Faculty Contact:
Dean’s Office
Tel : 6952037 Fax: 6401686
Email : eng-dean@kau.edu.sa
Web Site: http://engineering.kau.edu.sa

History:
The Faculty of Engineering was established in 1975 and was comprised of six departments: Civil Engineering, Mechanical Engineering, Electrical Engineering, Industrial Engineering, Nuclear Engineering and Mining Engineering. In 1982 Chemical Engineering was introduced and the Mechanical Engineering Department was split into Aeronautical Engineering, Thermal Engineering and Desalination Technology and Production Engineering and Mechanical System Design.

Vision:
Innovation and leadership in engineering sciences and their applications.

Mission:
To educate, train and produce highly qualified engineering personnel and to conduct world-class scientific research and studies which collectively allow for a sustainable development of the society through technology transfer and knowledge dissemination.

Unique Features:
• The Faculty of Engineering represents a unique academic achievement since it is the first faculty in the Kingdom of Saudi Arabia to successfully obtain academic accreditation for all of its 12 programs and specializations from the American Accreditation Board of Engineering and Technology (ABET).
• The Faculty is credited with being the only institution in Saudi Arabia that offers specializations in Aeronautical Engineering, Nuclear Engineering, Mining Engineering, and Biomedical Engineering.
• The Faculty has established a number of scientific associations such as the Saudi Association of Civil Engineering, the Industrial Engineering Association, The Saudi Society of Aeronautics and Space Sciences, and the Saudi Scientific Association of Biomedical Engineering.
**Faculty of Engineering**

**Graduation Requirements:**
To earn a B.Sc. degree in Engineering, students must successfully complete 155 credit hours over a five-year (ten semesters) period with an overall GPA of 2.0 out of 5.0 or better, and complete one summer training program. Credit hours are distributed as follows:

- **27 General University Requirements** (Foundation Year)
- **14 University Requirements for Science Track**
- **37 Faculty Requirements**
- **77 Departmental Requirements**

**Foundation Year Courses:** Credit Hours: (27 Credit Hours)

<table>
<thead>
<tr>
<th>No.</th>
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<tbody>
<tr>
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<td>English Language I (for Science)</td>
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<td>ELCS</td>
<td>102</td>
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<td>3</td>
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<td>110</td>
<td>Calculus I</td>
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<td>4</td>
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<td>110</td>
<td>General Physics I</td>
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<tr>
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<td>CHEM</td>
<td>110</td>
<td>General Chemistry I</td>
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<tr>
<td>6</td>
<td>STAT</td>
<td>110</td>
<td>General Statistics (1)</td>
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<tr>
<td>7</td>
<td>BIO</td>
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<td>General Biology (1)</td>
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<td>8</td>
<td>COMM</td>
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<td>Communication Skills</td>
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<td>9</td>
<td>CPIT</td>
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**General University Required:** (14 Credit Hours)

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<td>ISLS</td>
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<td>ARAB</td>
<td>101</td>
<td>Arabic Language (1)</td>
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**Total 27**

**Faculty Required: Core Courses** (37 Credit Hours)

<table>
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<th>Course No.</th>
<th>Course Title</th>
<th>Credit</th>
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<td>IE</td>
<td>201</td>
<td>Introduction to Engineering Design I</td>
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<td>3</td>
<td>IE</td>
<td>202</td>
<td>Introduction to Engineering Design II</td>
<td>2</td>
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<td>4</td>
<td>IE</td>
<td>255</td>
<td>Engineering Economy</td>
<td>3</td>
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<td>MATH</td>
<td>202</td>
<td>Calculus II</td>
<td>3</td>
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<td>203</td>
<td>Calculus III</td>
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<td>Differential Equations</td>
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<td>MATH</td>
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<td>Series and Vector Calculus</td>
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<td>General Physics Laboratory</td>
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<tr>
<td>10</td>
<td>PHYS</td>
<td>202</td>
<td>General Physics II</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
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<td>General Chemistry Laboratory</td>
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<tr>
<td>12</td>
<td>MENG</td>
<td>102</td>
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<td>3</td>
</tr>
<tr>
<td>13</td>
<td>EE</td>
<td>201</td>
<td>Structured Computer Programming</td>
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<td>14</td>
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<td>251</td>
<td>Basic Electrical Engineering</td>
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**Total 37**

**Department Required Core Courses** (77 Credit Hours)

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<th>Program Courses</th>
<th>Curriculum</th>
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<td>Program courses to satisfy ABET requirements</td>
<td>65 Maximum</td>
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<tr>
<td>6 credit hours of elective courses</td>
<td>6 Minimum</td>
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<td>XX 499: Senior Project</td>
<td>4</td>
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<tr>
<td>XX 399: Summer Training</td>
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**Total 77**
Faculty of Engineering

Departments and Academic Degrees:
The faculty of Engineering has nine departments offering twelve programs leading to Bachelor of Science degrees in Engineering.

<table>
<thead>
<tr>
<th>Department / Program</th>
<th>Academic Degree</th>
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<tbody>
<tr>
<td>Aeronautical Engineering</td>
<td>B.Sc. and M.Sc. degrees in Engineering</td>
</tr>
<tr>
<td>Chemical and Material Engineering</td>
<td>B.Sc. and M.Sc. degrees in Engineering</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>B.Sc., M.Sc. and Ph.D. degrees in Engineering</td>
</tr>
<tr>
<td>Electrical and Computer Engineering</td>
<td>B.Sc. and M.Sc. degrees in Engineering</td>
</tr>
<tr>
<td>Industrial Engineering</td>
<td>B.Sc. and M.Sc. degrees in Engineering</td>
</tr>
<tr>
<td>Mining Engineering, and Nuclear Engineering</td>
<td>B.Sc. and M.Sc. degrees in Engineering</td>
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<tr>
<td>Nuclear Engineering</td>
<td>B.Sc. and M.Sc. degrees in Engineering</td>
</tr>
<tr>
<td>Production Engineering and Mechanical Systems Design</td>
<td>B.Sc. and M.Sc. degrees in Engineering</td>
</tr>
<tr>
<td>Thermal Engineering and Desalination Technology</td>
<td>B.Sc. and M.Sc. degrees in Engineering</td>
</tr>
</tbody>
</table>

Journals:

- Publications: The Engineering Sciences Journal
- Tel No.: 6452017
- Email: jkauengs@kau.edu.sa
- Website: www.kau.edu.sa/centers/spc/jkau/engineering
History:
The Aeronautical Engineering Department was established in 1980.

