



FACULTY OF ENGINEERING



DEPARTMENT OF CHEMICAL ENGINEERING

Master of Science (MS) Degree – 46 Credits

The Master of Science (MS) in Chemical Engineering degree is 46 credits after the BS of which 37 are the transition credits from the BS program to the BE program and an additional minimum of 9 credits.

Sem	Course Code	Course Title	Credit	Pre-Req	Co-Req
7	CHEN 400	Chemical Process Synthesis and Design	3		
7	CHEN 404	Advanced Chemical Reactor Design	3		
7	CHEN 412	Industrial Catalytic Processes	3		
7	CHEN XXX	Specialized Area Elective	3		
7	GENG 450	Advanced Engineering Analysis and Research Methods	3		
Sem	Course Code	Course Title	Credit	Pre-Req	Co-Req
8	CHEN XXX	Specialized Area Elective	3		
8	CHEN XXX	Specialized Area Elective	3		
8	CHEN XXX	Specialized Area Elective	3		
8	GENG 599	Master's Thesis	6	GENG450	
Sem	Course Code	Course Title	Credit	Pre-Req	Co-Req
9	CHEN 480	Field Training	3		
Sem	Course Code	Course Title	Credit	Pre-Req	Co-Req
10	CHEN XXX	Specialized Area Elective	3		
10	CHEN XXX	Specialized Area Elective	3		
10	CHEN XXX	Specialized Area Elective	3		
10	CHEN 413	Advanced Transport Phenomena	3		
10	GENG 400	Engineering Seminars	1		
10	GENG 599	Master's Thesis (Reactivation)	0		
Sem	Course Code	Course Title	Credit	Pre-Req	Co-Req
11	GENG 599	Master's Thesis (Reactivation)	0		
		TOTAL	46		

Specialized Area Elective (Based on Selected Area):					
Petroleum Engineering (15 credits from the following list and 6 credits from any CHEN specialized area elective)					
	CHEN 416	Chemical Engineering Optimization	3		
	CHEN 421	Advanced Petroleum Processing	3		
	CHEN 426	Reservoir Engineering	3		
	CHEN 468	Mechanisms in Petroleum Engineering	3		
	CHEN 478	Corrosion in Chemical Processes	3		
	CHEN 513	Subsurface Production Engineering	3		
	CHEN 531	Oil Field Development	3		
	CHEN 532	Advanced Natural Gas Engineering	3		
	CHEN 543	Well testing	3		
	CHEN 551	Drilling Engineering	3		
	CHEN 579	Numerical Methods in Petroleum Industry	3		
Food Processing (15 credits from the following list and 6 credits from any CHEN specialized area elective)					
	CHEN 420	Food Process Engineering	3		
	CHEN 440	Food Creation and Development	3		
	CHEN 441	Food Sanitation	3		
	CHEN 442	Chemistry of Food and Bioprocessed Materials	3		
	CHEN 443	Food Microbial World	3		
	CHEN 444	Food Sensory Science	3		
	CHEN 517	Chemical-Process Dynamics and Control	3		
	CHEN 524	Food Laws and Regulations	3		
	CHEN 525	Powder Technology and Operating Design	3		
	CHEN 541	Quality Control in Food and Bioprocessing	3		
	CHEN 542	Food Preservation	3		
	CHEN 545	Processing Dairy Products	3		
	CHEN 546	Food Safety and Toxicology	3		
	CHEN 547	Lactation, Milk, and Nutrition	3		
	CHEN 550	Food Management and Marketing	3		
	CHEN 555	Emerging Food Technologies and Biotechnology	3		
	CHEN 566	Bioseparation Engineering	3		

