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**THE UNIVERSITY OF TENNESSEE SPACE INSTITUTE
FALL SEMESTER 2010 COURSE LISTINGS**

AEROSPACE ENGINEERING

AE 511 INVISCID FLOW (3)
SEC. 001 (Video Recorded)
TEXT: Karamcheti: Principles of Ideal Fluids Aerodynamics; R. E. Krieger Publ. Co.;
ISBN# 0898741130.
TIME: Monday & Thursday 1:00 – 2:15 E111
PROFESSOR: Dr. Ahmad Vakili

Brief review of vector algebra, kinematics and dynamics of inviscid fluids; potential flow about body, conformal mapping review and application. *Prerequisite: AE 422 or ME 531, MATH 425 or equivalent.*

AE 515 AIR VEHICLE AERODYNAMICS AND PERFORMANCE (3)
SEC. 001 (Same as AS 503)
TEXT: Introduction to Flight; John D. Anderson; McGraw-Hill; Science/Engineering/Math; 6
Edition (October 25, 2007); ISBN # 978-0073529394.
TIME: Tuesday & Friday 1:00 – 2:30 E111
PROFESSOR: Dr. Peter Solies

AVIATION SYSTEMS

AS 503 AIR VEHICLES (3)
SEC. 001 (Video Recorded) (Same as AE 515)
TEXT: 1. Asselin, Mario, An Introduction to Aircraft Performance; AIAA Education Series,
Reston, VA, 1997
2. Kinney, Jeremy R., Airplanes – The Life Story of a Technology, John Hopkins
University Press, Baltimore, MD, 2008
TIME: Tuesday & Friday 1:00 – 2:30 E111
PROFESSOR: Dr. Peter Solies

Current capabilities and future requirements for civilian and military air vehicles. Parameters significant for air vehicle type selection, integration of air vehicle into aviation systems.

COMMENT: The course focuses on the study of air vehicles as they evolved to enable human flight or unmanned flight missions. In a historical review the development of aviation technology, mission requirements, and economical aspects are emphasized. Fundamentals of aerodynamic principles and their application to air vehicles will be developed to determine performance in level flight, climb, glide and maneuvering flight, as well as characteristic parameters as range and endurance. The state of the art of present air vehicles is investigated, as well as current problems in aviation and possible solutions.

AS 508 FLIGHT TEST INSTRUMENTATION (3)
SEC. 001 (Video Recorded)
TEXT: TBD
TIME: Monday & Thursday 1:30 – 2:45 E113
PROFESSOR: John Muratore

Principles of measurement, measuring devices with views toward both ground and flight aerospace testing: measurement fundamentals, sensors for specific parameters (e.g. temperature, heat flux, flow rate, pressure, acceleration, vibration, strain, and humidity), data bus integration, signal condition, telemetry, and fabrication.

COMMENT: The objective of this course is to familiarize the student with the principles of flight test instrumentation sufficient to allow the student to plan and instrument an aircraft to conduct a series of tests. Subjects to be covered include basic principles of measurement theory, components of an instrumentation system, specific sensors used for flight test and the signal conditioning required to deal with typical flight test sensors. The class will also cover interfacing and data acquisition with digital sensors that output their results in computer compatible format such as serial data streams. The class will make extensive use of LabVIEW to experiment with sensors and instruments in the laboratory experiments.

This class will be videotaped and is being offered to DISTANCE Students. All Distance students will be required to purchase a NI USB-6008 Student Kit with LabVIEW student edition from National Instruments (approximate cost \$170.00) in order to perform required laboratory assignments.

AS 510 SPECIAL TOPICS IN AVIATION SYSTEMS: INTRODUCTION TO AVIONICS I (3)
SEC 001 (Video Recorded)
TEXT: Avionics Training: Systems, Installation and Troubleshooting; Len Buckwalter; Avionics Communications, Inc.; Latest Ed.; ISBN# 1-88-5544-21-9.
TIME: Tuesday & Friday 10:30 – 11:45 E113
PROFESSOR: Dr. Alfonso Pujol, Jr.