Vision:
To offer leadership in aerospace education and research.

Mission:
To provide an environment that promotes creativity, stimulates innovation, enhances life-long learning skills, and professionally serves the society within the Islamic ethical context.

Departmental Requirements:
Students are required to complete 155 credit hours distributed as follows:
- University requirements 14 credit hours
- Faculty requirements 64 credit hours
- Department requirements 77 credit hours
- Coop Program requirements 0 credit hours

Students study 77 credit hours of courses according to specialization.

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<th>No.</th>
<th>Course Code</th>
<th>Course No.</th>
<th>Course Title</th>
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<th>Lab</th>
<th>Prac</th>
<th>Prerequisite</th>
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<tr>
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<td>130</td>
<td>Basic Workshop</td>
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<td>MENG 102</td>
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<td>CE</td>
<td>201</td>
<td>Engineering Mechanics (Statics)</td>
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<td>MENG</td>
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<td>Mechanical Engineering Drawings</td>
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<td>MENG 130</td>
</tr>
<tr>
<td>4</td>
<td>MENG</td>
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<td>Engineering Mechanics (Dynamics)</td>
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<td></td>
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<td>6</td>
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<td>Machine Elements Design</td>
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<td></td>
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<td>311</td>
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<td>EE 201/200, AE 303</td>
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<td>331</td>
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<tr>
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<td>333</td>
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<td></td>
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<td>AE</td>
<td>362</td>
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<td></td>
<td>AE 311, MENG 262</td>
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Total 73
Department Elective Course: Students select 2 courses (6 credit hours) out of those in table below.

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Course Descriptions:

**AE 300: Engineering Thermo-Fluids I**

**Prerequisites:** MATH 203, PHYS 281

**AE 302: Engineering Thermo Fluids II**

**Prerequisites:** AE 300, CHEM 281

**AE 303: Fundamentals of Aerospace Design**
Fundamentals of aerospace engineering are introduced through hands on design project. Topics are treated when required in the design process including: history and configurations of aircraft, design philosophy, mission specifications, weight estimation, aerodynamics, propulsion, performance, stability and control, structures, design implementation, and cost estimation. By the end of the course the design teams should build and test their prototypes and communicate the details of their designs both orally and in writing.

**Prerequisites:** AE 300, IE 202, IE 255

**AE 311: Incompressible Flow**

**AE 331: Aerospace Structures I**

**Prerequisites:** MENG 270, AE 303

**AE 333: Flight Vehicle Materials**

**Prerequisites:** MENG 270, AE 303

**AE 362: Flight Dynamics**
AE 371: Propulsion I
Prerequisites: AE 311, MENG 262

AE 390: Summer Training
10 weeks of supervised hands-on work experience at a recognized firm in a capacity which ensures that the student applies his engineering knowledge and acquires professional experience in his field of study at KAU. The student is required to communicate, clearly and concisely, training details and gained experience both orally and in writing. The student is evaluated based on his abilities to perform professionally, demonstrate technical competence, work efficiently, and to remain business focused, quality oriented, and committed to personal professional development.
Prerequisites: CHEM 281, AE 302, AE 303

AE 412: Compressible Flow
Prerequisites: AE 331, AE 362

AE 414: Experimental Aerodynamics
Prerequisites: STAT 110, AE 302, AE 311

AE 419: Computational Fluid Dynamics
Prerequisites: AE 412

AE 432: Aerospace Structures II
Prerequisites: AE 331, AE 333

AE 434: Experimental Structural Mechanics
Prerequisites: STAT 110, AE 432

AE 436 : Aircraft Structural Design
Prerequisites: AE 432, AE 333

AE 452: Basic Aircraft Systems
Prerequisites: AE 362

AE 461: Performance of Aerospace Vehicles
Prerequisites: AE 311

AE 463: Aerospace Control Systems
Flight control system elements and configuration, mathematical modeling for control design, transfer functions, state-space representation, block diagram reduction, first-order, second-order, and higher-order linear system characteristics, open versus closed-loop control, stability and performance of linear feedback control systems, Routh-Hurwitz stability criterion, root-locus
AE 465: Aircraft Design

Prerequisites: AE 362

AE 472: Propulsion II

Prerequisites: AE 371, AE 412

AE 482: Aircraft Maintenance Systems

Prerequisites: STAT 110, AE 362

AE 499: Senior Project
The student is required to function in multidisciplinary team to design a system, component, or process to meet desired needs within realistic constraints. A standard engineering design process is followed including the selection of a client defined problem, literature review, problem formulation (objectives, constraints, and evaluation criteria), generation of design alternatives, work plan, preliminary design of the selected alternative, design refinement, detailed design, design evaluation, and documentations. The student is required to communicate, clearly and concisely, the details of his design both orally and in writing in several stages during the design process including a final public presentation to a panel composed of several subject-related professionals.

Prerequisites: AE 412, AE 432

Iranian Faculty Members

Ali M. Al-Bahi
Experimental Aerodynamics, Flight Mechanics CFD, Aircraft Maintenance
1983 ENSAE Toulouse, France

Sami S. Habib
Aircraft Design Flight Safety, Aircraft Structures and Materials
1986 University of Leads, UK

Abdulrahman H. Bajodah
Automatic Control
2003 Georgia Inst. of Technology, USA

Ibrahim E Olwi
Low Speed Aerodynamics, Thermal Systems, Solar Energy
1984 Tulane University, USA

Mostefat Bourchak
Composite Structures, Fatigue Damage NDT / NDE Vibration
2007 Bristol University, UK

Wail I. Harasani
Aircraft Design, Fleet Planning, Stability and Control
2005 Cranfield University, UK

Mohammed Alharbi
FEMA Aircraft Structures and Composite Materials
1997 University Maryland, USA

Maher S. Aly
Aerodynamics, Aircraft Performance, Flight Safety
1987 Cairo University, Egypt
History:
The Department of Chemical and Materials Engineering was established in 1981. The Master of Science (M.Sc.) in Chemical Engineering and Materials Engineering was launched in 1996.

