Course for Mechanical Engineering

SEMESTER 1		
Code	**Course Title**	**Credits**
	Calculus 1	3
	English 1	3
	Basic Physics 1: Mechanics	3
	Chemistry	3
	Citizenship & State Philosophy	3
	Introduction to Mechanical Engineering	3
	Total	**18**
SEMESTER 2		
Code	**Course Title**	**Credits**
	Indonesian Language	3
	English 2	3
	Basic Physics 2: Thermal & Electricity	3
	Calculus 2	3
	Total	**12**
SEMESTER 3		
Code	**Course Title**	**Credits**
	Statics	3
	Material Science	3
	Mechanical Drawing	3
	English 3	3
	English 4	3
	Religion	3
	Total	**18**
SEMESTER 4		
Code	**Course Title**	**Credits**
	Mechanics of Materials	3
	Engineering Mathematic 1 (Linear Algebra & ODE)	3
	Manufacturing Process 1	3
	Kinematic	3
	Thermodynamics 1	3
	Enterpreneurship& Leadership 1/Bussiness Model Development	3
	Total	**18**
SEMESTER 5		
Code	**Course Title**	**Credits**
	Engineering Mathematic 2 (Laplace transformation, Solution of ODE, Multivariate function)	3
	Manufacturing Process 2	3
	Logic and critical Thinking	3
	Cultural Diversity	3
	Total	**12**

SEMESTER 6		
Code	**Course Title**	**Credits**
	Fluid Mechanics 1	3
	Dynamic	3
	Thermodynamics 2	3
	Elements of Machine 1	3
	Basic of Electrical Power	3
	Enterpreneurship& Leadership 2/Bussiness Project	3
	Total	**18**
SEMESTER 7		
Code	**Course Title**	**Credits**
	Fluid Mechanics 2	3
	Elements of Machine 2	3
	Mechanical Vibrations	3
	Heat and Mass Transfer 1	3
	Elective 1	3
	Elective 2	3
	Total	**18**
SEMESTER 8		
Code	**Course Title**	**Credits**
	Heat and Mass Transfer 2	3
	Dynamic Systems and Control	3
	Engineering Measurement	3
	Elective 3	3
	Total	**12**
SEMESTER 9		
Code	**Course Title**	**Credits**
	Internship	6
	Total	**6**
SEMESTER 10		
Code	**Course Title**	**Credits**
	Energy Conversion (Internal & external combustion engine, Fluid Machinery)	3
	Elective 4	3
	Final Project	6
	Total	**12**

Elective Courses

Concentration of Manufacturing Technology and Product Development		
Code	**Course Title**	**Credits**
	Production Planning and Inventory Control (PPIC)	3
	Advanced Production System	3
	Quality management	3
	Product Design & Development	3
	Distribution and Transportation System	3
	Flexible Manufacturing System	3

Concentration of Mechanics and Materials		
Code	**Course Title**	**Credits**
	Numerical Method for Mechanical Engineering	3
	Advanced Materials - Polymeric Composite Materials	3
	Biomechanics	3
	Introduction to Engineering Tribology	3
	Finite Element Analysis (FEA)	3
	Failure analysis	3

Course Description and Prerequisite

1. **Citizenship & State Philosophy**
   This course covers the principles of Pancasila, UUD 1945, and GBHN, pattern of thought, primary of Pancasila amidst liberalism and socialism as well as its implementation in actual society. The principles of Pancasila are reflected in a critical way so that it can answer the recent problems in society. Furthermore, it covers the principles of Citizenship, nationality, pattern of thought, primary of Citizenship towards internationalism and regionalism as well as its implementation in actual society. The principles and regulations of Citizenship are reflected in a critical way so that it can answer the recent problems of people citizenship.
   Prerequisite(s): none

2. **Indonesian Language**
   This course provides Indonesian students with the language skills in order to develop theier Indonesian communicative competence in a formal context such as writing papers and theses and speaking in a seminar, symposium or conference, thourgh practice and careful analysis of its vocabulary choice, grammar use, logical paragraph, and essay writing with correct spelling. It covers topics such as structure of Indonesia language, diction, effective sentences, business letters, reports and proposals. This course is intended to help Indonesian and foreign students develop their communicative knowledge, competences, and skills, so they are able to communicate in their daily activities with the local community.
   Prerequisite(s): none

