

## DISTANCE LEARNING COURSES – SPRING 2011

### **CEMS 215 - Microscopy and Microstructural Characterization**

Students learn how to use optical and scanning electron microscopes for a range of applications. Underlying principles of the interactions of light and electron beams with materials are presented, and these interactions are related to crystal structure and microstructure of materials. Topics covered include mineral, phase, and element identification, characterization of microstructure, measurements of geometrical quantities, determinations of index of refraction, identification of defects, analysis of fracture surfaces, uses of microscopy in quality control, specimen preparation, photography using microscopes. There are two lectures and one lab each week.

Prerequisite: CEMS 214 or 216, previously or concurrently.

3.000 Credit hours

3.000 Lecture hours

**Levels:** Undergraduate

**Schedule Types:** [Distance Learning](#), [Lecture](#), Regular Course-Independently

[All Sections for this Course](#)

Inamori School of Engineering College  
Ceram/Glass/Matls/Biomed Engr Department

### **CEMS 216 - Bonding and Structure of Materials**

An introduction to the basic principles of solid materials structure. Electronic, atomic, and crystal structure are the primary focus for discussion. Structure is the foundation for understanding the physical and chemical properties of materials and for discussing defects in crystals. Key concepts are bonding within solids, rules that govern packing of atoms to form crystals, crystal structure, techniques for describing material's crystallography and selected properties of crystalline materials. Discussions culminate in an overview of common crystal structures in metals and ceramics. Prerequisites: CHEM 106 and CEMS 214.

3.000 Credit hours

**Levels:** Undergraduate

**Schedule Types:** [Distance Learning](#), [Lecture](#), Regular Course-Independently

[All Sections for this Course](#)

Inamori School of Engineering College  
Ceram/Glass/Matls/Biomed Engr Department

## DISTANCE LEARNING COURSES – SPRING 2011

### CEMS 235 - Thermodynamics of Materials

This course introduces the fundamental concepts of thermodynamics, equilibrium, and thermochemistry relevant to materials systems. Prerequisites: CHEM 106, MATH 253, CEMS 214.

4.000 Credit hours

**Levels:** Undergraduate

**Schedule Types:** [Distance Learning](#), [Lecture](#)

[All Sections for this Course](#)

Inamori School of Engineering College  
Ceram/Glass/Matls/Biomed Engr Department

### CEMS 325 - Glass Laboratory

This laboratory prepares students to fabricate and measure the properties of glass correlating composition and property relations, and observing trends. Optical property analysis is emphasized as are novel fabrication techniques such as sol-gel glass design for high-tech applications such as biomedical and photonics. Pre- or co-requisite CEMS 322.

2.000 Credit hours

2.000 Lecture hours

**Levels:** Undergraduate

**Schedule Types:** [Distance Learning](#), [Lecture](#), Regular Course-Independently

[All Sections for this Course](#)

Inamori School of Engineering College  
Ceram/Glass/Matls/Biomed Engr Department

## DISTANCE LEARNING COURSES – SPRING 2011

### **CEMS 334 - Introduction to Polymers**

An introduction to the polymeric materials for engineering and industrial use that studies the fundamental classes, processing, properties, and uses of polymeric materials. In addition to the major polymers, specialty polymers for biological, electrical, and high-performance uses are discussed. Necessary organic nomenclature is covered. Prerequisite: CEMS 235 or CHEM 343.

3.000 Credit hours

3.000 Lecture hours

**Levels:** Undergraduate

**Schedule Types:** [Distance Learning](#), [Lecture](#), Regular Course-Independently

[All Sections for this Course](#)

Inamori School of Engineering College  
Ceram/Glass/Matls/Biomed Engr Department

### **CEMS 344 - Properties II: Electrical, Magnetic, and Optical**

Underlying the macroscopic electrical (electronic) properties of materials is the behavior of the atomic state. In this course, a summary of basic concepts covering the electrical, magnetic, and optical behavior of solids is presented. Emphasis is placed on the fundamental properties of electrons and ions in solids. The relationship of these fundamental properties to ceramics is discussed using microstructure, property relations. The use of materials (ceramics) in electrical, magnetic, and optical devices is discussed through solutions to numerical problems. Prerequisites: PHYS 126, MATH 271, CEMS 237.

4.000 Credit hours

**Levels:** Undergraduate

**Schedule Types:** [Distance Learning](#), [Lecture](#), Regular Course-Independently

[All Sections for this Course](#)

Inamori School of Engineering College  
Ceram/Glass/Matls/Biomed Engr Department

## DISTANCE LEARNING COURSES – SPRING 2011

### **CEMS 500 - Special Topics**

The course covers advanced topics which are not ordinarily covered in detail in the general curriculum, but are either current areas of faculty research or areas of current or future industrial interest.

2.000 TO 4.000 Credit hours

**Levels:** Graduate, Undergraduate

**Schedule Types:** [Distance Learning](#), [Lecture](#)

[All Sections for this Course](#)

Graduate School College

Ceram/Glass/Matls/Biomed Engr Department

### **CEMS 545 - Characterization in Materials Science and Engineering**

The course will provide the student with detailed knowledge of the interactions of electromagnetic radiation with matter. Particle probes used in materials characterization will also be considered. A theoretical approach to understanding the mechanisms of interaction will provide the foundation for understanding any of the plethora of materials characterization techniques, including capabilities and limitations.