	CHEN 577	Food Packing	3		
	CHEN 588	Food Analysis Techniques	3		
Industrial Processes Engineering (15 credits from the following list and 6 credits from any CHEN specialized area elective)					
	CHEN 418	Polymers and Polymer Engineering	3		
	CHEN 420	Food Process Engineering	3		
	CHEN 421	Advanced Petroleum Processing	3		
	CHEN 422	Surface and Colloid Chemistry	3		
	CHEN 424	Cement Manufacturing	3		
	CHEN 426	Reservoir Engineering	3		
	CHEN 427	Thermal Processes in the Heavy Industry	3		
	CHEN 430	Environmental Design and Life Cycle Assessment	3		
	CHEN 440	Food Creation and Development	3		
	CHEN 441	Food Sanitation	3		
	CHEN 442	Chemistry of Food and Bioprocessed Materials	3		
	CHEN 443	Food Microbial World	3		
	CHEN 444	Food Sensory Science	3		
	CHEN 450	Ecotoxicology for Engineers	3		
	CHEN 468	Mechanisms in Petroleum Engineering	3		
	CHEN 485	Fuel Cell Technology	3		
	CHEN 513	Subsurface Production Engineering	3		
	CHEN 514	Air-Pollution Problems and Control	3		
	CHEN 515	Dynamics of Particulate Systems	3		
	CHEN 517	Chemical-Process Dynamics and Control	3		
	CHEN 524	Food Laws and Regulations	3		
	CHEN 525	Powder Technology and Operating Design	3		
	CHEN 531	Oil Field Development	3		
	CHEN 532	Advanced Natural Gas Engineering	3		
	CHEN 541	Quality Control in Food and Bioprocessing	3		
	CHEN 542	Food Preservation	3		
	CHEN 543	Well Testing	3		
	CHEN 544	Nanofabrication	3		
	CHEN 545	Processing Dairy Products	3		

	CHEN 546	Food Safety and Toxicology	3		
	CHEN 547	Lactation, Milk, and Nutrition	3		
	CHEN 550	Food Management and Marketing	3		
	CHEN 551	Drilling Engineering	3		
	CHEN 555	Emerging Food Technologies and Biotechnology	3		
	CHEN 566	Bioseparation Engineering	3		
	CHEN 577	Food Packing	3		
	CHEN 579	Numerical Methods in Petroleum Industry	3		
	CHEN 588	Food Analysis Techniques	3		
	CHEN 589	Waste Treatment Engineering	3		

COURSE DESCRIPTIONS

CHEN 400 CHEMICAL PROCESS SYNTHESIS AND DESIGN

3.0: 3 cr. E

This course provides an introduction to the core technical skills and professional responsibilities common to all chemical processes and operations. The course also covers process synthesis, process flows and diagrams, chemical product design, process thermodynamics, chemical process reactions, process mass transfer, heat transfer and fluid flow, economic effectiveness and operations safety.

CHEN 404 ADVANCED CHEMICAL REACTOR DESIGN

3.0: 3 cr. E

This course deals with the interpretation of rate data and development of performance equations for single and multiple reactor systems. Course topics include: design of ideal reactors and deviations from ideality, multiple chemical reactions, steady state and unsteady-state operation, optimization of reactors, collection and analysis of rate law data and bioreactors. This course covers the fundamentals of catalytic science, catalyst properties, preparation and characterization, catalytic reactor design and catalyst deactivation. This part is followed by an overview of the most important industrial catalytic processes: Hydrogen production and synthesis gas reactions, hydrogenation and dehydrogenation of organic compounds, and oxidation of organic and inorganic compounds.

CHEN 412 INDUSTRIAL CATALYTIC PROCESSES

3.0: 3 cr. E

This course covers the fundamentals of catalytic science; catalyst properties, preparation and characterization, catalytic reactor design and catalyst deactivation. This part is followed by an overview of the most important industrial catalytic processes: Hydrogen Production and Synthesis Gas Reactions (Fischer-Tropsch Synthesis), Hydrogenation and dehydrogenation of organic compounds, Oxidation of organic and inorganic compounds.