Avionic systems and communications, including analog and digital systems, aviation bands and frequencies, satellite and aircraft communications, selective calling, emergency locator transmitter, omnidirectional range, instrument and microwave landing systems, automatic direction finder, and other topics are also discussed.

COMPUTER SCIENCE

CS 471 NUMERICAL ANALYSIS (3)
SEC. 001 (Video Recorded) (Same as Math 471)
TEXT: TBD
TIME: Monday & Thursday 2:30 – 3:45 E111
PROFESSOR: Dr. Trevor Moulden

Numerical computation, instabilities, and rounding. Interpolation and approximation by polynomials and piecewise polynomials. Quadrature and numerical solution of initial and boundary value problems of

ordinary differential equations, stiff systems. *Prerequisite: Numerical Algorithms I or consent of instructor.*

ENGINEERING MANAGEMENT

EM 501 CAPSTONE PROJECT (3-6)
SEC. 001 Dr. Gregory Sedrick
SEC. 002 Dr. Denise Jackson

Application-oriented project to show competence in major academic area. Enrollment limited to Engineering Management students in non-thesis program. May be repeated. Maximum 6 hours.

EM 502 REGISTRATION FOR USE OF FACILITIES FOR EM STUDENTS (1-15)
SEC. 001 Dr. Gregory Sedrick
SEC. 002 Dr. Denise Jackson

Required for the student not otherwise registered during any semester when student uses University facilities and/or faculty time before a degree in Industrial Engineering (Engineering Management) is completed. May not be used toward degree requirements.

EM 532 PROUCTIVITY AND QUALITY ENGINEERING (3)
SEC. 001 UTSI students participating at Tullahoma or Oak Ridge
SEC. 002 UTSI students participating elsewhere
SEC. 003 UTK students participating at Knoxville DE classrooms
SEC. 004 UTK students participating elsewhere
TEXT: http://www.utsi.edu/academics/iieandem/student_services.htm
TIME: Tuesday 4:00 – 6:35 E113
PROFESSOR: Dr. Denise Jackson

Productivity and quality measures defined and used to analyze current competitive position of important sectors of American industry with respect to national and international competition. Study of management theorists and systems which promote or inhibit productivity or quality improvements.

EM 533 THEORY AND PRACTICE OF ENGINEERING MANAGEMENT (3)
SEC. 001 UTSI students participating at Tullahoma and Oak Ridge
SEC. 002 UTSI students participating elsewhere
SEC. 003 UTK students participating at Knoxville DE classrooms
SEC. 004 UTK students participating elsewhere
TEXT: http://www.utsi.edu/academics/iieandem/student_services.htm
TIME: Monday 4:00 – 6:35 E113
PROFESSOR: Dr. Gregory Sedrick

Principles of engineering management, including: business and organization design, culture, leadership, marketing and competition in global economy, motivation and performance management, empowerment, organizational behavior, and diversity. Systems thinking, learning organizations, and systems dynamics modeling. Principle application to work settings and case studies.

EM 537 ANALYTICAL METHODS FOR ENGINEERING MANAGERS (3)

SEC. 001 UTSI students participating at Tullahoma or Oak Ridge
SEC. 002 UTSI students participating elsewhere
SEC. 003 UTK students participating at Knoxville DE classrooms
SEC. 004 UTK students participating elsewhere

TEXT: http://www.utsi.edu/academics/ieandem/student_services.htm

TIME: Thursday 4:00 – 6:35 E113

PROFESSOR: Dr. Denise Jackson

Survey of management analysis and control systems through IE techniques. Qualitative and quantitative systems: methods analysis, work measurement, incentive systems, wage and salary development, production and inventory control, facility layout, linear programming, and applied operations research techniques. Not for credit for students with undergraduate degrees in industrial engineering.