Vision:
Commitment to total quality in teaching and scientific research and aspiration to leadership in chemical and materials engineering education.

Mission:
The mission of the Chemical and Materials Engineering Department is to graduate highly qualified chemical and materials engineers who are well trained and prepared to pursue professional careers in industry, government or research. The department strives to conduct world-class research and provide consultation services in chemical and materials engineering to related sectors of the community.

Departmental Requirements:
Students are required to complete 155 credit hours distributed as follows:
- University requirements 41 credit hours
- Faculty requirements 37 credit hours
- Department requirements 77 credit hours

Department Study Plan: Department Core Courses Credit Hours 71

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Total 71
Elective Core Courses: Students select 2 courses (6 credit hours) out of those in the Table below.

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**Total:** 39

Course Descriptions:

**ChE 201: Introduction to Chemical Engineering**


**Prerequisites:** CHEM 281, IE 200

**ChE 210: Materials Science**


**Prerequisites:** CHEM 281

**ChE 301: Chemical Engineering Thermodynamics (I)**

Introduction to thermodynamics concepts, first law of thermodynamics, Mass and energy balances in closed and open systems, volumetric properties of pure fluids, heat effects, humidity charts, second law of thermodynamics, entropy, Computer applications to thermodynamics problems.

**Prerequisites:** CHEM 281

**ChE 302: Chemical Eng. Thermodynamics (II)**


**Prerequisites:** CHEM 301

**ChE 311: Corrosion Engineering**


**Prerequisites:** CHEM 240, ChE210, EE 251

**ChE 321: Chemical Reaction Engineering**

The course is intended to develop the student’s ability to understand mole balances, conversion and reactor sizing, rate laws and stoichiometry for single and multiple reactions and its applications to steady-state non-isothermal reactor design. Collection and analysis of rate data and catalysis and catalytic reactor.

**Prerequisites:** EE 332, ChE 302

**ChE 331: Momentum Transfer**


**Prerequisites:** MATH 203, MATH 204, ChE 201

**ChE 332: Heat Transfer**

Modes of heat transfer, steady and un-steady-state conduction in different co-ordinates, convective heat transfer with and without phase change. Correlation’s for forced and natural convection. Analogy between momentum and heat transfer. Heat transfer applications.

**Prerequisites:** ChE 202, ChE 331

**ChE 333: Mass Transfer**


**Prerequisites:** ChE 331
ChE 334: Separation Processes  
Phase equilibrium, continuous contact and stage wise processes; fractional distillation, gas absorption and liquid-liquid extraction processes.  
Prerequisites: ChE 302, ChE 333

ChE 390: Summer Training  
10 weeks of training in industry under the supervision of a faculty member. Students have to submit a report about their achievements during training in addition to any other requirements assigned by the department.  
Prerequisites: ChE 334

ChE 400: Cooperative Work  
Extensive 26 weeks of supervised hands-on work experience at a recognized firm in a capacity which ensures that the student applies his engineering knowledge and acquires professional experience in his field of study at KAU. The student is required to communicate, clearly and concisely, training details and gained experience both orally and in writing. The student is evaluated based on his abilities to perform professionally, demonstrate technical competence, work efficiently, and to remain business focused, quality oriented, and committed to personal professional development.  
Prerequisites: ChE 334

ChE 411: Polymer Engineering  
Classification of polymeric materials, calculation of molar mass and molar mass distribution, polymerization reactions, kinetics of polymerization reactions, composites materials, polymer processing, mechanical and physical properties, commercial polymer.  
Prerequisites: CHEM 232

ChE 412: Engineering Materials  
Prerequisites: ChE 210

ChE 413: Materials Selection  
Prerequisites: ChE 210

ChE 414: Extractive Metallurgy  
Major operations in the iron and steel-making industry; direct reduction processes, blast furnaces, converter and electric-arc steel-making and steel refining methods; electroslag (ESR) and vacuum induction refining (VIR). Bauxite production. Electro-thermal reduction of cryolite to produce commercial aluminum. Production of TiO2. Extractive metallurgy of titanium. Gold extraction. Continuous casting.  
Prerequisites: ChE 210

ChE 422: Catalysis  
Kinetics of homogeneous and heterogeneous catalytic reactions. Physical and chemical properties of solid catalysts. Preparation, activity, selectivity, deactivation and regeneration of catalysts. Applications to refining and petrochemical industries.  
Prerequisites: ChE 321

ChE 435: Unit Operations Laboratory  
Experimental study of unit operations using pilot size equipment. Safety considerations. Data analysis. Selected topics related to unit operations such as membrane separation and mechanical separation, etc.  
Prerequisites: ChE 332, ChE 334

ChE 441: Modeling and Simulation  
This course is designed to give chemical engineering students the ability to solve systems of algebraic-differential equations. The course will develop their ability to drive system models and simulate digitally. Students are also trained on available simulation computer packages (Design II, ChE-Cad and Math-lab).  
Prerequisites: ChE 321, ChE 334

ChE 442: Process Control  
Prerequisites: ChE 321, ChE 334, MATH 205

ChE 451: Plant Design  
Prerequisites: ChE 321, ChE 334, IE 225

ChE 452: Computer Aided Design  
Prerequisites: ChE 441, ChE 451

ChE 461: Inorganic Chemical Technology  
Fundamentals of the chemical industry. Study of some important industries such as industrial gases, cement, ceramics and glass, Mineral acid synthesis, chlor-alkali, phosphate, fertilizers, pigments and paints. Water treatment.  
Prerequisites: ChE 321, ChE 334

ChE 462: Petroleum Refinery Engineering  
Prerequisites: ChE 321, ChE 334
ChE 463: Natural Gas Engineering
Prerequisites: ChE 321, ChE 334

ChE 464: Petrochemical Technology
Production technologies of synthesis gas, olefins and aromatic. Manufacture of important petrochemicals derived from base chemicals and synthesis gas. Production technologies of important polymers and plastics.
Prerequisites: ChE 334

ChE 465: Industrial Pollution Control
Prerequisites: ChE 321, ChE 334

ChE 466: Safety in Chemical Process Industries
Prerequisites: ChE 334

ChE 471: Special Topics
Topics in chemical or materials engineering upon the approval of the chemical engineering department council.
Prerequisites: ChE 334

ChE 499: Senior Project
Faculty – supervised individual or team of two or more students design projects. Emphasis on the integration of basic and engineering sciences in the solution of chemical processes design problems, including synthesis and economic evaluation of such process.
Prerequisites: ChE 321, ChE 334 MENG 130
Department of Civil Engineering

Department Contact:
Chairman’s Office
Tel: 6402000  Direct Telephone: 6952488  Ext: 68139  Fax: 6952179  Ext:68139
Email : eng-ce@kau.edu.sa
Web Site : http://ce.kau.edu.sa

History:
The Civil Engineering Department was established in 1975. In 1982, Environmental Engineering was introduced as a main specialization.