3. **Religion**
   This course covers religiosity, essence of religion. Learning to live together and dialog among religions, intercultural and multi-religions approach. It also takes into account philosophical, phenomenological consideration on religion.
   Prerequisite(s): none
4. **English 1**
   This course aims to explore and expand the students' proficiency to express and convey their message and intentions in both intelligible and comprehensible spoken English. In this course the students are also introduced and exposed to varieties of social interactions, situations and contexts for them to communicate effectively. In a class where international students are present, the course will provide the opportunity for the students to be exposed to World English and, thus, become aware of identity considerations and cultural sensitivity.
   Prerequisite(s): none

5. **English 2**

This course aims to explore students' ability in the professional setting. In this course, the students are also learning the use of English in the key areas of professional business communication

Prerequisite(s): none

6. **English 3**

   This course aims to explore and enrich the students' proficiency to express and convey their message and intentions in both intelligible and comprehensible spoken English. In this course the students are also introduced and exposed to varieties of text and contexts for them to evaluate and communicate effectively in written model. In a class where international students are present, the course will provide the opportunity for the students to be exposed to World English and, thus, become aware of identity considerations and cultural sensitivity.

   Prerequisite(s): none

7. **English 4**

   This Course aims to explore the students' ability in planning, researching, organizing, drafting, and producing Academic papers. In this course, the students are also learning how to cite and reference in Academic writing to minimize plagiarism.

   Prerequisite(s): none

8. **Entrepreneurship & Leadership 1/Business Model Development**

   This course is designed as a fundamental devising to leadership development with regard to entrepreneurial spirit. It emphasizes self-assessment and development of personal skills and style, understanding and critical evaluation of prominent leadership theories and exploration of current leadership issues. Through lectures, demonstrations, case analysis and small group discussion and exercise, students will explore the application of leadership concepts and practices across organisations and disciplines to build the character building.

   Prerequisite(s): none

9. **Entrepreneurship & Leadership 2/Business Project**

   This course is thought to be the continuation course, giving students chance to build a business plan and execute it. It covers the principles and practices of entrepreneurship in the business world. Theories on principles of entrepreneurship such as definition, tips on the key to success, challenges, creative thinking will be covered. Developing a business plan will be an essential part of the course. The entrepreneurial profile will also be discussed. Cases on successful entrepreneurs are highlighted to provide examples on how they were able implement strategies and efforts in achieving success.

   Prerequisite(s): none

10. **Cultural Diversity**

    This course aims at nurturing the seeds of multiculturalism to the students in a globalized world. It will focus on the common understanding on different cultures and civilization of a world.

    Prerequisite(s): none

11. **Logic and critical Thinking**

    This course covers the sense of logic and critical thinking as the basis of science and objective rationally. It also provides the students the skill of applying logic and critical thinking in daily habit.

Prerequisite(s): none

12. **Internship**
    Students will learn hands on work experience for a company or several companies during the course of 8 months. Student eligibility to this program is guided by University policies
    Prerequisite(s): Maximum two subjects get "D" and minimum 132 credits

13. **Thesis**
    This course requires the students to choose a topic to be investigated, which is related to Mechanical Engineering or an application of Mechanical Engineering. A prior approval from the thesis advisor on the topic chosen is compulsory and the students must meet all the thesis criteria set by the Faculty of Engineering and the university.
    Prerequisite(s): Internship and minimum 138 credits with maximum two subjects get "D"

Study Program

1. **Calculus 1**
   This course covers functions, limits, continuity, differentiation, and application of derivatives. These include line, circles, parabolas, trigonometric functions, rate of change and limits, calculating limits using the limit laws, one-sided limits and limits at infinity, continuity, tangent, and derivatives, the derivative as a rate of change, derivative of trigonometric functions, the chain rule and the parametric equation, implicit differentiation, related rates, linearization, differentials, extreme values of functions, the Mean Value theorem, monotonic functions and the first derivative test, concavity and curve sketching.
   Prerequisite(s): none

2. **Basic Physics 1**
   In this course, the students will learn about the basic concept of Physics, particularly focused on mechanics. The course will be started with a study of linear motion and the corresponding underlying physics law, namely Newton Laws. The course will be continued with the concept of mechanics energy, including its conservation laws and momentum. The rotating moting, the concept of inertia moment and rigid body motion will also be studied. As the last section, they will also learn about the physics laws in fluid mechanics. The students will also be introduced with the applications of those physics laws in modern equipment or instruments in daily life and industries.
   Prerequisite(s): none

