

MECHANICAL ENGINEERING (MEEN)

MEEN 3230 Solid Mechanics Laboratory **2 Semester Credit Hours (4 Lab Hours)**

EXPERIMENTAL PRINCIPLES FROM STRENGTH OF MATERIALS, AND EXPERIMENTS AND COMPUTER-BASED ANALYSIS OF MACHINE ELEMENTS AND STRUCTURES FOR STRENGTH OF MATERIAL AND SOLID MECHANICS.

Prerequisite: MEEN 3330 or 3330*.

* May be taken concurrently.

Co-requisite: SMTE 0099.

MEEN 3310 Engineering Analysis for Mechanical Engineering **3 Semester Credit Hours (3 Lecture Hours)**

APPLICATIONS OF FUNDAMENTALS OF LINEAR ALGEBRA, VECTOR ANALYSIS, NUMERICAL METHODS, COMPUTER PROGRAMMING, AND PROBABILITY AND STATISTICS FOR MECHANICAL ENGINEERING. (CROSS-LISTED WITH MATH 3310 - MATHEMATICAL ANALYSIS FOR MECHANICAL ENGINEERING)

Prerequisite: MATH 3315.

MEEN 3330 Solid Mechanics for Mechanical Engineering **3 Semester Credit Hours (3 Lecture Hours)**

STRESS ANALYSIS OF DEFORMABLE BODIES AND MECHANICAL ELEMENTS; STRESS TRANSFORMATION; COMBINED LOADING; FAILURE MODES; MATERIAL FAILURE THEORIES; FRACTURE AND FATIGUE; DEFLECTIONS AND INSTABILITIES; THICK CYLINDERS; CURVED BEAMS; DESIGN OF STRUCTURAL/MECHANICAL MEMBERS; DESIGN PROCESSES FOR SHAFTS, BEARINGS, SPRINGS, FASTENERS, AND MECHANICAL JOINTS.

Prerequisite: ENGR 3320.

MEEN 3335 Introduction to Unmanned Aircraft Systems **3 Semester Credit Hours (3 Lecture Hours)**

OVERVIEW OF UNMANNED AERIAL SYSTEMS: HISTORY, PLATFORMS, OPERATIONS, COMMAND AND CONTROL, SENSOR SYSTEMS, PAYLOADS, REGULATIONS, POLICY. CURRENT DEVELOPMENTS IN UNMANNED AERIAL SYSTEMS.

MEEN 3340 Solid Modeling and Finite Elements **3 Semester Credit Hours (2 Lecture Hours, 3 Lab Hours)**

USE OF COMPUTER AIDED DESIGN AND SOLID MODELING TOOLS IN ENGINEERING DESIGN, AND ANALYSIS, AND MANUFACTURING INCLUDING: SOLID MODELING, STRESS, FLOW, AND HEAT TRANSFER ANALYSIS USING FINITE ELEMENT METHODS.

Prerequisite: MEEN 3310 and ENGR 3320.

MEEN 3345 Heat Transfer

3 Semester Credit Hours (3 Lecture Hours)

STEADY AND UNSTEADY CONDUCTION IN ONE- AND TWO-DIMENSIONS; FORCED CONVECTION, INTERNAL AND EXTERNAL FLOWS; HEAT EXCHANGERS; INTRODUCTION TO RADIATION; ELEMENTS OF THERMAL SYSTEM DESIGN.

Prerequisite: (ENGR 3316 and 3315).

MEEN 4220 ENGINEERING LAB

2 Semester Credit Hours (2 Lecture Hours)

Experimentation and analysis of thermal/fluid systems, energy balances, performance measurements of devices and systems, data analysis and correlation, elements of experimental design.

Prerequisite: ENGR 3315 and MEEN 3345.

MEEN 4240 PROJECT MANAGEMENT

2 Semester Credit Hours (2 Lecture Hours, 2 Lab Hours)

Foundations of engineering economy, cash flow and equivalence, and project justification. Introduction to project management, planning, scheduling, and control, use of project management software, GANTT charts, PERT charts, and critical path. Students prepare proposals, including specifications, timelines, schedule, and budget, for projects to be implemented in MEEN 4370 - Capstone Projects . This course should be taken the semester preceding MEEN 4370 - Capstone Projects

Prerequisite: MEEN 3330 and 3345.

Co-requisite: SMTE 0099.