Vision:
A distinguished learning and research community in Civil Engineering knowledge

Mission:
To offer high-quality education and conduct innovative research in Civil Engineering that will provide sustainable solutions for societal needs and the environment.

Departmental Requirements:
Students are required to complete 155 credit hours distributed as follows:
• University requirements 41 credit hours
• Faculty requirements 37 credit hours
• Department requirements 77 credit hours

Departmental Core Courses: Credit Hours 71

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<th>No.</th>
<th>Course Code</th>
<th>Course No.</th>
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Total: 71
Elective Courses: Students select 6 credit hours from the following courses:

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<td>CE</td>
<td>465</td>
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<td>GPS and GIS Applications</td>
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<td>CE</td>
<td>483</td>
<td>Traffic Engineering</td>
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<td>Flexible Pavement Maintenance</td>
<td>3</td>
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<td>CE 381, CE 341</td>
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<td>CE</td>
<td>497</td>
<td>Special Topics in Civil Engineering</td>
<td>3</td>
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<td>Chairman’s Approval</td>
</tr>
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</table>

Total 39

Course Descriptions:

**CE 201: Engineering Mechanics (Statics)**

**Prerequisites:** IE 200, PHYS 281

**CE 202: Strength of Materials**

**Prerequisites:** CE-201, MENG 130, MATH 203

**CE 321: Construction Management**
Characteristics of Construction Industry; project delivery systems; the design and construction process; construction contracting; construction planning; project control, conceptual cost estimation; and Quality and Safety Management.

**Prerequisites:** IE 225

**CE 332: Geology For Civil Engineers**
Introduction to engineering geology, earth surface and physical properties of earth materials, geological processes, types and classification of rocks, physical and Mineralogical properties of rocks, basics of structural geology, soil formation and properties, clay Minerals, groundwater.

**Prerequisites:** CE 202 CHEM 281

**CE 333: Geotechnical Engineering**

**Prerequisites:** CE 332, EE 251, IE 202

**CE 340: Structural Analysis I**

**Prerequisites:** CE 202, EE 201, MATH 205

**CE 341: Materials Of Construction**

**Prerequisites:** CE 202 CHEM 281

**CE 342: Reinforced Concrete Design I**

**Prerequisites:** CE 340, CE 341, IE 202

**CE 352: Hydraulics**

**Prerequisites:** MEP 290, IE 202, MATH 204

**CE 353: Hydrology and Water Resources Engineering**
Dams and Spillways. Conjunctive use of surface and groundwater. Planning for water resources development. Economical analysis of water resources projects.

**Prerequisites:**

CE 352

**CE 371: Surveying**

Introduction to the basic surveying theory and practice; Units of measurements and conversions; Error analysis; Distance measurements by taping; Leveling; Angle measurements; Traversing and traverse computations; Topographic surveying and mapping; Area and volume computations; Circular curves; Use of surveying software such as Wolfpack and Surfer.

**Prerequisites:**

MATH 202, MENG 102

**CE 381: Transportation Engineering**

Transportation as a system; human and vehicle characteristics; traffic flow characteristics; highway capacity analysis; highway control devices; public transportation; urban transportation planning; parking facilities; transportation safety; intelligent transportation system and computer applications; introduction to railway, waterway, airport and pipeline.

**Prerequisites:**

CE 371, ARAB 201

**CE 401: Civil Engineering Fundamentals**

The course is designed to review the basic fundamentals of civil engineering. The students will be exposed to the different fields of Civil Engineering.

**Prerequisites:**

CE 321, CE 333, CE 342, CE 352, CE 381

**CE 400: Cooperative Work (26 Weeks)**

Types, selection, utilization, and unit cost of construction equipment regarding soil compaction and stabilization, excavation and earthmoving operations. Formwork design. Detailed cost estimation for civil works. Project control.

**Prerequisites:**

ISLS 301, CE 321, CE 342

**CE 422: Construction Engineering**


**Prerequisites:**

CE 321

**CE 423: Construction Estimating and Scheduling**


**Prerequisites:**

CE 422

**CE 424: Construction Contracting**


**Prerequisites:**

CE 321

**CE 434: Foundation Engineering**


**Prerequisites:**

CE 333

**CE 435: Applications in Foundation Engineering**

Introduction to foundation engineering; purpose and classification of foundations; site exploration and foundation selection; loads and calculations of allowable pressures and settlements; foundations in variety of conditions; foundations on fill and improved ground; combined footings; slope stability; computer applications.

**Prerequisites:**

CE 344

**CE 439: Foundation Engineering**


**Prerequisites:**

CE 343

**CE 440: Structural Analysis II**


**Prerequisites:**

CE 202, EE 201, MATH 205

**CE 441: Design Of Steel Structures**


**Prerequisites:**

CE 340

**CE 442: Reinforced Concrete Design II**


**Prerequisites:**

CE 342

**CE 444: Advanced Reinforced Concrete Design**

Introduction to Pre-stressed Concrete, ACI provisions. Types of Pre-stressing Losses, Stresses, Deflection, Flexural and Shear Strengths of P.S.C. Retaining Walls, Types and Forces on R.W., etc.

Prerequisites: CE 342

CE 457: Water Resources Planning And Management
Course Descriptions: Introduction to planning and management principles; evaluation of alternatives by the principles of engineering economy; levels of planning; planning approach and planning environment; project formulation; project evaluation; Environmental considerations in planning; System analysis in water planning; multipurpose and multi objective projects.

Prerequisites: CE 353

CE 461: Environmental Engineering
In this course, the physical, chemical, mathematical and biological principles for defining, quantifying, and measuring environmental quality are described. Next, the processes by which nature assimilates waste material are described and the natural purification processes that form the bases of engineering systems are detailed. Finally, the engineering principles and practices involved in the design and operation of conventional environmental engineering works are covered at length.

