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<td>MECH3309</td>
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<td>MECH4322</td>
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<td>Finite Element Analysis with ANSYS</td>
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<td>MECH4327</td>
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<td>Aerodynamics</td>
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**TOTAL CREDIT HOURS FOR DEGREE PROGRAM**: 184
TOTAL CREDIT HOURS: 144
AY 2018-2019

MECHANICAL ENGINEERING

FALL Semester I
- ENG0101 Freshman Seminar
- ENG0102 College Composition
- ENG0103 College English
- ENG0104 College Chemistry
- ENG0105 College Physics
- ENG0106 College Calculus
- ENG0107 College Computer Science
- ENG0108 College Programming

SPRING Semester I
- ENG0110 Freshman Seminar
- ENG0111 College Composition
- ENG0112 College Chemistry
- ENG0113 College Physics
- ENG0114 College Calculus
- ENG0115 College Computer Science
- ENG0116 College Programming

FALL Semester II
- ENG0101 Freshman Seminar
- ENG0102 College Composition
- ENG0103 College English
- ENG0104 College Chemistry
- ENG0105 College Physics
- ENG0106 College Calculus
- ENG0107 College Computer Science
- ENG0108 College Programming

SPRING Semester II
- ENG0110 Freshman Seminar
- ENG0111 College Composition
- ENG0112 College Chemistry
- ENG0113 College Physics
- ENG0114 College Calculus
- ENG0115 College Computer Science
- ENG0116 College Programming

FALL Semester III
- ENG0101 Freshman Seminar
- ENG0102 College Composition
- ENG0103 College English
- ENG0104 College Chemistry
- ENG0105 College Physics
- ENG0106 College Calculus
- ENG0107 College Computer Science
- ENG0108 College Programming

SPRING Semester III
- ENG0110 Freshman Seminar
- ENG0111 College Composition
- ENG0112 College Chemistry
- ENG0113 College Physics
- ENG0114 College Calculus
- ENG0115 College Computer Science
- ENG0116 College Programming

FALL Semester IV
- ENG0101 Freshman Seminar
- ENG0102 College Composition
- ENG0103 College English
- ENG0104 College Chemistry
- ENG0105 College Physics
- ENG0106 College Calculus
- ENG0107 College Computer Science
- ENG0108 College Programming

SPRING Semester IV
- ENG0110 Freshman Seminar
- ENG0111 College Composition
- ENG0112 College Chemistry
- ENG0113 College Physics
- ENG0114 College Calculus
- ENG0115 College Computer Science
- ENG0116 College Programming

FALL Semester V
- ENG0101 Freshman Seminar
- ENG0102 College Composition
- ENG0103 College English
- ENG0104 College Chemistry
- ENG0105 College Physics
- ENG0106 College Calculus
- ENG0107 College Computer Science
- ENG0108 College Programming

SPRING Semester V
- ENG0110 Freshman Seminar
- ENG0111 College Composition
- ENG0112 College Chemistry
- ENG0113 College Physics
- ENG0114 College Calculus
- ENG0115 College Computer Science
- ENG0116 College Programming

FALL Semester VI
- ENG0101 Freshman Seminar
- ENG0102 College Composition
- ENG0103 College English
- ENG0104 College Chemistry
- ENG0105 College Physics
- ENG0106 College Calculus
- ENG0107 College Computer Science
- ENG0108 College Programming

SPRING Semester VI
- ENG0110 Freshman Seminar
- ENG0111 College Composition
- ENG0112 College Chemistry
- ENG0113 College Physics
- ENG0114 College Calculus
- ENG0115 College Computer Science
- ENG0116 College Programming

FALL Semester VII
- ENG0101 Freshman Seminar
- ENG0102 College Composition
- ENG0103 College English
- ENG0104 College Chemistry
- ENG0105 College Physics
- ENG0106 College Calculus
- ENG0107 College Computer Science
- ENG0108 College Programming

SPRING Semester VII
- ENG0110 Freshman Seminar
- ENG0111 College Composition
- ENG0112 College Chemistry
- ENG0113 College Physics
- ENG0114 College Calculus
- ENG0115 College Computer Science
- ENG0116 College Programming

FALL Semester VIII
- ENG0101 Freshman Seminar
- ENG0102 College Composition
- ENG0103 College English
- ENG0104 College Chemistry
- ENG0105 College Physics
- ENG0106 College Calculus
- ENG0107 College Computer Science
- ENG0108 College Programming

SPRING Semester VIII
- ENG0110 Freshman Seminar
- ENG0111 College Composition
- ENG0112 College Chemistry
- ENG0113 College Physics
- ENG0114 College Calculus
- ENG0115 College Computer Science
- ENG0116 College Programming

This flowchart represents a recommended eight-semester path to graduation of your respective program and respective degree.