CHEN 413 ADVANCED TRANSPORT PHENOMENA

3.0: 3 cr. E

This course covers the fundamental theory of momentum, energy and mass transport. Shell momentum, heat and mass balances and equations of change are developed and used to determine velocity, temperature, and concentration distributions for laminar flow. Viscosity, thermal conductivity and mass diffusivity are also covered, as well as friction factors and macroscopic balances.

CHEN 416 CHEMICAL ENGINEERING OPTIMIZATION

3.0: 3 cr. E

This course introduces the application of optimization methods to important chemical engineering problems in thermodynamics, unit operations, separation processes, energy design, and optimization in industrial practice. This course includes continuous, linear and nonlinear, and mixed integer linear programming problems. The course emphasizes problem definition, model formulation and solution analysis, with sufficient details on existing algorithms and software to solve problems.

CHEN 418 POLYMERS AND POLYMER ENGINEERING

3.0: 3 cr. E

This course provides a good understanding of the synthesis of polymers and their commercial applications. Important properties that these materials possess, including their molecular, physical, chemical, thermal, mechanical, and electrical properties are reviewed. The forming techniques for plastics (compression molding, injection molding...) and the different parameters leading to the degradation of polymers will also be covered.

CHEN 420 FOOD PROCESS ENGINEERING

3.0: 3 cr. E

This course provides concepts of advanced knowledge and understanding of process and engineering principles of various methods of heating, cooling, freezing, drying, and crystallization of foods; it covers water relations in foods and kinetics of physico-chemical changes during processing.

CHEN 421 ADVANCED PETROLEUM PROCESSING**3.0: 3 cr. E**

This course presents the following topics: atmospheric and vacuum crude oil distillation units, light end units, catalytic reforming process, fluid catalytic cracking process, and distillate hydro-cracking process. The course also includes concepts of hydro-treating processes, refinery gas treating processes, upgrading residues, and handling of hazardous materials and safety.

CHEN 422 SURFACE AND COLLOID CHEMISTRY**3.0: 3 cr. E**

This course examines the factors underlying interfacial phenomena, with an emphasis on the thermodynamics of surfaces, structural aspects, and electrical phenomena. Some applications are studied in the areas of emulsification, detergency, foaming, fluidization, sedimentation, nucleation, wetting, adhesion, flotation, and electrophoresis.

CHEN 424 CEMENT MANUFACTURING**3.0: 3 cr. E**

This course covers the fundamentals of cement manufacturing steps, raw materials management, cement quality control concept, quarrying and its environmental aspect, grinding technology, clinker manufacture (chemical and thermodynamics aspect), firing systems, classic and alternative fuels, clinker properties, manufacturing performance evaluation, cement applications.

CHEN 426 RESERVOIR ENGINEERING**3.0: 3 cr. E**

This course covers both fundamental and applied reservoir engineering concepts. It provides students a detailed understanding of the rock and fluid properties, the PVT analysis and the Darcy's law and applications. It also focuses on the natural water influx models and reservoir drive mechanisms as well as the practical application of the material balance equations in oil and gas reservoirs.

CHEN 427 THERMAL PROCESSES IN THE HEAVY INDUSTRY**3.0: 3 cr. E**

The focus of this course is to transmit the Competence of materials and energy use and transformation in the heavy industry as well as the product formulation. Combustion engineering, heat and materials balances, materials transformation, emissions controlling, gas properties and dedusting systems are as well covered in this course. Automatic process control (PID, LINKman, online gamma analyzers....) and manual process control (gas and materials measures) are also covered in this course.

CHEN 430 ENVIRONMENTAL DESIGN AND LIFE CYCLE ASSESSMENT**3.0: 3 cr. E**

This course covers the life cycle thinking approach and details the four phases of life cycle assessment: Goal and scope definition, life cycle inventory, life cycle impact assessment, and life cycle interpretation. Tutorial sessions and a practical case study using a life cycle assessment software are also covered.