Prerequisites: CE 352

CE 465: Wastewater Reclamation And Reuse
Potential reuse applications. Sources of water for reuse. Treatment technologies suitable for water reuse applications. Criteria for each type of reuse application. The overall procedures for determining the feasibility and planning of water reuse systems as well as the management structure of reuse projects. The management of the biosolids resulting from the treatment of wastewater and related regulations governing their use and disposal. Each student has to prepare and work on a mini-research/project throughout the course and present it at the end of the course.

Prerequisites: CE 461

CE 471: GPS and GIS Application
Introduction to the basic for GPS and GIS applications; Geodesy: introduction, the ellipsoid and geoids, geodetic position, geoids undulation, deflection of the vertical, geodetic coordinate system; Map Projection: projections used in state plane coordinate systems, UTM projection; GPS: overview of GPS, differential GPS, GPS static survey, GPS kinematic survey; GIS: introduction to GIS, GIS data sources and data format, creating GIS databases, GIS applications, use of surveying software such as GeoMedia and Leica Geo Office.

Prerequisites: CE 371

CE 482: Highway Design And Construction
Characteristics of driver, pedestrian vehicle, and traffic flow affecting highway design; geometric design of highways; layouts of intersections, interchanges and terminals; highway drainage; review of highway paving materials; design of asphalt paving mixtures; pavement design; highway construction and supervision; categorize common pavement surface distress and associated correction activates; introduction to maintenance management system; computer applications on highway geometric design.

Prerequisites: CE 341, CE 381

CE 483: Traffic Engineering
Traffic Engineering studies and measurement; traffic flow theory and queuing theory; highway capacity analysis; parking analysis and layout design; traffic signs, marking and channelization; signalized intersection design and operation; roundabout design and management; ITS applications in traffic engineering; computer application in traffic engineering.

Prerequisites: CE 381

CE 486: Flexible Pavement Maintenance
Essential terminologies and concepts of preserving existing highway asphalt pavements; characterizing flexible pavement distresses and identifying possible cause of distresses; relating pavement distress types and distress severity to cost-effective repair alternatives; simple procedure to inventory pavement conditions and select maintenance methods.

Prerequisites: CE 381, CE 341

CE 499: Senior Project
Team-work on a civil engineering capstone design project involving comprehensive design experience; exposure to professional practice with practitioner involvement. Preparation of the project report and its presentation.

Prerequisites: CE 321, CE 333, CE 342, CE 352, CE 382

---

**Faculty Members**

**Professors**

Abdullah M. Mohorjy  
Environmental Impact- Assessment  
1987 Colorado State University, USA  
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Structures, Concrete Durability, Healing of Cracks in Concrete  
2004 Imperial College, University of London, UK

### Associate Professors

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### Assistant Professors

**Adel S. El-Komy**  
Surveying Photogrammetry  
1996 Cairo University, Egypt

**Ahmed M. Banafa**  
Value Engineering Probabilistic Approach in Construction  
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Deep Foundations Carbonate Soils Rock, Properties Geo Environment, Soil Mechanics  
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**Abdul Wahab M. Zughaihi**  
Construction Engineering and Management  
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Structures, Expert Systems, Concrete in Fire, Structural Design for Fire Safety  
2001 Aston University, UK

**Maged H. Hussein**  
Specialization Water Resources Environmental Engineering  
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**Mohammed K. Basalama**  
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**Mohamed S. Alama**  
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**Walid H. Ahmed Khishefati**  
Structures, Concrete Durability, Healing of Cracks in Concrete  
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### Lecturers

**Abdulaziz Al-Mohammadi**  
Structures  
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**Ali A. Al-Turki**  
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**Ameen S. Hamdi**  
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2007 King AbdulAziz University, Saudi Arabia  
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**El Siddig A. El Zein**  
Hydraulic Engineering  
1990 International Institute for Hydraulic and Environmental Engineering, Netherlands
The Department of Electrical and Computer Engineering awards the B.Sc. degree in each of the following specializations:

- Electrical Power and Machines Engineering
- Electronics and Communications Engineering
- Computer Engineering
- Biomedical Engineering

**Mission:**

The Mission of the Department of Electrical and Computer Engineering (ECE) is to provide high quality education to students that enable them to enhance services to the community through their professional, technical, managerial, communication, team-work, and research competencies in accordance with Islamic teachings.

**Departmental Requirements:**

Students are required to complete 155 credit hours distributed as follows:

- University requirements 41 credit hours
- Faculty requirements 37 credit hours
- Department requirements 77 credit hours

### Department Core Courses: (35 Credit Hours)

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<th>No.</th>
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**Total 32**

### Sub major Requirements: 1a Specialization of Power and Machines Requirements, Compulsory Courses

<table>
<thead>
<tr>
<th>No.</th>
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<th>Course No.</th>
<th>Course Title</th>
<th>Credit</th>
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<td>Switchgear and Protection of Power System I</td>
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**Total 39**
## Specialization of Power and Machines Engineering Requirements, Elective Courses

Students select 2 courses (6 credit hours) out of those in the Table below.

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<tr>
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<th>Course Code</th>
<th>Course No.</th>
<th>Course Title</th>
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**Total 63**

### Elective Courses

Electives (9 Cr. Hrs. for Regular Stream and 3 Cr. Hrs. for Coop Stream) Credit Hours 8

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**Total 36**
### Faculty of ENGINEERING

#### Department of Electrical and Computer Engineering

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**Total** 59

### 3a: Specialization of Computer Engineering Requirements Department Core Courses Credit Hours 36

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**Total** 36

### 3b: Specialization of Computer Engineering Requirements, Elective Courses, Students select 3 courses (9 credit hours) out of those in the Table below.

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**Total** 53
### 4a. Specialization of Biomedical Engineering Requirements, Compulsory Courses

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### 4b. Specialization of Biomedical Engineering Requirements, Elective Courses

Students select 3 courses (9 credit hours) out of those in the Table below.

