CERAMIC ENGINEERING (CER ENG)

CER ENG 5000 Special Problems (IND 0.0-6.0)
Problems or readings on specific subjects or projects in the department. Consent of instructor required.

CER ENG 5001 Special Topics (LEC 0.0-6.0)
This course is designed to give the department an opportunity to test a new course. Variable title.

CER ENG 5002 Cooperative Training (IND 1.0-3.0)
On-the-job experience gained through cooperative education with industry, with credit arranged through departmental cooperative advisor. Grade received depends on quality of reports submitted at work supervisor’s evaluation.

CER ENG 5040 Oral Examination (IND 0.0)
After completion of all other program requirements, oral examinations for on-campus M.S./Ph.D. students may be processed during intersession. Off-campus M.S. students must be enrolled in oral examination and must have paid an oral examination fee at the time of the defense/ comprehensive examination (oral/ written). All other students must enroll for credit commensurate with uses made of facilities and/or faculties. In no case shall this be for less than three (3) semester hours for resident students.

CER ENG 5099 Research (IND 0.0-15)
Investigations of an advanced nature leading to the preparation of a thesis or dissertation. Consent of instructor required.

CER ENG 5115 X-Ray Diffraction Analysis (LAB 1.0 and LEC 2.0)
Theory and practical aspects of x-ray diffraction analysis are covered including diffraction theory, qualitative and quantitative analysis techniques, electronic databases, and operation of modern powder diffractometers. Students cannot receive credit for both Cer Eng 3417 and Cer Eng 5115. Prerequisite: Preceded or accompanied by Cer Eng 3410.

CER ENG 5210 Biomaterials I (LEC 3.0)
This course will introduce senior undergraduate students to a broad array of topics in biomaterials, including ceramic, metallic, and polymeric biomaterials for in vivo use, basic concepts related to cells and tissues, host reactions to biomaterials, biomaterials-tissue compatibility, and degradation of biomaterials. Prerequisite: Senior undergraduate standing. (Co-listed with Bio Sci 5210, Met Eng 5210, Chem Eng 5200).

CER ENG 5217 Electrical Ceramics (LAB 1.0 and LEC 2.0)
The application and design of ceramics for the electrical industry is discussed. Particular emphasis is placed on how ceramic materials are altered to meet the needs of a specific application. The laboratory acquaints the student with measurements which are used for electrical property evaluation. Prerequisite: Cer Eng 4210.

CER ENG 5220 Advanced Mechanical Properties of Ceramics (LAB 1.0 and LEC 3.0)
The application and design of ceramics for the electrical industry is discussed. Particular emphasis is placed on how ceramic materials are altered to meet the needs of a specific application. The laboratory acquaints the student with measurements which are used for electrical property evaluation. Prerequisite: Cer Eng 4210.

CER ENG 5227 Thermomechanical/Electrical/Optical Properties Lab (LAB 1.0)
Laboratory consisting of three separate modules of experiments for the characterization of the thermomechanical, electrical and optical properties of ceramics. The student will choose one of the three modules. Prerequisite: Civ Eng 2210 or Cer Eng 4210.

CER ENG 5230 Glass Science And Engineering (LEC 3.0)
The development, manufacturing methods, applications, and properties of flat, fiber, container, chemical, and special purpose glasses. Composition/property relationships for glasses and nucleation-crystallization processes for glass-ceramics are also covered. Prerequisite: "C" or better grade in Cer Eng 2120.

CER ENG 5240 Advanced Electrical Properties Of Ceramics (LAB 1.0 and LEC 3.0)
The processes occurring in inorganic materials under the influence of an electric field are considered from basic principles. Emphasis is placed on application to real systems. Prerequisite: "C" or better grade in Cer Eng 4210.

CER ENG 5250 Refractories (LEC 3.0)
The manufacture, properties, uses, performance, and testing of basic, neutral and acid refractories. Prerequisite: Cer Eng 3230.

CER ENG 5260 Dielectric And Electrical Properties Of Oxides (LEC 3.0)
The processes occurring in inorganic materials under the influence of an electric field are considered from basic principles. Emphasis is placed on application to real systems. Prerequisite: "C" or better grade in Cer Eng 4210.

CER ENG 5270 Advanced Thermal Properties of Ceramics (LEC 3.0)
This course will introduce senior undergraduate students to a broad array of topics in biomaterials, including ceramic, metallic, and polymeric biomaterials for in vivo use, basic concepts related to cells and tissues, host reactions to biomaterials, biomaterials-tissue compatibility, and degradation of biomaterials. Prerequisite: Senior undergraduate standing. (Co-listed with Bio Sci 5210, Met Eng 5210, Chem Eng 5200).

CER ENG 5310 Advanced Ceramic Processing (LEC 3.0)
Materials, processing and design of microelectronic ceramics are covered. Introduction to devices, triaxial ceramics, high aluminas, tape fabrication, metallizations, thick film processing and glass-to-metal seals. Prerequisites: Cer Eng 3210 & 3325.

CER ENG 5317 Organic Additives In Ceramic Processing (LEC 2.0)
Basic chemistry, structure and properties or organic additives used in the ceramics industry; solvents, binders, plasticizers, dispersants. Use of organic additives in ceramic processing. Prerequisites: Cer Eng 3210 and 3315.

