

Course Description AE

AE 211- Intro. To Arch. Design and Graphics

This course is an introduction to basic principles of design, composition, form making, freehand drafting techniques, orthographic projections of plans, elevations, sections, isometric drawing, perspectives, shade and shadow, and color theory. Each of these topics will be examined holistically, beginning with their historical origins, contemporary applications, and finally in the context of the student's own artistic practice. Two- and three-dimensional solutions will be explored. Projects and class meetings will be structured to help students develop a design process and critique skills.

AE 212- Architectural Design I

This is a studio- based course. It provides the students with the fundamentals of design, utilizing graphic thinking in the design process. Topics covered include: principles of design, composition of shapes, volumes and spatial relationships, designing in behavioral and socio- cultural contexts. Analyses of an existing simple building; spaces, partitions and functions. Design will be generated through the study of functional and behavioral use of space. Issues of age, gender, culture and individuality as well as complex functional relationships will be examined in their influence on architectural design. Studio work is individual developing plans, facades, sections and three dimensional drawings.

AE 213- History of Architecture I

This course presents an introduction to architectural history, contexts and settlement forms from the prehistoric beginnings to contemporary architecture. It will cover Middle Eastern and North African civilizations of the Nile Valley, Mesopotamia, Phoenicia, and Crete, and to the Classical civilizations of Greece and Rome, Byzantine, Early Christian architecture; evolution of western architecture: Romanesque, Gothic, the development of architecture in the Islamic context, modern architecture and city evolution from the mid-eighteenth century, i.e. from the Enlightenment and the Industrial Revolution, Modernity, Post-Modernity, Deconstruction. It covers also the modern and contemporary Islamic architecture in both Arab and Islamic world, besides the contemporary architecture in KSA.

AE 222- Applications of CAD and BIM

The aim of this course is to explore current CAD technologies and develop skills to produce 2D and 3D design specifications and to transform CAD drawings into photo realistic virtual products. At the end of the course, the students will understand a variety of terms and terminologies as applied to BIM (Building-Information Modeling). The course demonstrates the use of an industry standard operating system to create 2D and 3D digital fabrication and parametric design.

AE 232- Building Construction, Materials, Technology I

This course is an introduction for the principles of construction elements and techniques. The

course aims to clear the main elements of the building, Building materials and building systems (bearing walls, skeleton, shell construction and other new structural systems) and to train the student to draw the constructional details through the study of: Bearing wall buildings (bricks and stones), Architectural symbols, Building methods, Bonds, Tools, Wall thickness, Openings. Lintels and arches, Vaults and domes, Foundations, Damp proofing, Heat and sound insulation, Expansion and settlement joints, Retaining walls, Erection requirements, Concrete components, Structural elements, Stairs, and external finishes.

AE 301- Fluid Mechanics

Statics of fluids, analysis of fluid flow using principles of mass, momentum and energy conservation from a differential and control volume approach. Dimensional analysis.

Application to pipe flow and open channel flow.

AE 311- Architectural Design II

This course is a studio on environment and sustainability. It aims at introducing environmental design strategies in response to climate, human comfort and energy consumption. It focuses on the integration of sustainable and passive design principles, into conceptual and practical architectural design. Topics will include the fundamentals of sustainable building and design, energy efficient design, day-lighting, “green” materials selection, and other sustainability initiatives. Studio work is individual developing design project and studies.

AE 331- Building Construction, Materials, Technology II

This course introduces the state-of-the-art and major innovations in building technologies and structural, enclosure, mechanical, and interior systems. The course continues the mandate for Total Building Performance, clarifying the full range of building performance mandates required in today's architecture. It focuses also on construction phases and working details, descriptions and techniques.

The course identifies a variety of systems, methods, and materials used for building construction technology and develop the understanding of architectural details and finishing. It improves the skills of students in detailed drawings. The course also included site visits for construction projects sites.

AE 332- Building Construction Documents

The course prepares students to transform ideas and CAD drawings into site construction documents for the building industry. Students are exposed to the standards, regulations, and contract liabilities of the Saudi building code. As a training exercise, students are assigned to produce the construction documents for a design project they produced in the studio.

AE 342- Electrical Systems and Illumination in Building

This course covers: Basic electrical circuits, panel board, wiring and system distribution in buildings. Building total electrical system design. Protection, security systems, electric codes. Introduction to basic phenomena, and concepts of architectural lighting and electrical light sources. Lighting system, and design methods, quantity and quality of illumination. Day lighting, lighting measurements, instruments and methods. Measuring method and equipment. Impact of lighting system on architectural design. Computer applications.

AE 343- Mechanical Systems in Buildings

This course covers an introduction to all the mechanical systems of the building. Topics included: Mechanical services required in different building types. Human thermal comfort in relation to heating, cooling and humidification; environmental systems and energy consumption; mechanical ventilation and air movement; energy loads and initial costs. Smoke and fire control; the different types of water piping; sanitary systems, plumbing, sewerage and health environment concerns. Use of vertical transportation systems; water heating and cold storage; solar energy and oil and gas storage. It includes the needed computer applications related to the field.