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<td>Any Course offered by the Department, faculty or</td>
<td>2 or 3 or 4</td>
<td></td>
<td></td>
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<td>Approval of ECE Department</td>
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</table>

**Total**: 51

**Course Descriptions:**

**EE 201: Structured Computer Programming**


**Prerequisites:**

MATH 110, CPIT 100

**EE 250: Basic Electrical Circuits**


**Prerequisites:**

EE 201

**EE 202: Object-Oriented Computer Programming**

Object-oriented programming: classes, objects, and methods. Object-oriented design. Simple data structures. Best programming practices (structured coding, documentation, testing and debugging).

**Prerequisites:**

MATH 110, CPIT 100

**EE 251: Basic Electrical Engineering**

Elementary circuit analysis. Diode and op-amp circuits. Motors, generators and transformers. High-voltage equipment. Power...
EE 303: Electrical Circuits And Systems

Prerequisites: MATH 203

EE 301: Electrical Circuits And Systems

Prerequisites: EE 202, MATH 204, IE 202

EE 300: Analytical Methods in Engineering

Prerequisites: MATH 203

EE 302: Electromagnetic Fields

Prerequisites: EE 250, MATH 205

EE 303: Electrical Measurements and Instrumentation
Fundamental Measurement Concepts, Generalized measurement system, errors in measurements, characteristics of measuring instruments statistical analysis of errors. Oscilloscopes, analog AC and DC instruments, measurement of power, DC and AC bridges, transducers, fundamental of electronic instruments, attenuators, converters, peak and average detectors. RMS detectors. digital instruments, digital display units, digital voltmeter.

Prerequisites: EE 250, MATH 205

EE 305: Discrete Mathematics and their Applications

Prerequisites: EE 202, MATH 204, IE 202

EE 306: Electrical Engineering Technologies
Electrical engineering fields of activities. Sources of electrical energy: power supplies, batteries, generators and alternative power sources. Distribution and utilization of electrical energy, commu-tators and protection devices. Conversion of electrical energy; sensors and actuators. Electrical safety. Principles of electrical and electronic measurements and instruments-tation, standards and calibration. Sources of measure-ment errors, and analysis of measured data. This is the components.

Prerequisites: STAT 110, EE 250

EE 311: Electronics I
Conduction in metals and semiconductors, P-N junctions, diode circuits. Field-effect and junction transistors. Low frequency equivalent circuits. Basic amplifiers.

Prerequisites: EE 250

EE 312: Electronics II

Prerequisites: EE 311

EE 321: Introduction to Communications
Fourier Signal Analysis. Linear Modulation: AM, DSBSC, SSB, Frequency Conversion, generation and detection. FDM, Exponential Modulation: FM, PM, NBFM, WBFM. Pulse Modulation, Sampling Theorem, PAM, PDM, PCM, TDM., Digital Multiplex ASK, PSK and FSK.

Prerequisites: EE 301

EE 331: Principles of Automatic Control
Introduction to control systems with examples from different fields. Transfer functions and block diagram algebra. Stability analysis (Routh-Hurwitz and Nyquist). Design of Control Systems using Bode diagrams and root locus techniques.

Prerequisites: MATH 204, EE 300, EE 301

EE 332: Computational Methods in Engineering

Prerequisites: EE 201, MATH 204

EE 341: Electromechanical Energy Conversion I

Prerequisites: EE 250

EE 351: Electrical Power Systems I

Prerequisites: EE 250

EE 352: Electrical Machines and Electronics

Prerequisites: EE 251
EE 360: Digital Design I
Prerequisites: EE 250

EE 361: Digital Computer Organization
Prerequisites: STAT 110, EE 360

EE 364: Advanced Programming
Structured programming concepts and control structure. Systematic program design. Modularization and scope concepts. Use of a variety of data structures and programming techniques. Iteration and recursion. Memory management. Program correctness, informal verification and testing.
Prerequisites: EE 202

EE 366: Microprocessor and Microcontrollers
This is an introductory course in designing microcontroller-based systems. Topics include an overview of a single-chip microcontroller, hardware and software concepts in microcomputers, system architecture, central processing unit (CPU), internal memory (ROM, EEPROM, RAM, FLASH), input/output ports, serial communication, programmable interrupts and timers, microcontroller programming model and instruction set, assembly language programming.
Prerequisites: EE 202, EE 360

EE 367: Data Structures and Algorithms
Basic concepts of data and their representations inside a computer (scalar, structured and dynamic). Manipulation of arrays, strings, stacks, queues, linear lists, circular lists, orthogonal lists, trees and graphs. Sorting and searching algorithms. File organization and file access methods.
Prerequisites: EE 305, EE 364

EE 370: Biomedical Engineering Primer
Biomedical engineering fields of activity. Research, development, and design for biomedical problems, diagnosis of disease, and therapeutic applications. Modular blocks and system integration. Physical, chemical and biological principles for biomedical measurements. Sensors for displacement, force, pressure, flow, temperature, biopotentials, chemical composition of body fluids and biomaterial characterization. Patient safety.
Prerequisites: BIO 321, EE 306

EE 372: Physiology For Biomedical Engineers
Biomedical Body environment, fluids and compartments, digestive system. Metabolism, energetics of glucose metabolism. Respiratory system and artificial respiration. Cardiovascular system and its regulatory mechanism, hemodynamics. Metabolism and body temperature regulation. Endocrinology, reproductive system and renal physiology.
Prerequisites: BIO 321

EE 374: Experimentation and Data Analysis in Health Care
Descriptive statistics; elementary probability; discrete and continuous random variables and their distributions; hypothesis testing involving continuous and categorical (nominal and ordinal) variables, two and more treatments; linear regression; analysis of survival data. Design of clinical trials; sample size and selection of samples; selection and preparation of apparatus and preparing experimental protocols. Clinical standards for data collection, organization, summarization and verification; medical sample handling, transporting and disposal; sterilization, cleansing and hygiene. Applications of essential statistical techniques for use in analyzing data from different types of engineering experiments, biological experiments and clinical studies. Term project.
Prerequisites: BIO 321, STAT 110

EE 390: Summer Training
10 weeks of training in industry under the supervision of a faculty member. Students have to submit a report about their achievements during training in addition to any other requirements as assigned by the department.
Prerequisites: EE 321, EE 361

EE 400: Cooperative Work (26 weeks)
Extensive 26 weeks of training in industry under the supervision of a staff member. Students should submit a final report about their training in addition to any other requirements as assigned by the department.
Prerequisites: EE 321, EE 366

