CHIN 312 - Advanced Chinese Language II (3)
This course emphasizes the development of advanced oral, aural, reading and writing skills in Mandarin Chinese. Expanding of vocabulary and development of reading comprehension will be through different genres of authentic texts. Students will be trained to write short essays on a variety of topics. Prerequisite(s): Grade of C or better in CHIN 311.

CHME - CHEMICAL & MATERIALS ENGINEERING
CHME 100 - Basics of Chemical Engineering (1)
Development of chemical engineering and introduction to chemical engineering education and practice.

CHME 102 - Material Balances (3)
Chemical Engineering basic problem-solving skills; unit conversions; elementary stoichiometry; material balances; sources of data. Chemical engineering majors must earn C or better in this course. Prerequisite(s): CHEM 111G or CHEM 115, MATH 190.

CHME 111 - Introduction to Computer Calculations in Chemical Engineering (3)
Introduction to the use of computer software to solve engineering problems. Chemical engineering majors must earn a C or better. Prerequisite(s): MATH 121G or MPL greater than or equal to 4.

CHME 201 - Energy Balances (3)
Chemical Engineering energy balances; combined energy and material balances including those with chemical reaction, purge and recycle; thermochemistry; application to unit operations. Sources of data. Introduction to the first law of thermodynamics and its applications. Chemical engineering majors must earn C or better in this course. Prerequisite(s): CHEM 102, CHEM 115 or CHEM 111, and MATH 192. Restricted to: CHME,CHME majors. Restricted to Las Cruces campus only.

CHME 201 H - Material and Energy Balances - Honors (4)
Same as CHME 201. Additional work to be arranged. Restricted to CHME majors. Prerequisite(s): CHEM 115 or CHEM 111G, CHEM 111 and MATH 192G.

CHME 301 - Chemical Engineering Thermodynamics I (3)
Applications of the first and second law to chemical process systems, especially phase and chemical equilibria and the behavior of real fluids. Development of fundamental thermodynamic property relations and complete energy and entropy balances. Chemical engineering majors must earn C or better in this course. Prerequisite: CHEM 201 and MATH 291G. Restricted to majors.

CHME 302 - Chemical Engineering Thermodynamics II (2)
Continuation of CHME 301. Chemical engineering majors must earn C or better in this course. Restricted to majors. Prerequisite(s): CHME 301 and MATH 392.

CHME 302 L - Thermodynamic Models of Physical Properties (13P)

CHME 305 - Transport Operations I: Fluid Flow (3)

CHME 306 - Transport Operations II: Heat and Mass Transfer (4)
Theory of heat and mass transport. Unified treatment via equations of change. Analogies between heat and mass transfer. Shell balance solution to 1-D problems in heat and mass transfer. Analysis of chemical engineering unit operations involving heat transfer. Design principles for mass transfer equipment. Chemical engineering majors must earn C or better in this course. Prerequisite(s): CHME 305 and MATH 392. Restricted to: CH E/ CHME majors.

CHME 307 - Transport Operations III: Staged Operations (3)
Theory of mass transport. Mass transfer coefficients. Analysis of chemical engineering unit operations involving mass transfer and separations. Equilibrium stage concept. General design and operation of mass-transfer equipment and separation sequences. Chemical engineering majors must earn C or better in this course. Prerequisite(s): CHME 302, CHME 306.

CHIN 111 - Elementary Chinese I (4)
Mandarin Chinese for beginners.

CHIN 112 - Elementary Chinese II (4)
Mandarin Chinese for beginners. Prerequisite: C or better in CHIN 111.

CHIN 211 - Intermediate Chinese I (3)
Speaking, reading and writing Mandarin Chinese. Prerequisite(s): C or better in CHIN 112. Restricted to Las Cruces campus only.

CHIN 212 - Intermediate Chinese II (3)
Speaking, reading and writing Mandarin Chinese. Prerequisite(s): C or better in CHIN 211. Restricted to Las Cruces campus only.