CHEN432 PETROLEUM ECONOMICS AND MANAGEMENT**3.0: 3 cr. E**

This course provides an introduction to financial reporting for oil companies. Capital budgeting: Cash flow analysis. Risk analysis: Probability theory and methods. Reserve estimation. Market theory: Supply and demand, oil price models, product prices, profit maximization, inflation and depreciation. The main geopolitical characteristics of the Energy Industry in the Gulf and Levant regions. Oil field project (Upstream and Downstream) management topics: project planning and scheduling techniques, project monitoring and control techniques. Overview of the factors that affect states' failure and success in management of petroleum resources. General knowledge of the regulation of pollution control.

CHEN 440 FOOD CREATION AND DEVELOPMENT**3.0: 3 cr. E**

This course covers the techniques involved in systematic food product creation, development, and process technology of specialty, fabricated, and synthetic foods. The complete process of bringing a new

product to the market; it involves the idea generation, product design and detail engineering market research and marketing analysis.

CHEN 441 FOOD SANITATION

3.0: 3 cr. E

This course covers hygienic practices, requirements for sanitation programs, and modern sanitation practices in food processing facilities. Topics include need for food safety training, cause of food borne illness; biological food contamination; chemical and physical contamination; purchasing and receiving; storing foods; preparing, cooking, and serving food; cleaning and sanitizing; hazard analysis critical control points (HACCP) and facilities self-inspection.

CHEN 442 CHEMISTRY OF FOOD AND BIOPROCESSED MATERIALS

3.0: 3 cr. E

The course focuses on the properties of biological molecules (e.g., proteins, enzymes lipids, carbohydrates and pigments) found in foods and pharmaceuticals. The course also presents basic elements of molecules, such as structure and reactive groups, in regard to how they affect the properties of foods and pharmaceuticals; and reactions such as Maillard browning and lipid oxidation in regard to mechanisms, products and controlling processes.

CHEN 443 FOOD MICROBIAL WORLD

3.0: 3 cr. E

This course covers food relevant microorganisms and their metabolic activities; sources of microbial contamination during food production, processing and storage; microbial spoilage; pathogens; physical and chemical destruction of microorganisms in foods and the kinetics involved; conversions of raw foods by microorganisms into food products.

CHEN 444 FOOD SENSORY SCIENCE

3.0: 3 cr. E

This course covers the principles and procedures for sensory evaluation of food. Appropriate uses of specific tests will be discussed, along with physiological, psychological, and environmental factors affecting sensory verdicts; it applies principles of experimental design and statistical analysis to the use of human senses for the purposes of evaluating consumer products.

CHEN 450 ECOTOXICOLOGY FOR ENGINEERS

3.0: 3 cr. E

This course focuses on toxic agents and implication of pollutants in the conception and operation of processes. Transport of contaminants in the environment and exposure modes. Evaluation tools. Dose-response relationship. Chronic/acute effects. Implication of ecotoxicological risk in the protection of the environment and industrial sanitation. Industrial ecology and re-engineering. Importance of impact assessment in the design of plants and processes.

CHEN 468 MECHANISMS IN PETROLEUM ENGINEERING

3.0: 3 cr. E

This course covers the three main aspects of production mechanisms used in the Petroleum Industry: 1) Primary Production which depends on decreasing reservoir pressure, 2) Secondary Recovery that uses water injection as a displacing fluid and for pressure maintenance, and 3) Tertiary Recovery which covers thermal operations using steam, miscible or immiscible gas injection, and polymer waterflood. Classification and reserve estimates based on material balance; steady-state and transient fluid flow in permeable reservoir rocks as applied to subsurface engineering problems will be reviewed.

CHEN 478 CORROSION IN CHEMICAL PROCESSES

3.0: 3 cr. E

This course describes the principles of corrosion engineering from the basic principles of electrochemistry and chemical thermodynamics to the prevention of corrosion problems in relation with material cost, reduced performance, reliability, and impact on the environment. The different forms of corrosion are described as well as their prevention control. Case studies from petrochemical industries are also covered.

CHEN 480 FIELD TRAINING**0.0: 3 cr. E**

Eight weeks of training in a field related to chemical engineering.