EE 403: Power System Instrumentation and Measurements
Prerequisites: EE 303

EE 404: Power Systems Lab
This lab consists of the following experiments: Thyristor gate control circuit, Single phase half-wave ac/dc with resistor and inductive loads, Single phase full-wave ac/dc with resistor and inductive loads, Three phase full-wave and half-wave ac/dc with inductive load and Single phase ac voltage controllers.
Prerequisites: EE 351

EE 405: Machines Lab
Prerequisites: EE 341

EE 410: Advanced Electromagnetics
Prerequisites: EE 423
**EE 411: Digital Electronics**  
**Prerequisites:** EE 311, EE 360

**EE 412: Integrated Circuits**  
**Prerequisites:** EE 312

**EE 413: Communication Circuits**  
Behavior of Transistors at high frequencies. Analysis and design of electronic circuits employed in electronic and communication systems.  
**Prerequisites:** EE 312, EE 321

**EE 414: Computer-Aided Analysis and Design of Electronic Circuits**  
**Prerequisites:** EE 312

**EE 415: Measurements and Electronic Instruments**  
**Prerequisites:** EE 413, EE 423, IE 331

**EE 416: Quantum and Optical Electronics**  
Fundamentals of quantum theory, Band theory of solids, Approximation methods, statistical and, thermodynamics approaches, semi conducting and optical properties of solids and applications.  
**Prerequisites:** EE 312

**EE 417: Avionics**  
Aircraft radio systems, aircraft navigation systems, flight control systems, Avionics test equipment.  
**Prerequisites:** EE 312

**EE 418: Microwave and Optical Devices**  
**Prerequisites:** EE 312, EE 423

**EE 419: VLSI Layout**  
**Prerequisites:** EE 312

**EE 420: Microwave Circuits**  
Analysis and applications of transmission lines. Filters, DC blockage. Couplers, mixers, radiators.  
**Prerequisites:** EE 423

**EE 421: Communication Theory I**  
**Prerequisites:** EE 321, IE 331

**EE 422: Satellite Communications**  
**Prerequisites:** EE 421, EE 423

**EE 423: Electromagnetic Waves**  
**Prerequisites:** EE 302, MATH 204

**EE 424: Antennas and Propagation**  
**Prerequisites:** EE 423, EE 312

**EE 425: Communication Systems**  
**Prerequisites:** EE 421, EE 423

**EE 426: Digital Communications**  
Sampling theorem. PCM. Data compression and quantization

**Prerequisites:** EE 421

**EE 427: Communication Theory II**

**Prerequisites:** EE 421

**EE 428: Radar Systems And Applications**

**Prerequisites:** EE 413, EE 424

**EE 429: Digital Signal Processing**

**Prerequisites:** EE 321

**EE 431: Advanced Control Systems**
State space representation and realization, controllability and observability. Liapunov and popov stability criteria, stochastic and sampled data control theory, optimal control theory.

**Prerequisites:** EE 331

**EE 433: Introduction to Robotics**

**Prerequisites:** EE 331

**EE 440: Power System Transients**

**Prerequisites:** EE 341, EE 351

**EE 441: Electromechanical Energy Conversion II**

**Prerequisites:** EE 341, EE 351

**EE 442: Power Electronics I**

**Prerequisites:** EE 311

**EE 443: Electromechanical Energy Conversion III**

**Prerequisites:** EE 441

**EE 444: Power Electronics II**

**Prerequisites:** EE 442

**EE 445: Utilization Of Electrical Energy**

**Prerequisites:** EE 341, EE 351

**EE 446: HV and EHV AC Transmission Systems**

**Prerequisites:** EE 351

**EE 447: High Voltage Direct Current (HVDC) Systems**

**Prerequisites:** EE 351

**EE 448: Power System Planning and Reliability**

**Prerequisites:** IE 331, EE 351

**EE 449: Power System Stability**

**Prerequisites:** EE 451

**EE 450: Power System Control**
Power factor Control, Automatic generation control, Load-frequency Control, Economic dispatch, Unit Commitment, reactive power control, Potential Instability and Breakdown, Reactive power distribution.

**Prerequisites:** EE 331, EE 441 (Concurrent)

**EE 451: Electrical Power Systems II**
Load Flow Analysis, Solution of Load Flow Equations, Gauss-Seidel and Newton Raphson Techniques, Asymmetrical Faults, Phase Sequence Networks, Use of Matrix Methods. Power Sys-
EE 459: Electric Power Distribution
Prerequisites: EE 451, EE 453

EE 460: Digital Design II
Prerequisites: EE 360

EE 461: Microprocessors and Microcomputers
Prerequisites: EE 460

EE 462: Computer Communication Networks
Prerequisites: EE 321

EE 463: Operating Systems
Prerequisites: EE 361, EE 367

EE 464: Structure of Programming Languages
Prerequisites: EE 361, EE 367

EE 465: Computer Applications in Biomedical Engineering
The concept of microcomputer and micro computing. Its impact, utility, and application areas. Simplified architecture and technology of microcomputer hardware and software. Design and implementa- tion of various functions on the chip level, Microcomputers as controllers. Various application examples in the form of practical term projects. (Open to non-computer option students only).
Prerequisites: EE 366

EE 466: Computer Interfacing
Basics of data transfer (Serial and parallel modes, 110 transfer initiation using polling and interrupt schemes, Standard busses). Interface components and their characteristics (Drivers, receiv-
Department of
Electrical and Computer Engineering

Prerequisites: EE 366

EE 467: Databases
The need for the database approach. Storage structures. Basic data structures (relational, hierarchical, and network approaches). The network approach (Architecture of the DBTG system, Set constructs, external level of DBTG, data manipulation commands). The hierarchical approach (IMS data structure, external and internal levels, data manipulation). The Relational approach (relational algebra and calculus. Query-by-example).
Prerequisites: EE 367, EE 463