CHIN 311 - Advanced Chinese Language I (3)
This course emphasizes the development of advanced oral, aural, reading and writing skills in Mandarin Chinese. Expanding of vocabulary and development of reading comprehension will be through different genres of authentic texts. Students will be trained to write short essays on a variety of topics. Prerequisite(s): Grade of C or better in CHIN 211 and CHIN 212.

CHIN 312 - Advanced Chinese Language II (3)
This course emphasizes the development of advanced oral, aural, reading and writing skills in Mandarin Chinese. Expanding of vocabulary and development of reading comprehension will be through different genres of authentic texts. Students will be trained to write short essays on a variety of topics. Prerequisite(s): Grade of C or better in CHIN 311.
CHME 311 - Engineering Data Analysis (3)
Methodology and techniques associated with analyzing engineering data. Extensive spreadsheet use to analyze data and develop statistically significant conclusions based on the data. Data sets range from single variable experiments to multifactor regression analysis. Prerequisite: MATH 192G.

CHME 322 L - Instrumentation & Transport Phenomena Laboratory (2(6P))
Design of lab experiments that demonstrate the principles of process measurement and instrumentation through the determination of thermodynamic properties, transport phenomena properties, and heat and mass transfer coefficients. Treatment of data to include regression techniques, calculation of measurement error, and statistical analysis of variance. Written and oral reports. Corequisite(s): CHME 441, CHME 307. Prerequisite(s): Area 1b, Area 1c, CHME 311, CHME 306.

CHME 323 L - Transport Operations and Instrumental Laboratory I (11GPI)
Design of laboratory experiments that demonstrate the principles of process measurement and instrumentation through the determination of thermodynamic properties, transport phenomena properties, and heat and mass transfer coefficients. Treatment of data to include regression techniques, calculation of measurement error, and statistical analysis of variance. Prerequisite(s): CHME 306, CHME 311. Restricted to: CHME majors.

CHME 324 L - Transport Operations and Instrumentation Laboratory II (11GPI)
Design of laboratory experiments that demonstrate the principles of process measurement and instrumentation through the determination of thermodynamic properties, transport phenomena properties, and heat and mass transfer coefficients. Treatment of data to include regression techniques, calculation of measurement error, and statistical analysis of variance. Prerequisite(s): CHME 323. Restricted to: CHME and CH E majors.

CHME 330 - Environmental Management Seminar I (1)

CHME 352 L - Simulation of Unit Operations (13PI)
Definition, specification, and convergence of basic unit operations in a process simulator. Course will cover pipe networks, pressure changers, heat exchangers, distillation columns, and chemical reactors. Corequisite(s): CHME 307, CHME 441.

CHME 361 - Engineering Materials (3)
Bonding and crystal structure of simple materials. Electrical and mechanical properties of materials. Phase diagrams and heat treatment. Corrosion and environmental effects. Application of concepts to metal alloys, ceramics, polymers, and composites. Selection of materials for engineering design. Prerequisite(s): CHEM 111G or CHEM 114, or CHEM 115; MATH 192G.

CHME 395V - Brewing Science and Society (3)
An overview of the science of brewing and the interrelationships between society, technology, business, and the evolution of the current beer market. Topics covered are history of brewing and the interrelationships between societal attitudes, technology, and cultural preferences; beer styles and evaluation techniques; production and characteristics of ingredients used in brewing; brewing unit operations; biochemistry of malting, mashing, and fermentation; engineering in the brewery; homebrewing; and societal and health issues related to beer and alcohol. Students must be at least 21 years of age by the first day of instruction of the semester to enroll in this course.

CHME 412 - Process Dynamics and Control (3)

CHME 422 L - Unit Operations and Process Control Laboratory (26PI)
Experiments with chemical engineering unit operations including the use of computer data acquisition and closed-loop process control. Covers control system instrumentation, development of empirical models from process data, and PID controller design and tuning. Includes written and oral reports. Prerequisite(s): CHME 307 and CHME 322L. Restricted to: CHME majors.