CHEN 485 FUEL CELL TECHNOLOGY**3.0: 3 cr. E**

The course provides an overview of the various types of fuel cells followed by a detailed discussion of the proton-exchange membrane (PEM) fuel cell fundamentals: thermodynamics relations including cell equilibrium, standard potentials, and Nernst equation; transport and adsorption in proton-exchange membranes and supported liquid electrolytes; transport in gas-diffusion electrodes; kinetics and catalysis of electrocatalytic reactions including kinetics of elementary reactions, the Butler-Volmer equation, reaction routes and mechanisms; kinetics of overall anode and cathode reactions for hydrogen and direct methanol fuel cells; and overall design and performance characteristics of PEM fuel cells.

CHEN 513 SUBSURFACE PRODUCTION ENGINEERING**3.0: 3 cr. E**

This course covers the advanced theories and techniques of tubing and packer design; hydraulic fracturing and acidizing; oil and gas well performance; vertical lift and choke performance; systems analysis; production operations.

CHEN 514 AIR-POLLUTION PROBLEMS AND CONTROL**3.0: 3 cr. E**

This course presents advanced concepts on air-pollutant identification and control technology; estimation of pollutant transport, dispersion, and conversion; design of control units using computer simulation applications.

CHEN 515 DYNAMICS OF PARTICULATE SYSTEMS**3.0: 3 cr. E**

This course analyzes systems of discrete particles which grow in size or in some other characteristic variable (e.g., age, molecular weight); reaction engineering and population balance analyses are discussed for batch and continuous systems; steady state and transient system dynamics are covered. Application topics may be selected from crystallization, latex synthesis, polymer molecular weight distribution, fermentation/ ecological systems and gas-solid systems.

CHEN 517 CHEMICAL-PROCESS DYNAMICS AND CONTROL**3.0: 3 cr. E**

This course provides the tools for designing a strategy for operating a plant and the hardware (sensors, control valves, computer controllers) to make it work. This course focuses on the applications of dynamic process responses based on the principles of material and energy balances, fluid flow, heat transfer, separation processes, and reaction kinetics. The course also covers the elements of a feedback control system including sensors, control valves, and computer-based controllers (feed forward control, cascade control, dead time compensation, and de-couplers)

CHEN 524 FOOD LAWS AND REGULATIONS**3.0: 3 cr. E**

This course covers the legislation in the form of directives and regulations which are put by government or regulatory agencies to control food safety; Controlled Designation of Origin CDO regulations; official inspections of specific design features, and certification of food handlers.

CHEN 525 POWDER TECHNOLOGY AND OPERATING DESIGN**3.0: 3 cr. E**

This course deals with the fundamentals of powder technology: production, handling, modification, and use of a wide variety of particulate materials, both wet and dry, in sizes ranging from nanometers to centimeters. The first part concerns particulate characterization: granulometric analysis and mechanical properties of powders. It is followed by the design of operating systems using powders: mixing, storage in silos, fluidization, granulation, crystallization, grinding, pneumatic transport and spraying techniques.

CHEN 531 OIL FIELD DEVELOPMENT**3.0: 3 cr. E**

This course covers the fundamentals of petroleum geology, properties of reservoir rocks, petroleum fluids, source rocks, traps, black and volatile oils, petroleum geochemistry, the conditions under which petroleum occurs in nature, the main problems which have to be solved in the exploration and development of oilfields.

CHEN 532 ADVANCED NATURAL GAS ENGINEERING**3.0: 3 cr. E**

This course covers the properties of natural gases and condensate systems; In addition, the course includes the concepts of gas flow in porous media; gas reservoir engineering, gas field development; gas condensate reservoirs and natural gas transportation and storage.

CHEN 541 QUALITY CONTROL IN FOOD AND BIOPROCESSING**3.0: 3 cr. E**

This course covers the principles of quality control in the food and bioprocessing industries; regulations and process control to maintain safety and quality; evaluation of physical, microbiological, chemical, sensory, and stability testing for food and bioprocessed materials; risk assessment, hazard analysis and critical control point, process control, water quality, wastewater analysis and reduction; cleaning and sanitation and compliance inspection.