3.000 Credit hours

3.000 Lecture hours

**Levels:** Graduate, Undergraduate

**Schedule Types:** [Distance Learning](#), [Lecture](#), Regular Course-Independently

[All Sections for this Course](#)

Graduate School College

Ceram/Glass/Matls/Biomed Engr Department

## DISTANCE LEARNING COURSES – SPRING 2011

### **ELEC 220 - Circuit Theory I**

Voltage and current laws, voltage and current sources, resistor, capacitor, and inductor. Series and parallel circuits, equivalent circuits, mesh and node equations, sinusoidal response, electric power and energy. Prerequisite: PHYS 126; pre- or co-requisite: MATH 271.

4.000 Credit hours

4.000 Lecture hours

**Levels:** Undergraduate

**Schedule Types:** [Distance Learning](#), [Lecture](#), Regular Course-Independently

[All Sections for this Course](#)

Inamori School of Engineering College  
Electrical Engineering Department

### **ELEC 356 - Electronic Circuits**

Analysis and design of small signal and large signal electronic amplifiers. Frequency response, feedback, operational amplifiers. Prerequisite: ELEC 354.

4.000 Credit hours

4.000 Lecture hours

**Levels:** Undergraduate

**Schedule Types:** [Distance Learning](#), [Lecture](#), Regular Course-Independently

[All Sections for this Course](#)

Inamori School of Engineering College  
Electrical Engineering Department

## DISTANCE LEARNING COURSES – SPRING 2011

### **ELEC 444 - Optical Fiber Communication Systems**

Basic optical fiber communication components including optical fibers, optical transmitters, and optical receivers; basic concept of analog and digital signals, channel multiplexing, and modulation; geometrical-optics description, wave propagation, dispersion, and fiber loss; system design and performance.

3.000 Credit hours

3.000 Lecture hours

**Levels:** Undergraduate

**Schedule Types:** [Distance Learning](#), [Lecture](#), Regular Course-Independently

[All Sections for this Course](#)

Inamori School of Engineering College  
Electrical Engineering Department

### **ELEC 544 - Optical Fiber Communication Systems**

Basic optical fiber communication components including optical fibers, optical transmitters, and optical receivers; basic concept of analog and digital signals, channel multiplexing, and modulation; geometrical-optics description, wave propagation, dispersion, and fiber loss; system design and performance.

3.000 Credit hours

3.000 Lecture hours

**Levels:** Graduate, Undergraduate

**Schedule Types:** [Distance Learning](#), [Lecture](#), Regular Course-Independently

[All Sections for this Course](#)

Graduate School College  
Electrical Engineering Department

### **MECH 241 - Mechanics of Materials I**

The mechanics of solid deformable bodies, members subjected to tension, compression, flexure and torsion. Beam topics, stability of columns, combined stresses and strains. Prerequisite: MECH 211.

3.000 Credit hours

**Levels:** Undergraduate

**Schedule Types:** [Distance Learning](#), [Lecture](#), Regular Course-Independently

[All Sections for this Course](#)

Inamori School of Engineering College  
Mechanical Engineering Department

## DISTANCE LEARNING COURSES – SPRING 2011

### MECH 321 - Thermodynamics II

Applications of thermodynamic principles to the analysis of energy systems including power and refrigeration cycles. Mixtures and solutions, chemical reactions and equilibrium. Prerequisite: MECH 320.

3.000 Credit hours

3.000 Lecture hours

**Levels:** Undergraduate

**Schedule Types:** [Distance Learning](#), [Lecture](#), Regular Course-Independently

[All Sections for this Course](#)

Inamori School of Engineering College  
Mechanical Engineering Department

### MECH 326 - Heat Transfer

Principles of steady-state and transient conduction, radiation and convection. Applications to heat exchangers and environmental problems. Prerequisites: MECH 320, 324.

3.000 Credit hours

3.000 Lecture hours

**Levels:** Undergraduate

**Schedule Types:** [Distance Learning](#), [Lecture](#), Regular Course-Independently

[All Sections for this Course](#)

Inamori School of Engineering College  
Mechanical Engineering Department

## DISTANCE LEARNING COURSES – SPRING 2011

### **MECH 366 - Manufacturing**

Analysis of manufacturing processes. Topics include casting, forging, extrusion, drawing, sheet-metal working, machining, powder metallurgy, fabrication of non-metals, joining, and many others. Plant tours are a required part of the course. Prerequisite: MECH 244 or CEMS 214. Pre- or Co-requisites: MECH 364 and ENGR 305.

3.000 Credit hours

**Levels:** Undergraduate

**Schedule Types:** [Distance Learning](#), [Lecture](#), Regular Course-Independently

[All Sections for this Course](#)

Inamori School of Engineering College  
Mechanical Engineering Department

### **MECH 434 - Heating, Ventilation, and Air Conditioning**

Applied engineering thermodynamics; psychometrics; humidification and dehumidification processes; air cooling processes, heating processes; heat vapor transmission, fluid flow and pressure losses; air conveying and distribution. Prerequisite: MECH 321, (MECH 326 or CEMS 332).

3.000 Credit hours

3.000 Lecture hours

**Levels:** Undergraduate

**Schedule Types:** [Distance Learning](#), [Lecture](#), Regular Course-Independently

[All Sections for this Course](#)

Inamori School of Engineering College  
Mechanical Engineering Department