CHME 423 L - Unit Operations Laboratory I (11GPI)
Experiments with chemical engineering unit operations including the use of computer data acquisition. Covers control system instrumentation and development of empirical models from process data. Includes written and oral reports. Prerequisite(s): CHME 324. Restricted to CHME and CHME majors.

CHME 424 L - Process Control Laboratory I (13GPI)
Experiments with chemical engineering process control including the use of computer data acquisition and closed-loop process control. Covers control system instrumentation. Includes written and oral reports. Prerequisite(s): CHME 423. Restricted to: CHME and CHME majors.

CHME 430 - Environmental Management Seminar II (1)
Survey of practical and new developments in environmental management field, hazardous and radioactive, waste management, and related health issues, provided through a series of guest lectures and reports of ongoing research. Restricted to: Main campus only. Crosslisted with: C E 430, E E 430, E S 430, E T 430, I E 430, I E 430, M E 430 and WERC 430.

CHME 436 - Environmental Process Design I (3PI)
Environmental clean-up and/or waste treatment process design. Participation in team solution to the WERC environmental contest problem, or equivalent, according to rules of contest. Design, construction, and operating demonstration of a bench or pilot scale facility to clean up a specified environmental problem. Written and oral reports covering work required. Open to all science, engineering, and business majors. Prerequisite: consent of instructor. May be repeated for a maximum of 6 credits. Same as CHME 536.

CHME 437 - Environmental Process Design II (3PI)
Continuation of CHME 436. Prerequisite: consent of instructor. May be repeated for a maximum of 6 credits. Same as CHME 537.

CHME 439 - Environmental Modeling (3)
Environmental transport processes in water, groundwater and the atmosphere; mathematical models to account for simultaneous chemical reaction and transport in the environment; models of chemical fate; aquatic chemistry; metals migration in soils; atmospheric deposition and global change; metals deposition. Prerequisite(s): MATH 392 or CHME 201.

CHME 441 - Chemical Kinetics and Reactor Engineering (3)
Analysis and interpretation of kinetic data and catalytic phenomena. Applied reaction kinetics; ideal reactor modeling; non-ideal flow models. Mass transfer accompanied by chemical reaction. Application of basic engineering principles to design, operation, and analysis of industrial reactors. Chemical engineering majors must earn C or better in this course. Prerequisite(s): CHEM 313, CHME 302 and CHME 308. Corequisite(s): CHME 307.

CHME 443 - Industrial Catalysis (3)
Fundamentals of catalytic processes, including chemistry, catalyst preparation, properties and reaction engineering. Addresses heterogeneous catalytic processes employed by industry. Detailed analysis of existing catalysts and catalytic reactions, and process design in chemical engineering. Prerequisite: CHME 441.
CHME 448 - Industrial Safety (3)
An introduction to the fundamentals of chemical process safety, including
Toxicology, industrial hygiene, source models, fires and explosions, relief
systems, hazard identification, risk assessment, environmental fate and
transport, hazardous waste generation, pollution prevention, and regulatory
Requirements. Chemical engineering majors must earn C or better in this
course. Prerequisite(s): CHEM 115 or CHEM 111G.

CHME 449 - Intellectual Property for Engineers and Scientists (3)
An overview of intellectual property with an emphasis on patents.
Terminology, patentability requirements, invention disclosures, inventorship,
scope of claims, patent application content and the patent
procurement process, and post-allowance matters including infringement and
enforcement Prerequisite(s): CHEM 110G, 111G or CHEM 115; and
senior standing in engineering or a fundamental science major; or consent of
instructor.

CHME 452 - Chemical Process Design & Economic Evaluation (3)
Concepts in chemical engineering process design, including: capital and
manufacture cost estimation; discounted cash flows; interest; taxes;
depreciation; profitability analysis; project specifications. Prerequisite(s):
CHME 307 and CHME 441.

CHME 452 L - Chemical Process Simulation (1) (P)
Construction and convergence of chemical processes in a process
simulator. Students will understand how to access variables, define and
converge design specifications and converge tear/recycle streams.
Prerequisite(s): CHME 352 L Corequisite(s): CHME 452.