CHEN 542 FOOD PRESERVATION**3.0: 3 cr. E**

This course covers the methods employed in food preservation; emphasis on thermal, freezing, drying and fermentation processes and corresponding physical, chemical, and organoleptic changes in product; relationship of these preservation techniques to development of an overall processing operation.

CHEN 543 WELL TESTING**3.0: 3 cr. E**

This course teaches well completion from drilling in the pay zone to production start-up. It also covers the main methods for artificial lift, and well servicing. The student will learn the concepts and equipment that are indispensable for completion and servicing operations. Students will be able to understand the operational aspects and the process of completing oil and gas wells in order to perform the designated and various tasks needed in the oil and gas industry.

CHEN 544 NANOFABRICATION**3.0: 3 cr. E**

This course provides basic engineering principles of nanofabrication. Topics include: photo-, electron beam and nanoimprint lithography, block copolymers and self-assembled monolayers, colloidal assembly, and biological nanofabrication.

CHEN 545 PROCESSING DAIRY PRODUCTS**3.0: 3 cr. E**

This course covers unit operations in dairy processing. Topics include formulation, processing, packaging and evaluation of fluid milk and manufactured products.

CHEN 546 FOOD SAFETY AND TOXICOLOGY**3.0: 3 cr. E**

This course covers issues and developments related to the relationship between food safety and public health, including emerging food-borne pathogens; virulence and pathogenicity; food-borne toxins; epidemiological techniques used in the investigation of food-borne disease; rapid detection methods; and quantitative microbial risk assessment in food safety.

CHEN 547 LACTATION, MILK, AND NUTRITION**3.0: 3 cr. E**

This course focuses on issues related to the nutritional properties of milk as a high-quality food with nutritional diversity; principles of physiology, biochemistry and cell biology in the mammary gland; procedures of milk production and milk collection for milk quality and nutrition; impacts of biotechnology and food safety on dairy production.

CHEN 550 FOOD MANAGEMENT AND MARKETING**3.0: 3 cr. E**

This course provides the student with realistic managerial experience. Staffing, merchandising, and cost control procedures are integral parts of the course. Marketing principles, theories and strategic concepts such as leadership, business definition, situation assessment, planning and objectives in specialized food sectors.

CHEN 551 DRILLING ENGINEERING**3.0: 3 cr. E**

This course covers the begins with an overview of drilling operations where students are introduced to: drilling equipment and mechanisms of accessories, rotary drilling rig components, drill strings, drill bits and, drilling fluids. Moreover, this course covers basic drilling engineering aspects associated to friction pressure losses, drilling hydraulics, casing and /cementing, well blowout prevention and /control and in addition to (some) of the mostly encountered drilling problems and their respective (practical) solutions.

CHEN 555 EMERGING FOOD TECHNOLOGIES AND BIOTECHNOLOGY **3.0: 3 cr. E**

This course covers new and emerging food technologies and food biotechnology; develops ways to process, preserve, package, or store food, according to industry, specifications, and regulations; studies the physical, microbiological, and chemical makeup of food.

CHEN 566 BIOSEPARATION ENGINEERING**3.0: 3 cr. E**

This course covers principles of bioseparation engineering including specialized unit operations not normally covered in regular chemical engineering courses. Processing operations downstream of the initial manufacture of biotechnology products, including product recovery, separations, purification, and ancillary operations such sterile processing, clean-in place and regulatory aspects. The principles of chromatography will be emphasized.

Ion exchange, and affinity-based separation will be discussed in detail.

CHEN 577 FOOD PACKING**3.0: 3 cr. E**

This course covers the packaging of food; the main objectives of packaging from physical protection, barrier protection, containment, information transmission, marketing, convenience, to portion control; different types of food packages and containers.