AE 344- HVAC Systems

This course intrudes the fundamental principles and engineering procedures for the design of heating, ventilating, and air conditioning systems; HVAC system characteristics; system and equipment selection; duct design and layout. The course covers also energy conservation techniques and the computer applications and tools related to the field.

AE 411- Architectural Design III

This is a studio-based course on the Art of Structure and Technology. The course aims at developing the student's skills in dealing with complex architectural problems taking in account the integration of all the building systems.

This studio's will link the two basic components of architecture- art and engineering. Based on a firm understanding of structural systems and their appropriate application to architectural design, projects will be designed to incorporate both aesthetic beauty and structural thinking. The influence of technology in the form of new materials and methods will be examined through their design potential. Three-Dimensional manual and digital models will play an essential role in the design development processes of this studio.

AE 461- Construction Economy

Introduction to the basic concepts and principles of engineering and construction economics. It covers of the different cost components, cost estimation techniques, cash flow analysis, and time value of money. It covers also main components of construction cost in relation to quality and time. Cost of materials, labors, equipment, overhead and profit. Work breakdown structure and quantity take off. Bid preparations, tenders, and contracts awards.

AE 462- Projects Management

This course is an introduction to the various field operations and systems activities necessary for construction project management, including basic aspects of construction methodology, such as estimating, scheduling, contracts, subcontractor management, cost control, and project administration. It covers basic managerial functions: planning, strategies, objectives, MBO; organizing, departmentalizing, job descriptions; elements of human resource management: staffing, directing, controlling, total quality management, continuous improvement, critical management methods, and exposure of various engineering applications.

AE 491- Capstone Design Project I

This course represents the first step of the graduation project. This including the selection of the project based on the real needs of society. Initiation of an engineering design process through research and design methods, literature review, data gathering, analysis of potential sites and similar existing buildings as well as assessment of alternative building engineering solutions to the design problem. Emphasis is on physical and social documentation, visual surveying, users' needs, generating alternative solutions, and evaluation in preparation for "Capstone Design Project II" course.

AE 492- Capstone Design Project II

This course is the second step of the Capstone Design Project after the course "Capstone Design Project I". This course is a semester long project that is divided into three components. The first part focuses on conceptual, strategic, and formal skills. The second part focuses on the demonstration of synthesis and integration. The third part (a design project) focuses on process and craft. The aim of the project is to provide the students with an opportunity to implement the concepts and techniques appropriate to a design. A dissertation on the project should be submitted on which the student is examined orally.

CE 212 – Strength of Materials

The course focus on the Concepts of stress, strain, and constitutive relations; stress and deformation of axially loaded members; thermal stresses; pressure vessels; energy concepts; torsion of circular and thin-walled sections; shear and bending moment diagrams in beams; elastic bending and shear stresses in beams; compound stresses; stress transformation; bending moment curvature equation; deflection of beams; singularity functions methods, analysis and design applications.

CE 311 –Structural Analysis

The course focus on the analysis of statistically determinate structures; influence lines; deflection of trusses, beams, and frames; introduction to indeterminate analysis using consistent deformation and moment distribution; computer programming.

CE 312 – Reinforced Concrete Design

The course focus on the loads design philosophies, current design codes, design for flexure, shear, torsion and axial loads. Design of beams, columns, beam-columns, two-way slabs; serviceability considerations; applications to buildings. Design project.

CE 413 – Steel Design

The course focus on the properties of structural steel; steel sections, introduction to load resistance factor design (LFRD), design of tension members, compression members and capacity calculations; width thickness ratios; design of beams with and without lateral supports; design of

members under combined axial and bending loads; design and details of simple bolted and welded connections, and an introduction to common building connections; use of STAAD. Pro software for design of elements and overall design of frames; completion of a design project; site visit.

ENGG 203- Statics and Dynamics

This Course is a combination of statics and dynamics for non-CE Majors. The objective is to prepare students for courses dealing with engineering design of components and systems based on the fundamentals of statics and dynamics. The course covers principles of forces and force systems, resultants and components of force systems, forces due to friction, condition of equilibrium, forces acting on members of trusses and frame structures, centroids and moments of inertia, review of kinematics and kinetics of particle motion, two-dimensional motion of rigid bodies.

ME 201- Thermodynamics

Introduction and basic thermodynamic concepts and definitions, System and control volume concepts. Properties and behavior of a pure substance, equation of states, table of properties Work and heat, the first law of thermodynamics applied to a system and control volume, Internal energy, enthalpy, steady state, Unsteady state, the second law of thermodynamics analysis for the control volume, heat engines, refrigerators and heat pumps, Carnot cycle, reversible and irreversible processes, Entropy, Clausius inequality, principle of the increase of entropy, Efficiencies. Entropy of ideal gas.

AE 294- Field Experience I (Optional)

Students obtain a position in the government or private sector as a full-time trainee for at least 8 weeks during the summer prior to their graduation. Students will work on a hands-on, real- world architecture design and implementation process, under the supervision of the field supervisor, who is on-site at the company, agency, or research laboratory where the field experience is taking place.

AE 394- Field Experience II**

Students obtain a position in the government or private sector as a full time trainee for at least 8 weeks during the summer. Students will work on a hands-on, real-world architecture design and implementation process, under the supervision of the field supervisor, who is on-site at the company, agency, or research laboratory where the field experience is taking place.