projection. Covers detail and assembly working drawings, dimensioning, tolerance specification, and design project
Learning Outcomes
1. Students will learn the fundamentals of part modeling and assemblies using modeling techniques in the SolidWorks solid modeling software.
2. They will learn how to put these parts and assemblies into production drawings using proper Geometric Dimensioning.

ENGR 111. Mathematics for Engineering Applications
3 Credits (3)
An introduction to engineering mathematics and basic programming skills needed to perform elementary data manipulation and analysis. Consent of Instructor required.
Prerequisite(s)/Corequisite(s): MATH 1250G. Prerequisite(s): MATH 1220G.

ENGR 120. DC Circuit Analysis
4 Credits (3+3P)
An introduction to DC circuit analysis using Ohm's law, Kirchoff's laws, and Thevenin's theorem. Topics include delta-wye and source transformations, node-voltage and mesh-current analysis, and superposition.
Prerequisite/Corequisite: MATH 1250G.
Learning Outcomes
1. Convert decimal numbers to engineering notation using metric prefixes and units.
2. Describe and relate electric charge, current, resistance, voltage, energy, and power.
3. Analyze circuits with voltage and current sources, ideal and real, independent and dependent.
4. Apply Ohm's Law and Kirchoff's Laws to DC circuits.
5. Create equivalent circuits using series/parallel combinations, delta-wye and source transformations, and Thevinin's Theorem.
6. Apply the node voltage and mesh current methods and superposition to analyze circuits.
7. Design and proto-type DC circuits and measure voltages and currents.

ENGR 130. Digital Logic
4 Credits (3+3P)
An introduction to logic design and the basic building blocks of digital systems. Topics include numbering systems, Boolean algebra, digital logic theory, combinational logic, sequential logic, and applications such as adders, multiplexers, encoders, counters, and registers. Includes hands-on laboratory.
Prerequisite: A grade of C- or better in MATH 1220G or higher.
Learning Outcomes
1. Explain the behavior of the six logic gates using the truth table (AND, OR, NOT, NAND, NOR, XOR, XNOR).
2. Create the truth tables for any logic gate or Boolean function.

3. Apply Boolean Algebra rules OR K-maps to any logic function expression to simplify it.
4. Create complete circuit designs using combinational logic functions and sequential logic functions.
5. Convert numerical values to the commonly used digital representations.
6. Apply arithmetic operations using different numbering systems.
7. Build digital circuits using breadboard and Integrated circuits.

ENGR 140. Introduction to Programming and Embedded Systems
4 Credits (3+3P)
An introduction to programming and to the field of embedded systems. Starting from the basic concepts of programming, this course uses microcontrollers, sensors, motors, and other peripheral devices to support the learning and application of the problem-solving process through embedded systems. This course focuses on reading, writing, debugging, testing, and documenting computer programs.
Prerequisite/Corequisite: E T 182 or ENGR 130.
Learning Outcomes
1. Set up and use a rich programming environment for programming
2. Employ effective use of the problem-solving process
3. Analyze existing code
4. Write, debug and test code given software requirements
5. Apply testing and documentation best practices
6. Transfer and apply programming knowledge to an Arduino-based environment

ENGR 190. Introduction to Engineering Mathematics
4 Credits (4)
Engineering applications involving involved Math topics most heavily used in first and second-year engineering courses. Topics include engineering applications of algebra, trigonometry, vectors, complex numbers, sinusoids and signals, systems of equations and matrices, derivatives, integrals and differential equations.
Prerequisite: A grade of C- or better in MATH 1250G or higher.
Learning Outcomes
1. Ability to solve systems of linear equations by use of matrices
2. Ability to use complex numbers and periodic function to solve engineering problems
3. Ability to solve problems using various coordinate system
4. Write and Solve problems with 2-D 3D vectors
5. Write and Solve problems with derivatives
6. Write and solve problems with integrals

ENGR 198. Special Topics in Engineering
1-3 Credits
Directed individual study of topics in engineering. Written reports covering work required. May be repeated for a maximum of 6 credits. Restricted to engineering majors. Graded S/U.
Prerequisite: consent of academic dean.

ENGR 217. Manufacturing Processes
3 Credits (3)
An introduction to modern manufacturing processes and their application. Students will be introduced to manufacturing concepts such as traditional and non-traditional machining operations, tooling, material selection, thermal joining, geometric dimensioning & tolerancing, metrology, additive manufacturing, assembly and inspection, g-code, and automated manufacturing using CAM packages.
Prerequisite: A grade of C- or better in both, ENGR 110 and (MATH 1220G or higher).
Learning Outcomes
1. Identify the different manufacturing processes and their applications
2. Use, set up, and calibrate measuring tools.
3. Apply geometric tolerances to engineering drawings
4. Demonstrate basic knowledge of materials and material properties
5. Demonstrate basic knowledge of GM codes and their application
6. Proficiently use CAM packages such as SolidWorks CAM
7. Identify different tooling, their use, and manufacturing application

ENGR 217 L. Manufacturing Processes Lab
1 Credit (3P)
A hands-on application of the concepts introduced in ENGR 217. This lab will expose the students to hands-on exercises and manufacturing methods used in industry.
Corequisite: ENGR 217.
Learning Outcomes
1. Understand how a product goes from design to being manufactured
2. Gain knowledge of industry tools and technology
3. Learn how to design for manufacturing
4. Engage students in critical thinking and the design process
5. Gain an appreciation for, and skills for effective communication, teamwork, ethics
6. Increase student knowledge of Geometric Dimensioning and Tolerancing (GDT)
7. Use of other tools such as drawing software, mathematics, economics, etc. knowledge of dimensions, length, time, mass, force, temperature, electric current, energy and power, and related parameters in engineering
8. Understand industry and NMSU safety practices and apply them whenever applicable.

ENGR 230. AC Circuit Analysis
4 Credits (3+3P)
An introduction to AC circuit analysis techniques, RC/RL and RLC transients, phasors, complex power, filter response, and operational amplifiers.
Prerequisite: A grade of C- or better in both, ENGR 120 and (MATH 1440 or MATH 1521G or higher) or ENGR 190)).
Learning Outcomes
1. Apply Ohm's Law and Kirchoff's Laws to AC circuits.
2. Determine transient responses of RL/RC and RLC circuits.
3. Use phasor techniques to analyze AC circuits.
4. Compute RMS quantities and complex power.
5. Analyze and design Op-Amp circuits.
6. Design and proto-type AC circuits and measure AC voltages and currents.

ENGR 233. Engineering Mechanics I
3 Credits (3)
Engineering mechanics using vector methods. Force systems, resultants, equilibrium, distributed forces, area moments, and friction.
Prerequisite: A grade of C- or better in ENGR 190 or MATH 1521G.
Prerequisite/Corequisite: PHYS 1310G or PHYS 1230G.
Learning Outcomes
1. Have an understanding of the force systems, resultants, equilibrium, distributed forces, area moments, and friction.

2. Be able to apply the acquired knowledge to formulate, solve and interpret solutions of engineering mechanics problems.

ENGR 234. Engineering Mechanics II
3 Credits (3)
Kinetics of particles, kinematics and kinetics rigid bodies, systems of particles, energy and momentum principles, and kinetics of rigid bodies in three dimensions.
Prerequisite: A grade of C- or better in M E 236 or C E 233 or ENGR 233.
Learning Outcomes

1. Have a good understanding of the kinetics of particles, kinematics and kinetics rigid bodies, energy and momentum principles, and kinetics of rigid bodies.
2. Be able to apply the acquired knowledge to formulate, solve and interpret solutions of engineering mechanics problems