Mondays:

- **CE 5426 Rock Mechanics –** (3 – 5PM - Lab Wed 3 – 5**) -** Study of rock as an engineering material, including physical and mechanical characterization of intact rock and rock masses as they relate to civil and mining engineering applications. This also includes the study of effect of jointing and water in a rock mass, foundations of civil and mining engineering structures in rock, stability of cuts in rock, and excavation and support of surface and underground and openings in rock.

Tuesdays:

- **EE 5522 Power Electronics (T/Th 5:15 – 6:30) -** Power semiconductor devices; traditional power converters; ac-dc converters: half-wave and full-wave rectifiers; dc-dc converters: traditional and transformer derived choppers; dc-ac converters: single-phase and three-phase inverters; ac-ac converters; pulse-width modulation; applications.

- **ChE 5193 Process Optimization: Lean / 6 Sigma** Emphasis on applying Lean and 6 Sigma process design and improvement techniques, data driven decision making, cultural transformation and effective change communication.

- **EMGT 5160 Quality Management** Global competitiveness, organizational culture, management role responsibilities, concepts for customer value, strategic management, measurement of customer value, organizing to improve systems, employee involvement, culture change and organizational learning. ISO 9000, quality awards.

Wednesdays:

- **CE 5326 Highway Planning and Design** (3-5:30PM) This course aims to provide an in-depth knowledge on highway network planning and design methodologies. Current planning and design methods for roadways will be introduced and used for class projects. The potential interrelationship between design parameters and traffic operation/safety will also be introduced for each design element.

Thursdays:

- **CE 5317 Traffic Flow Theory and Design –** Vehicle detection and traffic data collection methods. Measure for traffic system effectiveness, drive behavior theory, and microscopic modeling. Macroscopic traffic flow theory and modeling methodologies, simulation models and optimal calibration methods. Application of simulation models.

Flexible:

- **Mining and Minerals Processing / ChE Independent Study: Blast Furnaces** – 1 Credit Seminar, to be held during week of October 10. This course is being held in conjunction with SME**.**

- **CE 5027 Advanced Infrastructure Materials -** This course will cover advanced topics related to the behavior of asphalt concrete and Portland cement concrete. Topics to be covered include: properties of asphalt binder; hot mix, warm mix, and cold mix asphalt concrete; Portland cement production and chemistry; concrete durability; and the properties of FRC, FRP, and SCC.

- **CE 5128 Prestressed Concrete Structures** - Design and behavior of prestressed concrete structures: materials and systems (including specifics for precase and post-tensioned members), losses, flexure, shear, bond, deflections, partial prestressing, continuous beams.

- **CE 5201 Water Policy** - Socio-cultural, legal, and economic factors that affect water resources management. historical trends in water policy, resulting water laws in the United States. Federal, state and local institutional structures for water management.

- **CE 5316 Pavement Analysis and Design** - Analysis, behavior, performance, and structural design of pavements for highways and airfields will be discussed. Prominent pavement distress mechanisms, their causes, and remedial measures will be presented. Other topics include climate factors, rehabilitation, sustainability, and renewability in pavement engineering, life cycle design economics, and traffic loadings.

- **CE 5237 Water Quality Engineering** Applied analysis of water quality in natural systems. Review of mass-transport processes and approaches for solving water quality problems in lakes, estuaries, rivers, groundwater, and soil-sediment with TMDL (Total Maximum Daily Load) and remediation design applications. Applications in water and wastewater treatment.

- **IE 5305 Supply Chain Management** Concepts essential to understanding supply chain management, including strategy and design, as well as operational, managerial, technological, and implementation issues. It provides an integrated perspective of the supply chain, including purchasing, production, transportation, distribution and information systems.
- **EMGT 5110 Management of Engineers and Technology** Managing the synergism of people and technology. Overview of management functions, tools, methods. Planning, organization, leadership, motivation, control, quality, human resources, effective decision making.
- **EMGT 5220 - Innovation Management** Key success factors of technological innovation will be identified by looking at the diverse economic, social, cultural, psychological and technical phenomena that comprise innovation. Questions that will be answered include why certain inventions successfully make it to the market but some others died; why some organizations keep coming up with innovations with tremendous business value but some others stay as followers; how to enhance creativity at individual, team, organizational, and

national levels; what the emerging trend is in today's business innovation environment and how organizations should cope with it, etc.

EE 5501 Energy Conversion Systems - Theory, design and operation of conventional and alternative electrical energy conversion systems. Carbon dioxide cycle, Earth/Sun radiation balance, and environmental impacts. Power delivery systems and integration of conversion systems with the grid. Development of generation portfolios. Impact of energy policies and current energy issues. Case studies.

EE 5351 Introduction to Robotics and Mobile Robot Control Architectures Basic concepts and tools for the analysis, design, and control of robotic mechanisms. Topics include basic robot architecture and applications to dynamical systems, mobile mechanisms, kinematics, inverse kinematics, trajectory and motion planning, mobile roots, collision avoidance, and control architectures.

EE 5765 Modern Communications - Design and analysis of modern communication systems; evaluation of analog and digital modulation techniques. (3 hrs lect, 3 hrs lab)

ME 5315 Nondestructive Evaluation of materials - Fundamentals of Ultrasonic and Acoustic Emission NDE are considered including wave propagation, experimental measurement systems, flaw detection and characterization, and material characterization. Labs are used to support the study of ultrasonic and acoustic emission NDE. Other NDE techniques including magnetics, penetrants, eddy currents, thermography, are surveyed.

ME 5335 Introduction to Finite Element Analysis - An introduction to finite element analysis, including theoretical and applied components in mechanical and thermal systems.

ChE 5021 Transport Phenomenon - Study of the fundamentals and field equations for momentum, heat and mass transport with emphasis on the prediction of transport rates in chemical engineering applications.

ChE 5031 Chemical Engineering Analysis - Development of mathematical and statistical models for chemical engineering systems; simulation of these systems using digital computers; and system optimization and analysis of results.

ChE 5301 Advanced Reactor Design - Theory of advanced chemical reactor design. Reaction rate theory. Heterogeneous catalysis and transport processes. Analysis of non-ideal reactors, Stability. Optimization. Multiphase systems.

ChE 5601 Biochemical Engineering I Advanced design and operation of bioreactors for varied cultivation methods, transport limitations, and reactor types. Operation and control considerations for aeration, agitation, heat transfer, and instrumentation. Unit operations for recovery and purification of products. Microbial, animal, plant, and mixed culture applications.

ChE 5621 Particle Technology - Applications of particle technology, especially in the chemical and minerals industry context. Particle concepts including: particle characterization, slurry characterization, size reduction, size enlargement, particle separation, and multi-phase processes. The major unit operations common to solids processing: mining, crushing, concentration by sedimentation, filtration, flotation, and pryrometallurgy.

ChE 5711 Biomedical Engineering - Introduction to the field of Biomedical Engineering. Topics covered include cell and tissue engineering, transport phenomena in biological systems, biomaterials, bioelectricity and neural engineering, development of biomedical devices, and government regulations in the biomedical industry.