FLOWCHART LEGEND
- College Readiness Requirements (See the SUAC College Readiness Test Table)
- Math requirement for College Readiness (See the SUAC College Readiness Test Table)
- Pre-requisites
- Co-requisites

Program courses are co-developed in collaboration with Broward College and University of Arizona

Critical path to 8 semester graduation
General Education Courses
Faculty of Engineering & Technology Courses
Mechanical Engineering Courses

Approved by:
HOD Dean VRAS6

Disclaimer: Course and flowchart content based on requirements at the time of publication.
1st SEMESTER

Calculus & Analytical Geometry I
5 Credits (5 hrs. lec.)
Introduction to calculus with an emphasis on understanding and problem solving through graphics and numerical approach. Foundation in the fundamental and properties of functions, derivation, integration, and their application in physics, economics and biology.

Introduction to Engineering
3 Credits (3 hrs. lec.)
Engineering design, effective team participation and career preparation. Introduction on engineering hands-on project designing, education development, engineering career plan and personal and management skills enhancement.

General Chemistry I + Lab
3 + 1 Credits (3 hrs. lec. + 1 hr. lab)
Integrated lecture-lab course to develop fundamentals in chemistry through atomic and molecular properties and structures. Development of experimental skills and laboratory techniques from series of laboratory chemical experiments.

Composition I
3 Credits (3 hrs. lec.)
Emphasized on the English writing skills to enhance the ability of expounding through essays.

World Religion (General Education)
3 Credits (3 hrs. lec.)
Comprehension of multiple faith practices. Understanding of the concept of God and/or the righteous path in living the life. Multiple perspectives are expected from the comparative holy routines, with focus on the historical aspects.

2nd SEMESTER

Calculus & Analytical Geometry II
5 Credits (5 hrs. lec.)
Extended applications of numerical integration; definite integral in geometry, physics, economics and probability; differential equations from a numerical, graphical, and algebraic point of view; modeling using differential equations, approximations by Taylor series.

General Physics with Calculus I + Lab
4 + 1 Credits (4 hrs. lec. + 1 hr. lab)
A first course in Newtonian mechanics; introductory-level statics and dynamics of particles, rigid bodies and fluids. Covers or algebra, projectile and circular motion, Newton’s Laws, conservation of energy, collisions and conservation of momentum, rotational dynamics and conservation of angular momentum, statics, harmonic oscillators and pendulums, gravitation and Kepler’s Laws, fluid statics and dynamics.

Computer Programming for Engineering Applications
3 Credits (3 hrs. lec.)
Fundamentals of C, complexity and efficiency analysis, numerical precision and representations, intro to data structures, structured program design, application to solving engineering problems.

MATLAB I
1 Credit (1 hr. lab)
Introduction to MATLAB programming environment, arrays, creating and running script files, 2D plotting features, functions, programming elements, polynomials, curve fitting, and interpolation.

Composition II
3 Credits (3 hrs. lec.)
An advanced English academic writing skills study, with focus on critical scientific papers associated with engineering subjects.

General Psychology
3 Credits (3 hrs. lec.)

3rd SEMESTER

Calculus & Analytical Geometry III
5 Credits (5 hrs. lec.)
Advanced study of vectors, differential and integral calculus with multiple variables and geometry analytics.

General Physics with Calculus II + Lab
4 + 1 Credits (4 hrs. lec. + 1 hr. lab)
A first course in electromagnetic fields and their applications, using principles of Coulomb's and Gauss' Law, electric fields and potentials, electrical and magnetic properties of matter, Ampere's and Faraday's laws, elementary DC and AC circuits, Maxwell's equations.

Engineering Graphics
3 Credits (3 hrs. lec.)
Representations and analysis of systems of orthographic projection and graphical methods used in engineering design and production, correlated with technical sketching. Laboratory required.

Statics
3 Credits (3 hrs. lec.)
A study of equilibrium of a particle, equivalent and resultant force systems, equilibrium, geometric properties of areas and solids, trusses, frames and machines, shear force and bending moments, friction.

Indonesian Language (General Education)
3 Credits (3 hrs. lec.)
Bahasa Indonesia is a general education course aimed to help students to master Bahasa Indonesia (Indonesian language) well, efficiently, and productively. Students are expected to use spoken and written language actively, both in academic and non-academic context. With a reflective approach, students are encouraged to produce original spoken and written statements that would be appropriate for public. This course also introduces different genre in Indonesian literature and literature assessment in a form of academic paper. This course comprises two main components: 1) Speaking skill; and 2) Writing skill.
4th SEMESTER

Differential Equations
3 Credits (3 hrs. lec.)
Encompasses methods for ordinary differential equations (ODE); and qualitative techniques include matrix methods approach to systems of linear equations and series solutions.