CER ENG 5320 Microelectronic Ceramic Processing (LEC 3.0)
Materials, processing and design of microelectronic ceramics are covered. Introduction to devices, triaxial ceramics, high aluminas, tape fabrication, metallizations, thick film processing and glass-to-metal seals. Prerequisites: Cer Eng 3210 & 3325.

CER ENG 5410 Advanced Characterization Of Inorganic Solids (LEC 3.0)
Problems or readings on specific subjects or projects in the department. Consent of instructor required.
CER ENG 5810 Principles Of Engineering Materials (LEC 3.0)
Examination of engineering materials with emphasis on selection and application of materials in industry. Particular attention is given to properties and applications of materials in extreme temperature and chemical environments. A discipline specific design project is required. (Not a technical elective for undergraduate metallurgy or ceramic majors) (Co-listed with Aero Eng 3877, Chem Eng 5300, Physics 4523, Met Eng 5810).

CER ENG 6000 Special Problems (IND 0.0-6.0)
Problems or readings on specific subjects or projects in the department. Consent of instructor required.

CER ENG 6001 Special Topics (IND 0.0-6.0)
This course is designed to give the department an opportunity to test a new course. Variable title.

CER ENG 6040 Oral Examination (IND 0.0)
After completion of all other program requirements, oral examinations for on-campus M.S./Ph.D. students may be processed during intersession. Off-campus M.S. students must be enrolled in oral examination and must have paid an oral examination fee at the time of the defense/comprehensive examination (oral/written). All other students must enroll for credit commensurate with uses made of facilities and/or faculties. In no case shall this be for less than three (3) semester hours for resident students.

CER ENG 6050 Continuous Registration (IND 1.0)
Doctoral candidates who have completed all requirements for the degree except the dissertation and are away from the campus must continue to enroll for at least one hour of credit each registration period until the degree is completed. Failure to do so may invalidate the candidacy. Billing will be automatic as will registration upon payment.

CER ENG 6085 Internship (IND 0.0-15)
Students working toward a doctor of engineering degree will select with the advice of their committees, appropriate problems for preparation of a dissertation. The problem selected and internship plan must conform to the purpose of providing a high level engineering experience consistent with the intent of the doctor of engineering degree.

CER ENG 6099 Research (IND 0.0-15)
Investigations of an advanced nature leading to the preparation of a thesis or dissertation. Consent of instructor required.

CER ENG 6210 Biomaterials II (LEC 3.0)
This course will introduce graduate students to a broad array of topics in biomaterials, including ceramic, metallic, and polymeric biomaterials for in vivo use, basic concepts related to cells and tissues, host reactions to biomaterials, biomaterials-tissue compatibility, and degradation of biomaterials. A term paper and oral presentation are required. Prerequisite: Graduate Standing. (Co-listed with Bio Sci 6210, Met Eng 6210, Chem Eng 6300).

CER ENG 6220 Optical Properties Of Materials (LEC 3.0)
The objective of this course is to give the student a fundamental understanding of the structure-optical property relationships exhibited by isotropic and anisotropic materials. Topics will include the wave/particle nature of light, how light interacts with materials, color, and applications such as lasers, fiber optic communication systems, electro-optics, and integrated optics. Prerequisites: Physics 2135 or 2111 and Math 2222.

CER ENG 6230 Composite Materials (LEC 3.0)
The objective of this course is to give the students an understanding of the processing, design, and mechanical behavior of composite materials. The course will treat both fiber reinforced and laminate-based composites with an emphasis on the macromechanical behavior of these composites with respect to their architecture. Prerequisite: Graduate Standing.

CER ENG 6240 Advanced Topics On The Vitreous State (LEC 3.0)
Modern aspects of the structure and dynamics of inorganic vitreous materials will be reviewed and applied towards understanding the macroscopic properties of glasses. Prerequisite: Graduate standing.

CER ENG 6250 Electroceramic Composite (LEC 3.0)
The objective of this course is to give the student an understanding of the structure–property relationships exhibited by electroceramic composites. The composites of interest cover a wide range of electrical phenomena including composite dielectrics, piezoelectrics, conductors, magnets, and optics. Prerequisite: Cer Eng 4210.

CER ENG 6267 Crystal Anisotropy (LEC 3.0)
The objective of this course is to give the student an understanding of crystal structure-physical property relationships. The relationship between symmetry and tensor representation will be examined, and then related to the mechanical, electrical and optical properties exhibited by the materials. Prerequisite: Cer Eng 2110.

CER ENG 627 Interfacial Phenomena (LEC 3.0)
The nature and constitution of inorganic interfaces, surface processes and consequences, epitaxy, thermal grooving, UHV techniques, field emission-ionization and evaporation, surface models, adsorption and nucleation.

CER ENG 6310 Sintering And Microstructure Development (LEC 3.0)
The objective of this course is to give the students an understanding of the processing, design, and mechanical behavior of composite materials. The course will treat both fiber reinforced and laminate-based composites with an emphasis on the macromechanical behavior of these composites with respect to their architecture. Prerequisite: Graduate Standing.

CER ENG 6510 Principles Of Engineering Materials (LEC 3.0)
Examination of engineering materials with emphasis on selection and application of materials in industry. Particular attention is given to properties and applications of materials in extreme temperature and chemical environments. A discipline specific design project is required. (Not a technical elective for undergraduate metallurgy or ceramic majors) (Co-listed with Aero Eng 3877, Chem Eng 5300, Physics 4523, Met Eng 5810).

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