Spring 2019 UVA Virginia Engineering Online Courses

CE 5320: Advanced Reinforced Concrete Design (section 600, class #19961)
Jose Gomez – jpg4k@virginia.edu – MWF 11-1150am
Advanced topics in reinforced concrete design, including design of slender columns, deflections, torsion in reinforced concrete, design of continuous frames, and two-way floor systems. Introduction to design of tall structures in reinforced concrete, and design of shear walls.
Prerequisite: CE 3310. Prerequisite: Graduate standing.

CE 5500: Building Information Modeling (section 002, class #18584)
Arsalan Heydarian – ah6rx@virginia.edu – asynchronous
This course will be taught remotely by Dr. Vahid Balali, who has an extensive industry background in the area of construction management and specifically Building Information Modeling (BIM). This course focuses on the role of BIM in the construction industry and brings cutting edge and emerging technology solutions into the classroom. If you are considering working in the construction industry, I highly recommend registering for this course as you will be introduced to different BIM software solutions such as Revit, NavisWorks, Synchro, and Solibri.

CHE 6618: Chemical Reaction Engineering (section 600, class #18671)
Gary Koenig – gmk3k@virginia.edu – MW 330-445pm
Methods for analysis of steady state and transient chemical engineering problems arising in fluid mechanics, heat transfer, mass transfer, kinetics, and reactor design. Prerequisite: Undergraduate differential equations, transport processes, and chemical reaction engineering.

ECE 6502: Photovoltaics (section 600, class #16887)
Mool Gupta – mg9re@Virginia.edu – TR 330-445pm
The Photonics course is a one-semester course designed to provide a fundamental understanding of the subject of optics as it applies to photonics. Topics include ray optics, wave optics, Gaussian Beam optics, Fourier optics, Electromagnetic waves, polarization optics, Photonic crystals, guided wave optics, fiber optics, laser resonator optics, optical thin films (high reflection and anti-reflection coating design and fabrication), electromagnetic waves and applications such as solar energy, optical sensors, and optical data storage.

ECE 6502: Tensors for Data Science (section 601, class #18890)
Nikolaos Sidiropoulos – nikos@virginia.edu – MW 4-515pm
Covers the basic theory, algorithms, and applications of tensor decomposition in data science and machine learning. Matrix and tensor rank, multilinear rank, low-rank (canonical polyadic) and Tucker decomposition, identifiability, algorithms, performance bounds, sparse computations, parallelization, and applications from topic and graph mining, to mixture modeling, recommender systems, and speech / audio / language modeling and understanding.

ECE 6502: Digital Control Robotic Systems (section 602, class # 20385)
Gang Tao – gt9s@virginia.edu – TR 2-315pm
A first-level graduate course covering a topic not normally covered in the graduate course offerings. The topic will usually reflect new developments in the electrical and computer engineering field. Offering is based on student and faculty interests. Prerequisite: Instructor permission.

MSE 6130: Transmission Electron Microscopy (section 600, class # 20565)
James Howe – jh9s@virginia.edu – MW 1230-145pm
Emphasizes the fundamental principles of transmission electron microscopy and illustrates its capabilities for characterizing the internal structures of materials by diffraction, imaging and spectroscopic techniques; includes weekly laboratory exercises. Prerequisite: MSE 6010 or instructor permission.

**MSE 6240: Kinetics of Transport and Transformations in Materials** (section 600, class #18881)

Bicheng Zhou – bz2s@virginia.edu – MW 11-1215pm
An introduction to basic kinetic processes in materials and develops basic mathematical skills necessary for materials research. Students learn to formulate the partial differential equations and boundary conditions used to describe basic materials phenomena in the solid state including mass and heat diffusion in single- and two-phase systems, the motion of planar phase boundaries, and interfacial reactions. Students develop analytical and numerical techniques for solving these equations and apply them to understanding microstructural evolution. Prerequisite: MSE 6230.

**MSE 6592: Materials Informatics** (section 600, class #20566)
Prasanna Balachandran – pvb5e@virginia.edu – TR 930-1045am
A study of special subjects related to developments in materials science under the direction of members of the staff. Offered as required under the guidance of a faculty member.

**MSE 7592: Nanoscience and Technology** (section 600, class # 20567)
Petra Reinke – pr6e@virginia.edu – MW 11-1215pm
An advanced level study of special topics related to developments in materials science. Prerequisite: Instructor permission.

**MAE 6250: Multibody Mechanical Systems** (section 600, class #18765)
Shawn Russell – sdr2n@virginia.edu – MW 1230-145pm
Analytical and computational treatment for modeling and simulation of 3-Dimensional multibody mechanical systems. Provide a systematic and consistent basis for analyzing the interactions between motion constraints, kinematics, static, dynamic, and control behavior of multibody mechanical systems. Applications to machinery, robotic devices and mobile robots, biomechanical models for gait analysis and human motions, and motion control. Matrix modeling procedures with symbolic and numerical computational tools will be utilized for demonstrating the methods developed in this course. Focus on the current research and computational tools and examine a broad spectrum of physical systems where multibody behavior is fundamental to their design and control. Prerequisite: Engineering degree and familiarity with a programming language.

**MAE 6420: Engineering Mathematics II** (section 600, class #16835)
Houston Wood – hgw9p@virginia.edu – MW 1230-145pm
Further and deeper understanding of partial differential equations that govern physical phenomena in science and engineering. Solution of linear partial differential equations by eigenfunction expansion techniques. Green’s functions for time-independent and time-dependent boundary value problems. Fourier transform methods, and Laplace transform methods. Solution of variety of initial-value, boundary-value problems. Various physical applications. Study of complex variable theory. Functions of complex variable, the complex integral calculus, Taylor series, Laurent series, and the residue theorem, and various applications. Serious work and efforts in the further development of analytical skills and response. Cross-listed as APMA 6420. Prerequisite: Graduate standing and APMA/MAE 6410 or equivalent.

**MAE 6430: Statistics for Engineers and Scientists** (section 600, #16836)
Gianluca Guadagni – gg5d@virginia.edu – TR 2-315pm
Role of statistics in science, hypothesis tests of significance, confidence intervals, design of experiments, regression, correlation analysis, analysis of variance, and introduction to statistical computing with statistical software libraries. Cross-listed as APMA 6430. Prerequisite: Admission to graduate studies or instructor permission.

**MAE 6710: Finite Element Analysis** (section 600, class #16837)
Matthew Panzer – mbp2q@virginia.edu – MW 630-745pm
The topics covered are: review of vectors, matrices, and numerical solution techniques; discrete systems; variational formulation and approximation for continuous systems; linear finite element method in solid mechanics; formulation of isoparametric finite elements; finite element method for field problems, heat transfer, and fluid dynamics. Prerequisite: MAE 6020 or equivalent.

**SYS 6050: Risk Analysis** (section 600, class #18605)
James Lambert – jhl6d@virginia.edu – MW 5-615pm
A study of technological systems, where decisions are made under conditions of risk and uncertainty. Topics include conceptualization (the nature, perception, and epistemology of risk, and the process of risk assessment and management) systems engineering tools for risk analysis (basic concepts in probability and decision analysis, event trees, decision trees, and multi-objective analysis), and methodologies for risk analysis (hierarchical holographic modeling, uncertainty taxonomy, risk of rare and extreme events, statistics of extremes, partitioned multi-objective risk method, multi-objective decision trees, fault trees, multi-objective impact analysis method, uncertainty sensitivity index method, and filtering, ranking, and management method). Case studies are examined. Prerequisite: APMA 3100, SYS 3021, or equivalent.