Dynamics
3 Credits (3 hrs. lec.)
Dynamics of particles and rigid bodies as applied to mechanical systems due to kinetics, momentum, centripetal force, impulse, and moment of inertia.

Thermodynamics
3 Credits (3 hrs. lec.)
Basic laws and examples of engineering applications of macroscopic thermodynamics; equations of state; reversible and irreversible processes; vapor power cycles and gas power cycles.

Electrical Circuits + Lab
3 Credits (3 hrs. lec. and lab.)
A fundamental in electrical with electronics focus. Focuses on current and voltage divider; circuit node voltage and mesh current analysis; Thevenin and Norton equivalents; AC circuit; electromagnetic fields; electrical power, transformer, generator and motors; amplifiers and digital circuits; sensors and physical quantities measurements.

Manufacturing Processes + Machine Shop
3 Credits (3 hrs. lec.) + 1 Credits (1 hr lab.)
Introduction to theory of manufacturing techniques and processes with an emphasis on metalworking processes for industrial applications. Students do approaches and limitations of manufacturing in the actual machine shop. Students begin with instruction on shop safety practices as well as machine-specific safety practices. The students are then introduced to basic metal working techniques such as layout, use of hand tools, as well as set-up and operation of manual metalworking equipment including the metal lathe and milling machine. The students are introduced to the limitations of metalworking through a discussion of the material removal process.

MATLAB II
1 Credit (1 hr. lab)
MATLAB programming to handle two-dimensional arrays, manipulation of arrays, plots with special graphics, 3D plots, inline functions, solving a nonlinear equation with one variable, finding the maximum or minimum of a function.

5th SEMESTER

Engineering Analysis
3 Credits (3 hrs. lec.)

Introduction to Fluid Mechanics
3 Credits (3 hrs. lec.)
Fundamentals of fluid mechanics covering properties of fluids, fluid statics, dynamics of incompressible viscous and inviscid flows, control volume formulations of continuity, momentum and energy equations, dimensional analysis, viscous pipe flow, boundary layers and drag.
Mechanical Behavior of Engineering Materials
3 Credits (3 hrs. lec.)
Introduction to engineering solid materials; concepts of strain, stress, equilibrium; material/structural responses to applied loading/deflection; analysis of engineering components, e.g., beams, plates, thin-walled structures, axisymmetric elements; introduction to structural stability.

Fundamental of Materials for Engineers
3 Credits (3 hrs. lec.)
Principles which underlie and relate the behavior, properties and processing of materials to their engineering applications.

Mechanics of Materials Laboratory
1 Credit (1 hr. lab)
Practical session focuses on engineering materials for stress-strain relations, deformation, hardness, strength, fracture, and cyclic fatigue, with instruments, specimens, recording and interpretation of data, and formal engineering report writing.

Pancasila/Civic
3 Credits (3 hrs. lec.)
This course will discuss the history and the philosophical process that leads to the formulation of Pancasila as the principal values of the Republic of Indonesia. In this course, students will learn how to translate the principal values of Pancasila into customary implementation.

Environmental Ethics
3 Credits (3 hrs. lec.)

6th SEMESTER

Dynamics of Machines
3 Credits (3 hrs. lec.)
Analysis of motions and forces in machines, design exercises.

Engineering Component Design
3 Credits (3 hrs. lec.)
Application of failure analysis methods to the design of specific machine components such as shaft, gear sets, bolted/riveted/welded joints, spring and slender/thin-walled structures.

Mechatronics
3 Credits (3 hrs. lec.)
This course presents the field of embedded systems through a series of guided self-study modules. Students work individually or in teams of two and complete weekly mini-projects aimed at providing a working knowledge of microcontroller programming, basic digital and analog circuits, and their essential components. Each of the mini-projects is implemented and tested on an electronic breadboard. The course culminates with an open-ended design project integrating the skills developed through the mini-modules.

Numerical Methods
3 Credits (3 hrs. lec.)
Introduction to linear algebra; solution of engineering problems based upon an integrated approach combining numerical analysis and the use of computers.
Instrumentation Laboratory
3 Credits (3 hrs. lec.)
Basic principles of laboratory practice and instrumentation; statistical measurement theory including probability distributions, finite statistics, uncertainty analysis regression analysis dynamics of measurement systems; transducers and signal conditioning circuits. Experiments using basic laboratory instrumentation on the speed of sound, temperature measurements, and the dynamic response of first and second order systems.