EM 539 STRATEGIC MANAGEMENT IN TECHNICAL ORGANIZATIONS (3)

SEC. 001 UTSI students participating at Tullahoma or Oak Ridge
SEC. 002 UTSI students participating elsewhere
SEC. 003 UTK students participating at Knoxville DE classrooms
SEC. 004 UTK students participating elsewhere

TEXT: http://www.utsi.edu/academics/ieandem/student_services.htm

TIME: Wednesday 4:00 – 6:35 E113

PROFESSOR: Dr. Gregory Sedrick

Strategic planning process and strategic management in practice, corporate vision and mission; product, market, organizational, and financial strategies; external factors; commercialization of new analysis to determine commercial feasibility of new ventures. *Prerequisite(s): EM 534 and IE 518 or consent of instructor.*

EM 595 SPECIAL TOPICS IN ENGINEERING MANAGEMENT (3)

SEC. 001

PROFESSOR: Dr. Denise Jackson

INDUSTRIAL ENGINEERING

IE 500 MASTER'S THESIS (1-15)

SEC. 005 Dr. Denise Jackson as main advisor

SEC. 006 Dr. Gregory Sedrick as main advisor

IE 515 ADVANCED PRODUCTION AND INVENTORY SYSTEMS (3)

(CENTRA Web-based Course from UTK)

SEC. 003 UTSI students participating at Tullahoma or Oak Ridge

SEC. 004 UTSI students participating elsewhere

TEXT: http://www.utsi.edu/academics/ieandem/student_services.htm

TIME: Thursday 12:40 – 1:55 (EST)

PROFESSOR: Dr. Xiaoyan Zhu

Advanced topics in production planning and inventory systems. Material requirements planning; production planning and master scheduling; just-in-time concepts; distribution requirements planning; and other selected topics. *Prerequisite: 402 or consent of instructor.*

IE 516 STATISTICAL METHODS IN INDUSTRIAL ENGINEERING (3)
SEC. 001 (Interactive from UTSI to UTK)
TEXT: Applied Statistics and Probability for Engineers, 4th Edition;
 Douglas C. Montgomery, George C. Runger; John Wiley and Sons; 4th Edition; ISBN #: 978-0-471-74589-1. http://www.utsi.edu/academics/iieandem/student_services.htm
TIME: Tuesday & Friday 10:15 – 11:30 E111
PROFESSOR: Dr. Montgomery Smith

Application of classical statistical techniques to industrial engineering problems. Statistics and statistical thinking in managerial context of organizational improvement; descriptive statistics and distribution theory; relationship between statistical process control techniques and classical statistical tools; parameter estimation and hypothesis testing; goodness-of-fit testing; linear regression and correlation; analysis of variance; single and multiple factor experimental design. *Prereq: IE 251 - Probability and Statistics for Scientists and Engineers, or equivalent.*

IE 526 ADVANCED APPLICATIONS OF SYSTEMS MODELING AND SIMULATION (3)
 (CENTRA Web-based Course from UTK)
SEC. 003 UTSI students participating at Tullahoma or Oak Ridge
SEC. 004 UTSI students participating elsewhere
TEXT: http://www.utsi.edu/academics/iieandem/student_services.htm
TIME: Thursday 2:10 – 3:25
PROFESSOR: Dr. Xueping Li

Modeling of discrete, continuous, and combined systems using current simulation software. Development of flexible simulation models to enhance accessibility of simulation models for experimentation. Development of distributed simulation models to represent and test production and supply chain systems. (*Same as Management Science 526*). *Prerequisite(s): 306 or 525.*

IE 600 DOCTORAL RESEARCH/DISSERATION (3-15)
SEC. 003 Dr. Denise Jackson
SEC. 007 Dr. Gregory Sedrick