CHEN 579 NUMERICAL METHODS IN PETROLEUM INDUSTRY**3.0: 3 cr. E**

This course covers theory and practice of numerical simulation in the Geological (static) and Reservoir Engineering (dynamic) systems. The course describes methods, tools, and uses of numerical methods and computers in petroleum problems. The use of 2 Dimensional and 3 Dimensional models will be covered and examples provided. Mathematical equations governing fluid flow in reservoirs; numerical methods to solve the equations; numerical reservoir simulation; treatment of wells and history matching methods will be reviewed.

CHEN 588 FOOD ANALYSIS TECHNIQUES**3.0: 3 cr. E**

This course studies the theory and practice of the analysis of food components, including their chemical separation, identification and quantification comparing classical to modern instrumental food analysis techniques.

CHEN 589 WASTE TREATMENT ENGINEERING**3.0: 3 cr. E**

This course introduces concepts of physico-chemical, thermal, and biological methods for purification of solid waste and wastewater, and conversion to bioproducts/industrial products, energy and clean water. Industrial pollution sources, treatment methods, and legal requirements are examined.

FACULTY OF ENGINEERING GENERAL COURSES

ENVE 401 WATER RESOURCES ENGINEERING

3.0: 3 cr. E

This course covers the principles of ground-water development. Techniques for analyzing rainfall, runoff, fluid flow, reservoir siting, aquifer and groundwater flows. Design of reservoirs, conduits, water distribution systems, well fields, transmission lines, sewers, and drains. Well pumps. Stresses in pipes; materials and design of pipes; Metallic corrosion. Storage and distributing reservoirs, construction and maintenance. Water supply system appurtenances and special structures. Population growth and its effects on water supply requirements.

GENG 400 ENGINEERING SEMINARS

2.0: 1 cr. E

This module consists of lectures and seminars covering recent research and advances in various fields and applications of engineering disciplines.

GENG 402 PROJECT MANAGEMENT

3.0: 3 cr. E

To make available the fundamentals of project management with the most workable types of organizations and the necessary capabilities that must be included to reasonably ensure success and minimize the possibility of failure. The course consists of construction contracting for contractors, owners, and engineers: bidding, industry structure, types of contracts, and delivery systems of construction, planning, estimating, quantity take-off and pricing, labor and equipment estimate, proposal preparation, contract documents to prepare detailed estimates, permits, risk management, and taxes. Basic critical path planning and scheduling with activity on nodes and activity on arrows, monitoring, updating, controlling, crashing, resource leveling, resource allocation, and least cost scheduling including time-cost trade-off analysis. Computer applications using the Primavera software.

GENG 450 ADVANCED ENGINEERING ANALYSIS AND RESEARCH METHODS

3.0: 3cr. E

The aim of this course is to train MS students in the methodologies used for research. Starting from existing literature, students will learn the formulation and development of original research problems in engineering management and civil engineering. The focus of the course is how to plan, prepare and present research manuscripts, such theses, and papers. Overview of the most popular modeling techniques, and statistical sampling methods used for engineering research.

GENG 599 MASTER'S THESIS

6.X: 6 cr. E

An approved final thesis project.

Refer to General Listing of Course Descriptions for:

CHEM XXX

Refer to Faculty of Arts and Sciences

CIVE XXX

Refer to the Department of Civil Engineering

CSIS XXX

Refer to Faculty of Arts and Sciences

CSPR XXX

Refer to the Faculty of Arts and Sciences

ENGL XXX

Refer to the Faculty of Arts and Sciences

ENMG XXX

Refer to the Department of Engineering Management

GENG XXX

Refer to the Faculty of Engineering Requirements

LISP XXX

Refer to the Faculty of Arts and Sciences

MATH XXX

Refer to the Faculty of Arts and Sciences

MECH XXX

Refer to the Department of Mechanical Engineering

MGMT XXX

Refer to the Faculty of Business and Management

MRKT XXX

Refer to the Faculty of Business and Management