3. **Chemistry**
   This is an introductory course in theories and concepts of modern chemistry. The content of this course will cover stoichiometry, atomic structure and molecule, chemical bonding, phase and phase change, chemical reaction (kinetic of reaction, equilibrium, reduction-oxidation) and also electrochemical. The laboratory work will also be introduced to develop reasoning power of students, the ability to apply chemical principles; as well as acquaint the students with chemical laboratorytechnique.
   Prerequisite(s): none

4. **Introduction to Mechanical Engineering**

   This is an introductory course in mechanical engineering.The first unit of this course will allow students to take a close look at the mechanical engineering profession and learn about what differentiates it from other technical fields. This course will also examine what engineers—specifically, mechanical engineers—contribute to the workforce. The mechanical engineering profession and its relation to current national, social, industrial, ethical, and international issues and problems will be discussed as well.

   Prerequisite(s): none

5. **Basic Physics 2**

   In this course,the students will continue learn about basic concepts of Physics. The first unit of this course will learn about heat transfer and basic thermodynamics that covers basic heat transfer including conduction, convection and radiation and also Thermodynamic Law I including internal energy, heat & work, and ideal gas. Furthermore, students will be introduced to electricity, magnetism and wave. Lab work will be introduced as well in order to enhance the basic understanding of those phenomena in engineering work and daily life.

   Prerequisite(s): Basic Physics 1

6. **Calculus 2**

   This second course of calculus covers integration, application of definite integrals, transcendental functions, technique of integrations, conic sections, and polar coordinates, vector and geometric space and vector valued functions.

   Prerequisite(s): Calculus 1

7. **Statics**

   This course deals with fundamentals of static equilibrium. This course will be started by learning Newton's Law and the use of free body diagram to solve the static problems. Furthermore, students will study about structural supports, statically determinate structures (simply supported, cantilever, etc.), truss, frame, distributed load, internal forces and friction. In addition, virtual work method will be introduced as well. By taking this course, it is expected that the students will be able to develop the ability to apply mathematics and physics to solve basic engineering problems.

   Prerequisite(s): Basic Physics 1 & 2, Calculus 1 & 2

8. **Material Science**

   This is an introductory course into the structure and properties of materials. Subjects include materials classification & application, mechanical properties & testing, manufacturing properties, physical and chemical properties, the processing of materials, crystal structure, miller indices, composition, alloying, phase diagram, corrosion, diffusion, heat treating, and inspection. The laboratory activities will be carried out as well in order to reinforce the classroom theory. The objective of this course is to aid the students in materials selection when designing mechanical components.

   Prerequisite(s): Basic Physics 1 & 2, Chemistry

9. **Mechanical Drawing**

   This is an introductory course in technical drawing. It covers the use of manual drawing instruments, lettering, various geometric constructions, and multi-view orthographic engineering drawings and assemblies. This course also introduces 2-D technical drawing and

3-D modelling using computer-aided design software. The goal of this course is as industrial practices in the creation of parts, assemblies and drawings.
Prerequisite(s): none

10. **Mechanics of Materials**
    This course is the foundation to many advanced techniques that allow mechanical engineers to designmachine components, mechanisms, predict failure and understand the physical properties ofmaterials. The topics include plane stress-strain mechanical properties of materials, stress and deformation (due to axial force, torsion, bending moment, and shear force), Mohr's circle, failure theorems, indefinite statics, buckling and energy deformation method.
    Prerequisite(s): Statics, Calculus 1 & 2

11. **Engineering Mathematics 1**
    In this course consists of two parts. Firstly, the linear algebra is given to topics that will be useful to aid in solving mechanical engineering problems including linear equation systems, vector spaces, linear transformation, determinants, eigenvalues, similarity, and positive definite matrix. The second part of this course is the Ordinary Differential Equation (ODE) which covers first order ordinary differential equations, linear ordinary differential equations of higher order differentiation, and introduction to nonlinear differential equations.
    Prerequisite(s): Calculus 1 & 2