MATERIAL SCIENCE & ENGINEERING

**MSE 576 SPECIAL TOPICS IN MATERIALS SCIENCE ENGINEERING:
 ELECTROCHEMICAL PROCESSES IN MATERIALS (3)**
SEC. 001 (Video Recorded)
TEXT: Various
TIME: Tuesday & Friday 4:00 – 5:15 E111
PROFESSOR: Dr. George Murray

This course provides a thorough discussion of electrochemistry, including a variety of topics: thermodynamic and transport properties of aqueous and nonaqueous electrolytes, the electrode/electrolyte interface, and the kinetics of electrode processes. It also covers electrochemical characterization with regards to d.c. techniques (controlled potential, controlled current) and a.c. techniques (voltammetry and impedance spectroscopy). Applications of the following will also be discussed: electrowinning, electrorefining, electroplating, and electrosynthesis, as well as electrochemical power sources (batteries and fuel cells), electroactive polymers, organic photovoltaics, organic light emitting diodes, corrosion and corrosion control.

MATHEMATICS

MATH 404 APPLIED VECTOR CALCULUS (3)

SEC. 001 (Video Recorded)

TEXT: Wilfred Kaplan: Advanced Calculus; 5th ed.; Addison Wesley; ISBN# 0-201-79937-5.

TIME: Monday & Wednesday 10:00 – 11:15 E113

PROFESSOR: Dr. Kenneth Kimble

Refresher of one-variable calculus; function of several variables; partial derivatives; Vectors and vector fields; curves and surfaces; multiple, line, and surface integrals. Green and Stokes' theorems.

MATH 471 NUMERICAL ANALYSIS (3)

SEC. 001 (Video Recorded at UTSI)

SEC. 003 (AEDC)

TEXT: Numerical Analysis; Borden R.L., Faires, J.P.; Thompson Brooks/Cole; 8th edition; ISBN# 0 534 39 200 8.

TIME: Monday & Thursday 2:30 – 3:45 E111

PROFESSOR: Dr. Trevor Moulden (UTSI students use this number)

TBD (AEDC on-base students use this number)

Numerical computation, instabilities, and rounding. Interpolation and approximation by polynomials and piecewise polynomials. Quadrature and numerical solution of initial and boundary value problems of ordinary differential equations, stiff systems. *Prerequisite: Numerical Algorithms I or consent of instructor.*

MECHANICAL ENGINEERING

ME 511 HEAT TRANSFER I (3)

SEC. 001 (Interactive Video)

TEXT: G. E. Meyers: Analytical Methods in Conduction Heat Transfer; Amcht Publishing; ISBN# 0966606507.

TIME: Tuesday & Friday 1:00 – 2:15 E113

PROFESSOR: Dr. Basil Antar

Thermal physical properties of material. Analysis of steady-state and time dependent heat conduction by analytical methods. Numerical solution of heat conduction equation.

ME 521 THERMODYNAMICS I (3)

SEC. 001 (Video Recorded)

TEXT: Thermodynamics, and Engineering Approach; Y. Cengel and M. Boles; Half.com_Books_Thermodynamics_An Engineering Approach.webarchive; Amazon.com_Thermodynamics_An Engineering Approach w version 1.2 CD ROM_Yunus A. Cengel, Michael Boles_Books.webarchive.

TIME: Wednesday & Friday 8:15 – 9:30 E113

PROFESSOR: Dr. Robert W. McAmis

Macroscopic thermodynamics, including First and Second Law analyses and applications, availability, phase and chemical equilibrium, combustion, gas and liquid mixtures, property relations, determination of thermodynamic properties from molecular structure and spectroscopic data.

