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:

- **IE 5335 Engineered Products and Services -** Development, production, and distribution of engineered products and services. Strategies for positioning engineered products and services to successfully compete in a global market. Sales, purchasing, qualification, and service. Standards, regulations.

- **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.
- **EMGT 5250 – Legal Ethical and Environmental Issues in Engineering** Covers topics in basic law, contracts, intellectual property, professional ethics, the responsible engineer, moral thinking, risk/safety/liability, employer responsibilities, product liability, and environmental responsibilities. Provides a historical perspective on society's environmental concerns, and discusses federal environmental statutes, our regulatory system, approaches to preventing and mitigating environmental problems, and the elements of an effective environmental management system.

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 / CE/ ChE Independent Study: Environmental Permitting** – 1 Credit Seminar, to be held during week of October 10. This course is being held in conjunction with SME**.**

- **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 5241 – Water Chemistry -** Water is critical component of environmental systems, and the chemistry that occurs in water is a rich subject. This class focuses on water chemistry in both natural and engineered systems. Topics include a review of thermodynamics and equilibrium, acids and bases, titrations, the carbonate system, solubility of minerals, metal ion complexation, oxidation/reduction chemistry, and descriptions of adsorption. Principles are applied to chemistry in water treatment, nutrient cycling, organic matter, and organic pollutants. Both chemical equilibrium and chemical kinetics are explored. Students will be introduced to software that can be used to solve water chemistry problems. The class is targeted at seniors and graduate students.

- **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.

- **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.
- **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.
- **ME 5060 Mechanical Vision** - This course will introduce the up-to-date techniques of autonomous image-based robot control. The covered topics include algorithms on image acquisition, camera calibration, object identification, and visual servoing. The methods and concepts introduced will be combined with engineering applications such as obstacle

avoidance in traffic safety, image-guided robotic surgery, and human-robot interaction in life support. Through this course, students will acquire both hardware and software development experiences on visual seroing, which could be directly applied to their future engineering career or advanced academic pursuance

- **ME 5325 Sustainable Energy Systems -** A comparison of different energy systems will be made in terms of economic, environmental and political implications. Specific energy alternatives will include coal, oil, geothermal, bioenergy, solar, wind, fission, fusion, hydrogen, fuel cell.
- **ME 5210 Advanced Thermal Fluid Science -** This course covers heat transfer in fluid flowing around bodies and in tubes/ducts, energy, forced/natural convection, laminar/turbulent flow regimes, turbulent transport and modeling, high-speed flows, viscous dissipation, variable property effects, application to heat exchange devices, and convective mass transfer
- **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.