12. **Manufacturing Process 1**
    This course introduces the students to the basic of manufacturing process including the conventional and non-conventional manufacturing processes such as casting (sand and gravity), forging, coining, forming (deep drawing, stamping, machining (turning, milling and grinding), and joining (welding and riveting).The objective of this course is to gain the ability to select existing manufacturing processes and systems for direct engineering applications.
    Prerequisite(s): Material science, Basic Physics 1 & 2

13. **Kinematic**
    This course provides the principle of dynamics that consists of two parts, they are kinematics and kinetics. In this part, it will deal with graphical and analytical kinematics in terms of the study of various mechanisms that produce motion or change of motion, analysis and synthesis of mechanisms (cams, gears, gear trains, etc.).The topics include instantaneous velocity poles, simple mechanism (four bar, slider crank), velocity and acceleration analysis (graphical method), auxiliary point method, rolling phenomenon, and equivalent mechanism.
    Prerequisite(s): Physics 1, Calculus 1 & 2

14. **Thermodynamics 1**
    The course will introduce the fundamentals of the science of classical thermodynamics. Historical perspectives on the evolution of this field and its gradual development into a modern branch of science will be presented. The topics cover system, Fist and second Thermodynamic Law, Ideal gas and simple incompressible substance, control volume/opened system analysis, and entropy. Furthermore, the applications of the First and the Second Laws of thermodynamics to the analysis of performance and efficiency of pumps, compressors, turbines, nozzles, diffusers, and other engineering systems will be discussed.
    Prerequisite(s): Physics 2, Calculus 1 & 2

15. Engineering Mathematics 2

This second part of engineering Mathematics will cover Laplace transformation, solution of differential equation (using Fourier series, orthogonal function, etc.), multivariable function and an introduction to PDE.

Prerequisite(s): Engineering Mathematics 1

16. Manufacturing Process 2

This part of the subject of manufacturing process will be emphasized on the topics including non-conventional machining (EDM, wire cut), powder metallurgy, surface treatment, manufacturing process for non-metal materials (such as rubber, polymer, ceramic, and composite), geometry specification and cost calculation. In addition, an introduction of flexible manufacturing system will be discussed as well.

Prerequisite(s): Manufacturing Process 1

17. Fluid Mechanics 1

This course highlights the principal concept of fluid mechanics where the flow of fluids is important in many applications ranging from blood flow in the human body to air flow over the wing of a jet aircraft. Therefore, it is expected that students taking this course will be able to apply the knowledge of fluid mechanics either to solve problems or to design mechanical components. The topics include continuum and fluid properties, fluid statics, fluid dynamics, basic of laws of fluid, dimensional analysis.

Prerequisite(s): Physics 1, Calclulus 1&2, Engineering Math 1 & 2

18. Dynamic

This course is a continuation of the study of kinematics where this part emphasizes the kinetics of particles and rigid bodies, with applications to mechanical systems of current interest to engineers. Topics include force analysis, D'Alembert principle, inertia force, balancing of rotating and reciprocating masses, gyroscopic effect, and flywheel.

Prerequisite(s): Kinematic

19. Thermodynamics 2

This is the second part of thermodynamics course where, in this part, is more concern to the concept of exergy and the applications of the laws of classical thermodynamics to the analysis of performance and efficiency of engineering systems such as Rankine, Otto, Diesel, Brayton, and combined cycles. The fundamental thermodynamic relations are examined and applied to describe ideal and non-ideal mixtures. The applications of the laws of thermodynamics to chemically reactive systems, the concept of adiabatic flame temperature, as well as chemical and phase equilibrium are discussed.

Prerequisite(s): Thermodynamics 1

20. Elements of Machine 1

The course focuses on the fundamentals and principles of basic mechanical elements, failure theories and design criteria, and structures of basic mechanical systems. The goal of the course is to learn how to design simple mechanical elements and systems. The topics covered in this course are fundamental of machine elements, design process (stress analysis, failure

theory and safety factor), shaft design, shaft couplings, joining, bearing, springs, power transmission, brake & clutches and friction discs.
Prerequisite(s): Statics, Mechanics of Materials

21. Basic of Electrical Power

This course is aimed to acquire a basic understanding how a power system operates and the problems. The selected topics include introduction to biased power and electrical load, basics of electrical circuit & magnetism, transformer, direct current, synchronous, and induction motor/generator, power characteristics & utilization. Selection, control, and maintenance of electric motor and generator will be discussed as well.
Prerequisite(s): Physics 2, Calculus 1 & 2