MEEN 4325 Energy Conversion

3 Semester Credit Hours (3 Lecture Hours)

NATURAL RESOURCES: FUELS, SOLAR, WIND, GEOTHERMAL, WAVE, AND OCEAN THERMAL; THERMODYNAMICS OF POWER CYCLES AND PROCESSES: RANKINE, BRAYTON, GAS TURBINE, IC ENGINES, FUEL CELL; NUCLEAR POWER; DIRECT ENERGY CONVERSION: PHOTOVOLTAIC, THERMOELECTRIC, THERMIONIC, MAGNETOHYDRODYNAMICS; NON-REACTIVE PROCESSES: WIND, WAVE/ TIDAL, OCEAN THERMAL ENERGY, SOLAR THERMAL; CONCEPT OF LIFE CYCLE ASSESSMENTS OF CARBON FOOT PRINT. STUDENT TEAMWORK OF A CLASS TERM PAPER IS EXPECTED.

Prerequisite: ENGR 2316.

MEEN 4330 Introduction to Plasma Engineering and Applications **3 Semester Credit Hours (2 Lecture Hours, 2 Lab Hours)**

PHYSICAL, ELECTRICAL, CHEMICAL PROPERTIES OF PLASMAS; DIFFERENCES IN PROPERTIES OF THERMAL AND NON-THERMAL PLASMAS, DIRECT AND ALTERNATING CURRENT PLASMA SOURCES, INDUCTIVE AND CAPACITIVE COUPLED PLASMA SOURCES, DIAGNOSTICS AND APPLICATIONS OF PLASMAS.

Prerequisite: ENGR 2322 and (ENGR 2460 or PHYS 2426).

Co-requisite: SMTE 0099.

MEEN 4335 Introduction to Aircraft Aerodynamics and Performance **3 Semester Credit Hours (3 Lecture Hours)**

FORCES ON AIRCRAFT; STANDARD ATMOSPHERE; STEADY-STATE CRUISE, CLIMB, AND TURN PERFORMANCE; PERFORMANCE OPTIMIZATION; INTRODUCTION TO AIRCRAFT LONGITUDINAL STABILITY.

Prerequisite: ENGR 2326 and COSC 1330.

MEEN 4336 Introduction to UAS for Agricultural Applications **3 Semester Credit Hours (3 Lecture Hours)**

PROVIDES THE FOUNDATIONS TO ACQUIRE REMOTE SENSING DATA USING UNMANNED AIRCRAFT SYSTEMS (UAS) AND TO INTERPRET, PROCESS, AND APPLY REMOTELY SENSED DATA FOR AGRICULTURAL APPLICATIONS. PRINCIPLES OF REMOTE SENSING, DIGITAL IMAGE PROCESSING, AND GEOSPATIAL ANALYSIS WILL BE COVERED. EMPHASIS WILL BE ON THE USE OF UAS REMOTE SENSING TECHNOLOGY FOR VARIOUS DISCIPLINES IN AGRICULTURAL SCIENCES INCLUDING PLANT BREEDING, PLANT PHYSIOLOGY, CROP SCOUTING, PEST MANAGEMENT AND ENTOMOLOGY. OFFERED SPRING.

Prerequisite: MEEN 3335.

MEEN 4340 PROJECT MANAGEMENT

3 Semester Credit Hours (3 Lecture Hours)

Foundations of engineering economy, cash flow and equivalence, and project justification. Introduction to project management, planning, scheduling, and control, use of project management software, GANTT charts, PERT charts, and critical path. Students prepare proposals, including specifications, timelines, schedule, and budget, for projects to be implemented in MEEN 4370. This course should be taken the semester preceding MEEN 4370.

MEEN 4345 Sensors and Systems**3 Semester Credit Hours (3 Lecture Hours)**

THIS COURSE COVERS SENSORS AND SENSING SYSTEMS WHERE SENSING MODALITIES, ANALYSIS OF SENSED DATA, DATA TRANSMISSION AND RECEPTION ARE DISCUSSED. FILTERING AND ESTIMATION IN SENSING SYSTEMS ARE CONSIDERED. THE COURSE COVERS SENSORS AT COMPONENT LEVEL TO DEVELOP SUBSYSTEMS AND MORE COMPLEX SENSING SYSTEMS THAT MONITOR PHYSICAL PHENOMENA IN LABORATORY OR MARINE/TERRESTRIAL ENVIRONMENTS. OTHER TOPICS INCLUDE MULTIDIMENSIONAL SIGNAL AND IMAGE PROCESSING, OBJECT TRACKING, MULTISENSORY DATA FUSION, APPLICATIONS IN ENVIRONMENTAL MONITORING, REMOTE SENSING AND SURVEILLANCE.