ME 525 COMBUSTION AND CHEMICALLY REACTING FLOWS (3)

SEC: 001 (Video Recorded)

TEXT: TBD

TIME: Monday & Thursday 10:00 – 11:15 E111

PROFESSOR: Dr. Robert W. McAmis

Fundamentals: thermochemistry, chemical kinetics and conservation equations; phenomenological approach to laminar flames; diffusion and premixed flame theory; single droplet combustion; deflagration and detonation theory; stabilization of combustion waves in laminar streams; flammability limits of premixed laminar flames; introduction to turbulent flames. *Prerequisite(s): 522 and 541 or consent of instructor.*

ME 540 PERTURBATION METHODS IN ENGINEERING I (3)

SEC. 001 (Video Recorded)

TIME: Monday 4:00 – 6:35 E111

TEXT: David C. Wilcox; Perturbation Methods in the Computer Age; DCW Industries, Inc.; 1995.

PROFESSOR: Dr. Joseph Majdalani

Solution of nonlinear problems in solid and fluid mechanics and dynamics by use of asymptotic perturbation techniques. Asymptotic expansions, regular and singular perturbations and applications in dynamics, celestial mechanics, potential, viscous and compressible flows. Uniformly valid approximations in various physical problems. Generalized boundary-layer techniques. Coordinate straining techniques; Poincare's method. Matched asymptotic expansions and multiple scales. Problems with several time or length scales. Examples taken from various fields of science. *Registration Permission: Consent of Instructor.*

ME 581 ROCKET PROPULSION I (3)

SEC. 001 (Video Recorded)

TEXT: Rocket Propulsion Elements; George P. and Biblarz, Oscar; Wiley; 7th Edition; ISBN# 041326429.

TIME: Wednesday 4:00 – 6:35 E111

PROFESSOR: Dr. Joseph Majdalani

Rocket propulsion fundamentals; thermodynamics of non-reacting and chemically reacting ideal gases, rocket nozzle design; ideal rocket performance parameters; rocket heat transfer; chemistry of propellants; liquid rocket engine systems; ground testing; introduction to solid propellant rockets.

ME 587 DYNAMIC MODELING AND SIMULATION (3)

SEC. 002 (Interactive Video) (Same as BE 587)

TEXT: An Introduction to Mathematical Modeling; Edward A. Bender; Dover Publications; ISBN# 0-486-41180-X.

TIME: Monday & Thursday 8:30 – 9:45 E113

PROFESSOR: Dr. Kenneth Kimble

Modeling and analysis of physical systems. Systems and parameter identification. Mathematical modeling methods and approximations. Digital simulation techniques and practices. Design and control applications. (Same as Biomedical Engineering 587).

PHYSICS

PHYS 511 THEORETICAL PHYSICS (3)

SEC. 001 (Videotaped)

TIME: Monday & Thursday 8:30 – 9:45 E111

TEXT: Theoretical Physics – Mechanics; Constant; Addison Wesley.

PROFE SSOR: Dr. Horace Crater

This course will serve as a bridge for students wishing to enter the physics program at UTSI who do not have a physics undergraduate degree or whose background needs expanding before taking the core physics courses of Mechanics (Phys 531), Electrodynamics (Phys 541), quantum mechanics (Phys. 521-22), and statistical mechanics (Phys. 551). It will also serve those students not in the physics program who need the background to take these core courses. The mathematics required will be calculus and ordinary differential equations. Any math beyond this will be taught only as needed by the physics developed in the course. This course will be a general physics course at an intermediate level and include concepts and applications in applied physics. Topics included for the first semester will be kinematics and dynamics of one-body, two-body, and rigid body motion, elasticity, fluid and heat flow, and thermodynamics. The second semester will include topics in kinetic theory, statistical mechanics, electrostatics, magneto-statics, electrodynamics, and physical optics. Special topic may be included depending on student interest. This course in the past has been taught so as to be self paced.

PHYS 513 PROBLEMS IN THEORETICAL PHYSICS I (3)

SEC. 002 (Interactive from UTK, Distance Ed)

TEXT: Check with Instructor

TIME: Wednesday 10:15 – 11:30 E111

PROFESSOR: Dr. Marianne Breinig (UTK Faculty)