CHME 455 - Chemical Plant Design (3)
Design and analysis of integrated process plants. Consideration given to
optimizing performance, operability, reliability, safety, control, energy
integration, and cost effectiveness. Requires written report covering
solution of a capstone design problem. Prerequisite(s): CHME 452.

CHME 455 L - Chemical Plant Simulation (1) (P)
Construction, convergence, and optimization of chemical processes in a
process simulator. Dynamic process simulation and control. Prerequisite(s):
CHME 412, CHME 452L. Corequisite(s): CHME 455.

CHME 456 - Advanced Chemical Process Simulation (3)
Advanced techniques in computational simulation of chemical processes
using process simulation software. Restricted to CHME majors.
Prerequisite: CHME 452L or consent of instructor.

CHME 461 - Calculation of Material and Molecular Properties (3) (P)
The aim is to describe and apply techniques for computing common
properties of materials and molecules: optimized geometries, transition
states, vibrational spectra, energies (electronic, internal energy, enthalpy,
and Gibbs free energy), heat capacities, net atomic charges, atomic
spin moments, and effective bond orders. These techniques allow one to
estimate the thermodynamic properties of a chemical, as well as to
compute the mechanisms and energy barriers for chemical reactions and
catalytic processes, and to quantify the electronic, magnetic, and chemical
ordering in materials. The theory behind these techniques will be described
and students will perform hands-on computer exercises using common
computational chemistry programs. Prerequisite(s): CHEM 116, MATH 192G,
(PHYS 214 or PHYS 215) AND (EHS Safety training to include the courses: (1)
Employee & Hazard Communication Safety (HazCom); (2) Hazardous Waste
Management; and (3) Laboratory Standard.).

CHME 468 - Adsorption (3) (P)
Introduction to adsorption science and technology, which includes
adsorption equilibrium and kinetic theories, adsorbent materials and
characterization, adsorption processes and design. Selected applications of
adsorption processes in chemical and pharmaceutical industries and
environmental protections will also be discussed. Taught with CHME 588.
Prerequisite(s): CHEM 201. Restricted to: CHME majors.

CHME 469 - Thermal, Optical, and Electronic Properties of Materials (3) (P)
Fundamentals that dictate the thermal, optical, and electronic properties
and their transport phenomena in materials focused on their governing
principles. Transport phenomena at the nanometer/quantum scale
stressing the differences with bulk systems will be considered. A
laboratory component of this course will also be included. Prerequisite(s):
CHME 463, CHEM 361.

CHME 470 - Introduction to Nuclear Energy (3)
Atomic and nuclear structure, nuclear stability and radioactivity, nuclear
reactions, detection and measurement of radiation, interaction of radiation with
matter, radiation doses and hazard assessment, principles of nuclear
reactors, and applications of nuclear technology. Prerequisite(s): CHEM
111G, MATH 192G.

CHME 471 - Health Physics (3)
Introduction to radiation protection, radiation/radioactivity, radioactive
decay/fission, interactions of radiation and matter, biological effects of
radiation, radiation measurement and statistics, sampling for radiation
protection, radiation dosimetry, environmental transport, radiation
protection guidance, external and internal radiation protection, and hazards
analysis. Crosslisted with: WERC 471. Prerequisite(s): MATH 192G, CHME
470.

CHME 473 - Nuclear Regulations and Compliance Practices (3)
Introduction, through the use of case studies, to the best technical
compliance practices for regulations governing the siting, licensing,
constructing, operating and decommissioning of nuclear fuel cycle
facilities. Consent of instructor required. Prerequisite(s): MATH 191G and
(CHEM 111G or CHEM 115). Crosslisted with: WERC 473

CHME 474 - Power Plant Design (3)
Principles of electric power generation. Review of DC and AC systems,
energy sources, and prime movers. Analysis of hydroelectric, fossil fuel,
nuclear, and alternative power systems. Environmental and economic
considerations. Prerequisite(s): MATH 191G, CHEM 111G.