Prerequisite: MATH 2414, PHYS 2426 and ENGR 2460.

MEEN 4350 Controls, Automation and Robotics**3 Semester Credit Hours (2 Lecture Hours, 3 Lab Hours)**

AUTOMATION IN A MANUFACTURING AND ASSEMBLY SETTING FOR OCEAN AND MARINE ENVIRONMENTS, MATERIAL HANDLING SYSTEMS, REMOTE GUIDED VEHICLES, AUTOMATED STORAGE AND RETRIEVAL SYSTEMS, COMPUTER NUMERICAL MACHINE TOOLS, ROBOTICS.

Prerequisite: MATH 3315, ENGR 2326 and 2460.

Co-requisite: SMTE 0099.

MEEN 4351 Dynamical Systems Analysis and Modeling**3 Semester Credit Hours (3 Lecture Hours)**

MODELING AND ANALYSIS OF SYSTEMS THAT HAVE A TIME-BASED RESPONSE. TRANSIENT AS WELL AS STEADY STATE SOLUTIONS FOR SDOF AND MDOF SYSTEMS AND COMPUTATIONAL SOLUTIONS INCLUDING TIME RESPONSE, BODE PLOTS, PHASE PLOTS, AND OTHER PLOTS RELEVANT TO THE SYSTEM. LINEAR AND NON-LINEAR MODELING OF SYSTEMS WILL BE STUDIED. MODELING OF MECHANICAL SYSTEMS (VIBRATIONS), ELECTRICAL CIRCUITS, AND THERMAL/FLUID SYSTEMS WILL BE COVERED.

Prerequisite: COSC 1330, ENGR 2460 and MEEN 3345.

MEEN 4355 Marine Fabrication**3 Semester Credit Hours (2 Lecture Hours, 3 Lab Hours)**

ADVANCED TOPICS IN MANUFACTURING AND FABRICATION RELATED TO SHIPS AND OFFSHORE PLATFORMS AND CONSTRUCTION.

Prerequisite: ENGR 3350.

Co-requisite: SMTE 0099.

MEEN 4360 Thermal Systems Design**3 Semester Credit Hours (3 Lecture Hours)**

ANALYSIS, MANAGEMENT AND COST, OPTIMAL DESIGN, AND COMPUTER SIMULATION OF THERMAL SYSTEMS AND COMPONENTS; APPLICATIONS IN FLUID FLOW AND HEAT TRANSFER, PUMPS, TURBINES AND HEAT EXCHANGERS. SELECTED COURSE TOPICS ARE ASSIGNED AS PROJECTS.

Prerequisite: MEEN 3345.

MEEN 4365 Mechanical Systems Design**3 Semester Credit Hours (3 Lecture Hours)**

ANALYSIS, MANAGEMENT AND COST, OPTIMAL DESIGN, AND COMPUTER SIMULATION OF MECHANICAL SYSTEMS AND COMPONENTS; MACHINE ELEMENTS, AND STRESS ANALYSIS. SELECTED COURSE TOPICS ARE ASSIGNED AS PROJECTS.

Prerequisite: (MEEN 3330 and ENGR 3350).

MEEN 4370 CAPSTONE PROJECTS**3 Semester Credit Hours (1 Lecture Hour, 5 Lab Hours)**

This course allows students to employ the knowledge attained in other courses to implement (including building, testing, and documenting) an approved project, within budget and on schedule. Course requirements include a written report and oral presentations.

Prerequisite: MEEN 4240 and (MEEN 4360 or 4360 and MEEN 4365 or EEEN 4333).

Co-requisite: MEEN 4360, MEEN 4365, SMTE 0099.

MEEN 4375 Fuel Cells**3 Semester Credit Hours (3 Lecture Hours)**

STUDENTS WILL ACQUIRE AN UNDERSTANDING OF THERMODYNAMICS, TRANSPORT PHENOMENA AND REACTION FUNDAMENTALS THAT ARE REQUIRED TO UNDERSTAND THE PROCESSES AND PHENOMENA THAT POSE LIMITS ON FUEL CELL PERFORMANCE.