Introduction to International Relations
3 Credits (3 hrs. lec.)
A cross national analysis of the concepts of sovereignty, power, security, economic development and national interests in the formulation of foreign policy; the respective roles of the United Nations and the European Union within the context of the growth of Intergovernmental Organizations and Non-governmental actors such as legislatures and interest groups. Study of the utilization of those concepts on policy of both leading nations and the emerging states with emphasis on both conflictual issues related to both tangible and intangible causes as well as the cooperative aspects of a more globalized and interdependent economic system. This is a writing credit course with International/Intercultural content.

Internship (3 Credit Hours, on Summer term)

7th SEMESTER

Senior Capstone I
3 Credits (3 hrs. lec.)
Project-based designing to solve practical, industrial problems using engineering design process.

Senior Colloquium
1 Credit
A transition platform between the academic experience and the world of work through lectures and seminars, resume writing workshop, to prepare the path to professional engineer, financial planning, and engineering ethics.

Control System Design
3 Credits (3 hrs. lec.)
Mathematical modeling of dynamical systems, hardware and software issues; computer simulations; classical control methods including transient response, steady-state errors, bode diagrams, root locus and design of closed loop control systems; introduction to state feedback design and digital control.

Heat Transfer
3 Credits (3 hrs. lec.)
Advanced and detailed study of conduction, convection and radiation heat transfer, with applications to engineering problems.

Senior Mechanical Laboratory
2 Credits (2 hrs. lab)
Experimental investigations involving thermal power and mechanical systems such as fluid machinery, heat-exchanger, rotating equipment, and piping system.

Intermediate Thermodynamics (Technical Elective I)
3 Credits (3 hrs. lec.)
Study on power systems; non-reacting and reacting mixtures; psychometrics; gas dynamics. (See advisor for course approval)
8th SEMESTER

Senior Capstone II
3 Credits (3 hrs. lec.)
Extension of Senior Capstone I (MECH 4304). The projection of the planned designed into prototype, design and working system testing and iterative evaluation prior prototype finalization.

Mechanical Vibrations
3 Credits (3 hrs. lec.)
Free and forced vibrations of simple mechanical systems; effects of damping; introduction to multidegree of freedom systems.

Introduction to Philosophy
3 Credits (3 hrs. lec.).

HVAC System Design (Technical Elective II)
3 Credits (3 hrs. lec.)
Analysis and design of air conditioning systems for commercial and industrial buildings, including equipment and component selection. Energy-efficient concepts will be emphasized. (See advisor for course approval)

Vehicle Dynamics (Technical Elective III)
3 Credits (3 hrs. lec.)
This course is designed to introduce undergraduate students to theories and principles of vehicle dynamics. Topics include behavior of tires, vehicle ride analysis, suspension system analysis, steering system design, cornering stability analysis, driving analysis, and braking analysis. (See advisor for course approval)
Planar Multibody Dynamics with Applications
3 Credits (3 hrs. lec.)
Kinematic and dynamic analysis of mechanical systems in planar motion, numerical methods and use of computer programs in analysis.

Finite Element Analysis with ANSYS
3 Credits (3 hrs. lec.)
Fundamentals of finite element analysis, model generation, solution procedure, post processing in ANSYS for problems from various disciplines such as structural thermal or fluids.

Aerodynamics
3 Credits (3 hrs. lec.)
Basic equations and their approximation; potential flow theory; fundamentals of airfoil and wing theory; viscous and compressibility effects; an introduction to compressible flows; application to aerodynamics of wings and bodies.

Intermediate Thermodynamics
3 Credits (3 hrs. lec.)
Study on power systems; non-reacting and reacting mixtures; psychometrics; gas dynamics.

HVAC System Design
3 Credits (3 hrs. lec.)
Analysis and design of air conditioning systems for commercial and industrial buildings, including equipment and component selection. Energy-efficient concepts will be emphasized.

Numerical Methods in Fluid Mechanics and Heat Transfer
3 Credits (3 hrs. lec.)
Development of numerical techniques for the solution of ordinary and partial differential equations that arise in heat transfer and fluid mechanics; classification of equations, methods of solutions, examples.

Gas Dynamics
3 Credits (3 hrs. lec.)
Study the isentropic flow with area changes, normal and oblique shocks, one-dimensional flows with friction and heat addition, choking, method of characteristics, applications.

Vehicle Dynamics
3 Credits (3 hrs. lec.)
This course is designed to introduce undergraduate students to theories and principles of vehicle dynamics. Topics include behavior of tires, vehicle ride analysis, suspension system analysis, steering system design, cornering stability analysis, driving analysis, and braking analysis.

Introduction to Biomechanics
3 Credits (3 hrs. lec.)
Introducing the basic concepts of the kinematics and dynamics of human motion, sport science, and biomedical tools.