CHME 475 - Nuclear Reactor Theory (3)
An overview of the properties of nuclei, nuclear structure, radioactivity,
nuclear reactions, fission, resonance reactions, moderation of neutrons,
will be followed by mathematical treatment of the neutronics behavior of
fission reactors, primarily from a theoretical, one-speed perspective.
Criticality, fission product poisoning, reactivity control, reactor stability and
introductory concepts in fuel management, slowing down and one-speed
diffusion theory. Corequisites: MATH 392. Prerequisites: CHEM 112G, PHYS
215G, MATH 210G.
CHME 476 - Nuclear Fuel Cycles (3)
Physical and chemical processes in the conventional nuclear fuel cycle: uranium mining and milling, conversion, enrichment, fuel fabrication, reactor operation, interim storage, reprocessing and recycling, waste treatment and disposal. Alternative fuel cycles and future prospects. Prerequisite(s): CHME 470.

CHME 479 - Corrosion and Degradation of Materials (3 cr.)
Failure of engineering materials in aggressive environments. Chemical and electrochemical mechanisms of corrosion. Influence of chemical composition and microstructure on corrosion behavior. Types of corrosion and chemical attack, including uniform corrosion, galvanic corrosion, pitting and other forms of localized corrosion, stress corrosion cracking, and corrosion fatigue. Methods of corrosion mitigation including cathodic protection, coatings, passivation, and corrosion inhibitors. Corrosion in nuclear reactors and nuclear waste repositories. Prerequisite(s): CHME 361.

CHME 481 - Biomedical Engineering and Engineering Healthcare (3)
Orientation to solving human and world health issues with biological engineering systems, tools, and analysis methods. Introduces general concepts including applied biology for engineers, biophotonics, biosensing, bioinstrumentation, tissue and biomaterials engineering, biomedical engineering research practices, and physical bioanalytical methods. Taught with CHME 581. Prerequisite(s): CHEM 116 AND CHEM 201. Restricted to: CHME majors.

CHME 485 - Materials from Biorenewable Resources (3 cr.)
Types, sources, composition and properties of biomass. Production, processing, and applications of biomass materials with energy, water, cost, sustainability, and waste management considerations. Prerequisite(s): CHEM 111, CHEM 313; a course in plant science, soil science, food science, or biology.

CHME 486 - Biofuels (3)
Introduction to the fundamentals and applications of biofuels and bioenergy produced from biomass; renewable feedstocks, their production, availability and attributes for biofuel/bioenergy production; types of biomass-derived fuels and energy; thermochemical conversion of biomass to heat, power, and fuel; biochemical conversion of biomass to fuel; biodiesel production; environmental impacts of biofuel production; economics and life-cycle analysis of biofuel; value-added processing of biofuel residues; term paper of selected topics relevant to biofuels. Taught with CHME 586. Consent of Instructor required. Prerequisite(s): admitted to MBA Program or consent of course department.

CHME 489 - Introduction to Modern Materials (3 cr.)
Structure and mechanical, thermal, electric, and magnetic properties of materials. Modern experimental techniques for the study of material properties. Crosslisted with: PHYS 489. Prerequisite(s): PHYS 315 or engineering equivalent.

CHME 490 - Senior Seminar (1)
Orientation to professional practice. Oral presentations by invited speakers, faculty, and students. Prerequisite: senior standing. Restricted to CHME majors.

CHME 491 - Special Topics (1-4)
Lecture and/or laboratory instruction on special topics in chemical engineering. May be repeated to a maximum of 6 credits under different subtitles listed in the Schedule of Classes. Restricted to majors.

CHME 498 - Undergraduate Research (1-3(6+9P))
Provides an opportunity for undergraduate students to work in research or areas of special interest such as design problems and economic studies under the direction of a faculty member. Written report and oral presentation in CHME 490, Senior Seminar, covering work required. Prerequisite: consent of instructor and department head. Approval of written application. Maximum of 3 credits per semester. May be repeated for a maximum of 6 credits.

CHSS - COMMUNITY HEALTH AND SOCIAL SCIENCES

CHSS 101 - Overview of Health and Community Services (3)
Health and community service professions with emphasis on public health, community health education, and environmental/occupational health.