Prerequisite: ENGR 3316, MEEN 3345 and CHEM 1411.

MEEN 4380 Renewable Energy**3 Semester Credit Hours (3 Lecture Hours)**

RENEWABLE AND ALTERNATIVE ENERGY SOURCES AND FUELS; MODERN ENERGY CONVERSION DEVICES, SUCH AS OFFSHORE WIND FARMS, MARINE CURRENT TURBINES, FUEL CELLS, PHOTOVOLTAIC CELLS, AND MICRO-POWER TURBINES. COST AND ENVIRONMENTAL ANALYSIS OF RENEWABLE SOURCES. INSTALLATION, DESIGN CHARACTERISTICS, OPERATIONAL PERFORMANCE, AND MAINTENANCE OF MOTORS, TURBINES, PUMPS AND COMPRESSORS. INTRODUCTION TO GLOBAL ENERGY CONCERNS; FOSSIL AND NUCLEAR FUELS; ENERGY CONSUMPTION ANALYSIS; ENERGY MANAGEMENT AND CONSERVATION TECHNIQUES.

Prerequisite: ENGR 3316, 2460 and MEEN 4325.

Co-requisite: SMTE 0099.

MEEN 4385 Offshore Energy Management**3 Semester Credit Hours (3 Lecture Hours)**

TOPICS RELATED TO THE DESIGN AND ENERGY MANAGEMENT OF SHIPS AND OFFSHORE PLATFORMS WILL BE COVERED. SUCH TOPICS MAY INCLUDE OIL AND GAS EXPLORATION, WIND AND MARINE ENERGY SYSTEMS, AND ENVIRONMENTAL PROTECTION.

Prerequisite: MEEN 3345.

MEEN 4390 Introduction to Computational Fluid Dynamics**3 Semester Credit Hours (3 Lecture Hours)**

INTRODUCTION TO NUMERICAL, COMPUTATIONAL, MODELING AND SIMULATION OF THERMO-FLUID SYSTEMS. APPLICATIONS RELATED TO SHIPS AND OFFSHORE PLATFORMS AND STRUCTURES WILL BE PRESENTED.

Prerequisite: MEEN 3345.

MEEN 4395 Offshore Water Exploration and Desalination Systems**3 Semester Credit Hours (3 Lecture Hours)**

ADVANCED AND FUTURE APPLICATIONS OF SEA FLOOR MAPPING, UNDER-WATER ACOUSTICS AND GIS FOR FRESH WATER EXPLORATION AND MINING. RENEWABLE ENERGY DRIVEN COASTAL, NEAR-SHORE, AND OFFSHORE DESALINATION SYSTEMS.

Prerequisite: ENGR 2316.

MEEN 4396 Directed Independent Study**3 Semester Credit Hours**

REQUIRES A FORMAL PROPOSAL OF STUDY TO BE COMPLETED IN ADVANCE OF REGISTRATION, APPROVAL OF SUPERVISING FACULTY AND CHAIRPERSON.

MEEN 4420 Engineering Lab Measurements**4 Semester Credit Hours (2 Lecture Hours, 4 Lab Hours)**

PRINCIPLES OF PHYSICAL MEASUREMENTS; STANDARDS, CALIBRATION, ERROR ESTIMATION; STATIC AND DYNAMIC PERFORMANCE OF MEASURING SYSTEMS; LABORATORY EXPERIENCE, EXPERIMENT PLANNING, REPORT WRITING. THE PURPOSE OF THIS COURSE IS FOR STUDENTS TO GAIN PROFICIENCY IN DESIGNING, ASSEMBLING, AND OPERATING AN EXPERIMENT; AND ANALYZING AND PRESENTING EXPERIMENTAL RESULTS. THIS ENCOMPASSES SKILLS SUCH AS AN UNDERSTANDING CONTROL AND DATA ACQUISITION ELECTRONICS, OPERATION AND LIMITATION OF MODERN SENSORS, CALIBRATION AND ERROR ANALYSIS, ASSESSING APPLICABILITY OF THEORY AND THE IMPACT OF SECONDARY EXPERIMENTAL VARIABLES, AND WRITING AND PRESENTING REPORTS AND ANALYSIS.

Prerequisite: ENGR 2460.

Co-requisite: SMTE 0099.