22. Heat and Mass Transfer 1

In this course, the students are introduced to the various modes of heat transfer: conduction, convection, and radiation. Application of these methods to steady and unsteady flow is considered. Fins, various other forms of extended surfaces, heat sources and sinks are thoroughly investigated with particular attention to electronic/ electrical systems. Heat exchangers are also studied. The goal of this course is to gain knowledge and ability to solve engineering problems related to heat and mass transfer since most of engineering applications are related to this field.
Prerequisite(s): Basic Physics 2, Fluid Mechanics 1, Engineering Mathematics 1 & 2

23. Fluid Mechanics 2

This second part of fluid mechanics subject will discuss the topics related to internal flow of viscous fluid (laminar & turbulent flow, fully developed, Moody diagram, minor &major losses), External flow (flow characteristics, lift & drag, and boundary layer), ideal-fluid analysis, and compressible flow (ideal gas, Mach number and sound velocity, isentropic and non-isentropic flows).
Prerequisite(s): Fluid Mechanics 1

24. Elements of Machine 2

In the second course of Elements of Machine, students will study how to design gear i.e. system, geometry, spur gear, helical gear, conical, etc. Lubrication and Standard & Code will be discussed as well. Additionally, a design project will be given to students to enhance the implementation of the theories that have been studied.
Prerequisite(s): Elements of Machine 1 & Mechanical Drawing

25. Mechanical Vibrations

The aim of this course is to apply the knowledge of mechanical vibration to analyse a system such as complex machines which often produce vibrations as they operate. Such vibrations could shorten the life of equipment, decrease its effectiveness and precision, or simply produce an unpleasant noise. This course will cover various ways to detect, prevent, and dampen vibrations. The topics include modelling vibration system, energy method, single degree of freedom (DOF), forced vibration, and two DOF – vibration modes.
Prerequisite(s): Kinematic, Dynamic, Engineering Mathematic 1 & 2

26. Heat and Mass Transfer 2

This second part of heat transfer subject covers the topics including basic of mass transfer, forced convection for external & internal flow, calculation for heat exchanger using LMTD and NTU-ε methods, free and combined convection, radiative heat transfer (black body, Wien's law, radiation characteristics, Kirchoff's law, form factor).
Prerequisite(s): Heat and Mass Transfer 1

27. Control Systems

This unit of study aims to allow students to develop an understanding of methods for modeling and controlling linear, time-invariant systems. The study of control systems engineering is of fundamental importance to most engineering disciplines, including Electrical, Mechanical, Mechatronic and Aerospace Engineering with broad range of applications within these disciplines, from aircraft and spacecraft to robots, automobiles, computers and process control systems.d. The following specific topics are covered: feedback & control components, modelling of dynamics system, dynamic response and control system characteristics, feedback basic characteristics, root locus & frequency response, and control system compensation. Additionally, an introduction to mechatronics will be discussed as well.
Prerequisite(s): Dynamic, Mechanical Vibration, Engineering Mathematics 1 & 2

28. Engineering Measurement

This course introduces to the student the basic principles and implementations of engineering measurements for industrial practices. The selected topics in this course include measurements, accuracy, precision, measurement system, calibration, standard, signal analysis, data representation in frequency domain, instrument dynamic response, sensors & transducers, and industrial metrology. Analog& digital systems and data acquisition are introduced as well.
Prerequisite: Engineering Mathematics 1 & 2, Manufacturing Process 1 & 2, Mechanical Drawing.

29. Energy Conversion (Internal & external combustion engine, Fluid Machinery)

This course will briefly introduce to the students the role of thermodynamics, fluid mechanics, and chemistry to the application in the engineering practices especially in industry. The topics covered include internal combustion engines (gasoline engine, diesel engine, gas turbine), external combustion engine (steam turbine, closed gas turbine), and fluid machinery (pump, compressor and turbine).
Prerequisite: Thermodynamics 1 & 2, Fluid Mechanics 1 & 2, Chemistry

Concentration of Manufacturing and Product Development

30. Production Planning and Inventory Control (PPIC)

The goal of this course is to give knowledge and ability to conduct planning and control in manufacturing system. This course include forecasting, aggregate planning, deterministic inventory control, master production scheduling, material requirements planning, capacity planning, capacity requirement planning, sequencing and scheduling.
Prerequisite(s): none