CHSS 216 - Ethical Research Issues in Human and Community Service (3)
Ethical and legal responsibilities of health personnel with emphasis on research applications. May not receive credit for both CHSS 216 and CHSS 316. Community Colleges only.

CHSS 295 - Leadership/Mentorship Training for the CHSS Ambassadors Program (1)
Leadership development for volunteers serving as CHSS ambassadors. Focus on public relations and CHSS undergraduate degree programs. Prerequisite: consent of instructor. Graded S/U.

CHSS 299 - Service Learning Experience in Human and Community Services (3)
Exploration of contemporary social, civic, economic and ethical problems that require student participation in collaborative efforts within the community. Requires 20 clock hours of community based service for each credit. Graded: S/U. Prerequisite(s): CHSS 101, PHS 190 and PHS 275 or consent of instructor. Corequisite(s): PHL 295 or CHSS 216. Contact instructor for approval.

CMI - CINEMA & FILM/VIDEO PRODUCTION

CMI 100 - Introduction to the Creative Media Industry (3)
This class is an introductory course for students interested in learning about the creative media industry and the Creative Media Institute. It offers a broad view of the entire industry including Marketing, Production, Budgets, Jobs, New Media Literacy, and Industry Standards. Students will listen to experts in the field, and become involved in open discussions about the industry and use new information to complete hands-on assignments in the laboratory. Restricted to Las Cruces campus only.

CMI 200 - Sound Design I (3)
Focuses on the techniques for creating, recording and manipulating sounds through challenging sound design projects. Crosslisted with: CMT 206. Restricted to: ANVE, DFM majors. Restricted to Las Cruces campus only.

CMI 205 - Cinematography I (3)
Theories and techniques of visual design in videography and the aesthetics of lighting. Crosslisted with: CMT 205. Prerequisite(s)/Corequisite(s): CMI 100. Restricted to: ANVE, DFM majors. Restricted to Las Cruces campus only.

CMI 216 - Editing I (3)
Focuses on individual editing skills including capture, interface, basic cuts, and transitions. Crosslisted with: CMT 195. Restricted to: ANVE, DFM majors. Restricted to Las Cruces campus only.

CMI 220 - Drawing for Animation (3)
Introductory study of the human body and animal form in relation to animation. Students learn fundamentals and exaggeration of the figure, as related to proportion, rhythm, mechanics and motion. Areas of focus are: basic form, proportion, shape, contour, gesture, anatomy, portraiture, perspective, clothing effects and drawing from observation. Restricted to: ANVE, DFM, CMT majors.

CMI 231 - History of Animation (3)
Examines the history of Animation as an art form and industry through readings, screenings, lecture and periodic guest speakers. Restricted to: Main campus only. Restricted to DFM, ANVE majors.

CMI 232 - Storyboarding (3)
Examines effective writing principles for creating storyboards that communicate the overall picture of a project. There are timing, scene complexity, emotion and resource requirements. Crosslisted with: CMT 232 and ENGL 232. Restricted to: DFM, ANVE majors. Restricted to Las Cruces campus only.

CMI 233 - Light, Shade, Render (3)
This course will explore the theory and practice of 3D lighting and rendering methodologies. Techniques covered will implement cameras, lighting sources, textures, surface-mapping and algorithmic rendering to produce stylized and photo realistic images. Topics covered will include direct and indirect lighting, shaders that simulate physical substances and effects, rendering multiple passes and simulating physical lens effects. Prerequisite(s): CMI 260, CMI 280, or Consent of Instructor. Restricted to: Main campus only. Restricted to DFM, ANVE majors.

CMI 235 - Narrative: Principles of Story Across the Media (3)
Examines the various strategies of written and visual storytelling: narrative structure and its principle components (plot, theme, character, imagery, symbolism, point of view), with an attempt to connect them to elements of contemporary forms of media expression, including screenwriting, playwriting, writing for documentaries and animation, etc. Crosslisted with: ENGL 236. Restricted to Las Cruces campus only.