31. Quality management

The aim of this course is to deliver an understanding and knowledge of quality control techniques of which very important to design a quality assurance system. Quality assurance system: quality system documentation, standard quality management system, ISO 9000, Malcolm Baldbridge, Six Sigma, Taguchi method, and Total Quality Management concepts.
Prerequisite(s): none

32. Product Design & Development

This course trains the students to be competent in using a set of tools and methods for product design and development. This teaches the students how to be confident with their own abilities to create a new product and makes them aware of the multiple role functions in creating a new product. Furthermore, this unit provides the students with skills and turn achieves a common objective. Eventually, this provides the reinforcement of specific knowledge gained from other course through practices and reflections in an oriented setting
Prerequisite(s): none

33. Distribution and Transportation System

Transporatation and Distribution System: principles and practices of transportation and its role in the distribution process. The physical transportation system of the US and its performance; carrier responsibilities and services; economic and legal bases of rates, freight classification and tarrifs; public policy regarding regulation; transportation issues and problems. Transportation alternatives and technologies; transportation performance analysis; total transportation cost analysis; fleet development and management; fleet performance indicators; routing and scheduling; shipment planning; vehicle loading; transportation management and information system requirements.
Prerequisite(s): none

34. Flexible Manufacturing System

This course is mainly concerned about the concept and method of flexible manufacturing system planning and control. The study covers flexible manufacturing system technology, flexible manufacturing system component, flexible manufacturing system performance evaluation: analytical model, simulation model, flexible manufacturing system configuration planning: routing optimization, capacity optimization, tools optimization, flexible manufacturing system production planning and control: batching, set-up planning. This course provides ability to plan and to control flexible manufacturing system.
Prerequisite(s): none

35. Advanced Production System

This course studies the concept and method of controlling the throughput manufacturing system.
Prerequisite(s): none

Concentration of Mechanics and Materials

36. Numerical Method for Mechanical Engineering

This course is focused on the use of numerical methods for solving engineering problems with the aid of a digital computer. The course will contain numerical methods such as roots of equations, linear algebraic equations, optimization, curve fitting, and integral and differential

equation solving. MATLAB will be used as the programming language. Programming cluster laboratory times will be available twice a week. Problems will be drawn from all fields of interest to mechanical engineers.
Prerequisite(s): none

37. Advanced Materials - Polymeric Composite Materials

This course is mainly discussed about the polymeric composite materials and its application for mechanical components since polymeric composite material has been widely implemented in broad areas such as biomedical, automotive, and aerospace. The topics will cover an introduction to design of structures made of composite materials, materials selection, fabrication, materials behavior, structural analysis and applications in industry.
Prerequisite(s): none

38. Introduction to Biomechanics

This is a first course biomechanics for undergraduate students that provides background in musculoskeletal anatomy and principles of biomechanics. The course applies and builds on the concepts of Statics and, Dynamics for human activities, and Mechanics of Materials and tissues. The course provides an overview of musculoskeletal anatomy, the mechanical properties and structural behaviour of biological tissues, and biodynamics. Specific course topics will include structuraland functional relationships in tissues and organs; application of stress and strain analysis to biological tissues; analysis of forces in human function and movement; energy and power in human activity;
Prerequisite(s): none

39. Introduction to Engineering Tribology

Introduction to Tribology is an interdisciplinary course for the tribology in design and manufacturing. The course introduces the nature of engineering surfaces, basic phenomena of interacting surfaces in relative motion, major modes of friction and wear, and popular theories of contact and lubrication. It will also introduce instruments for friction and wear analyses. Design of typical tribological elements and systems will be discussed as well.
Prerequisite(s): none

40. Finite Element Analysis (FEA)

This is an introductory course to computer-aided analysis, which is designed for the students to familiarize with modern computer application in stress analysis. The course will cover fundamentals of finite element analysis (FEA) and the applications to engineering analysis. Commercially available software packages will be used to conduct the class. This course will familiarize students with the basic concepts of finite-element method for stress analysis, and computer implementation.
Prerequisite(s): none

41. Failure analysis

In this course, the student will be taught how to apply engineering and scientific principles to root-cause failure analysis and to the understanding of how engineering materials and components fail. Also, some important topics such as failure modes and mechanism, design and manufacturing integrity, materials selection, legal problems, and product liability issues will be discussed.
Prerequisite(s): none