EE 468: Systems Programming
Prerequisites: EE 361, EE 367

EE 469: Compiler Construction
Prerequisites: EE 367

EE 470: Biomedical Signals and Systems
Prerequisites: EE253,EE370,EE202

EE 471: Biomedical Instrumentation
Prerequisites: EE 312, EE 370, EE 372

EE 472: Biomedical Imaging Systems
Fundamentals of medical imaging physics and systems: X-ray radiography, ultrasound, radionuclide imaging, and magnetic resonance imaging (MRI). Biological effects of each modality. Tomographical reconstruction principles, including X-ray computed tomography (CT), position emission tomography (PET), and single-photon emission computed tomography (SPECT). Use of existing equipment. Basic troubleshooting principles. Retrieving information from manufacturer’s catalogs and technical libraries.
Prerequisites: EE 470

EE 473: Introduction to Therapeutic and Prosthetic Devices
Prerequisites: EE 470

EE 474: Safety, Reliability and Maintenance in Health Care Facilities
Prerequisites: EE 370, IE 331

EE 476: Biomedical Systems Management
Prerequisites: IE 256, EE 370

EE 479: Genetic Engineering and Health Diagnostics
Prerequisites: EE 370

EE 481: Computer Graphics
Prerequisites: EE 364, EE 367

EE 482: Introduction to Artificial Intelligence
Prerequisites: EE 367

EE 483: Advanced Computer Architecture and Modern Peripherals
Survey of hardware description languages, Concepts of parallel processing, and super computer architectures. Study of modern peripherals like optical storage, bubble memories and laser printers.
Prerequisites: EE 361

EE 484: VLSI Design
Theory and design of computational/computer systems with

**Prerequisites:**
- EE 460, EE 411

**EE 488: Formal Languages and Automata Theory**

**Prerequisites:**
- EE 305, EE 367

**EE 490: Special Topics in Electrical Engineering**
Selected topic to develop skills and knowledge in a given field.

**Prerequisites:**
- EE 321, EE 331, IE 331

**EE 491: Special Topics in Electrical Power Engineering**
Selected topic to develop skills and knowledge in a given field.

**Prerequisites:**
- EE 451 (Dept. Approval)

**EE 492: Special Topics in Electrical Machines**
Selected topic to develop skills and knowledge in a given field.

**Prerequisites:**
- EE 441

**EE 493: Special Topics in Electronics**
Selected topic to develop skills and knowledge in a given field.

**Prerequisites:**
- EE 321

**EE 494: Special Topics in Communications**
Selected topic to develop skills and knowledge in a given field.

**Prerequisites:**
- EE 321

**EE 495: Special Topics in Computer Engineering**
Selected topic to develop skills and knowledge in a given field.

**Prerequisites:**
- EE 331, IE 331

**EE 496: Special Topics in Automatic Control**
Selected topic to develop skills and knowledge in a given field.

**Prerequisites:**
- EE 331, IE 331

**EE 497: Special Topics in Biomedical Engineering**
Selected topic to develop skills and knowledge in a given field.

**Prerequisites:**
- EE 370

**EE 499: Senior Project**
Selection of topic: literature review; project design planning for data collection, and experimental work. Data processing analysis and results. Preparation of the first draft of final report. Presentation of the project.

**Prerequisites:**
- EE 321, EE 366

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**Faculty Members**

**Professors**

Ali H. Bamani
Automatic Control
1985 University of Colorado, USA
abamani@kau.edu.sa

Ali M. Rushdi
Computer & Control Engineering, Reliability, Electromagnetic Communications
1980 University of Illinois, USA
arushdi@kau.edu.sa

Adnan M. Affandi
Electronics and Communications, Local Area Networks.
1982 Kent University, UK
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Anwar H. Mufti
High Voltage
1987 Salford, UK

Khalid A. Al-Nabulsi
Electronics, Communications & Electromagnetics
1984 Arizona University, USA
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Rabah W. Al-Dhaheri
Digital Communication & Digital Signal Processing
1988 Michigan State University, USA
rdhaheri@kau.edu.sa

Abdul Rahmen H. Al-Masood
Power Systems; Protection
1992 Strathclyde University, UK
amasood@kau.edu.sa

Bahattin M. Karagozoglu
Biomedical Eng. 1977
Strathclyde University, Glasgow, UK
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Sulaiman F. Mahdi
Electronics & Communications
1969 University of Michigan, USA
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Mohammad S. Al-Alfi
Control Systems
1988 Color. State University, Fort Collins, USA
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Ahmed A. Adas
Computer Eng.
1982 Colorado University of Salford, USA
aladhas@kau.edu.sa

Abdul-Aziz M. Jalal
Power System Control
1993 Toledo University, USA

Abdul-aiziz U. Al-Abdulaziz
Electrical Power Systems
1985 UMIST, Manchester, UK
authman@kau.edu.sa

Associate Professors
Assistant Professors

- **Ahmed S. Abdulwhab**
  Power Systems Reliability
  2003 University of Saskatchewan, Canada

- **Abdullah S. Balamesh**
  Modeling & Performance Evaluation of Computer Networks
  University of Arizona Tuscon, USA

- **Abdullah M. Dubaie**
  Communications
  1995 Colorado S. University, USA

- **Abdul Muti Y. Al-Zehary**
  Biomedical Eng.
  1992 University of St. Andrews, UK

- **Abdulahameed F. Al-Khateeb**
  Biomedical Eng.
  1997 University of Pennslyvania, USA

- **Abdulaghani M. Al-Qassimi**
  Computer Engineering.
  1988 Colorado S. University, USA

- **Abdul-Hay A. Youssef**
  Computer Eng.
  1988 Al-Azher University, Egypt

- **Ahmed Saber**
  Power System Optimization
  2007 University of the Ryukyus, Japan

- **Ahmed S. Balamesh**
  Electronics & Communications
  1995 University of Michigan, USA

- **Alaa M. Gouda**
  Electronics Computer Eng.
  2005 Cairo University, Egypt

- **Ali H. Morfeg**
  Computer Eng.
  1990 University of Colorado, USA

- **Amjed F. Hajjar**
  VLSI Design
  2002 Colorado S. University, USA

- **Ghazi M. Al-Rawi**
  Computer Engineering
  2003 Stanford University, USA

- **Haitham M. Al-angari**
  EE, Biomedical
  2005 Northwestern University

- **Mohammad Awedh**
  Computer Engineering
  Formal & Hardware System
  University of Colorado, USA

- **Mohamed M. El-Hindawi**
  Power Electronics
  1981 Cairo University, Egypt

- **Mohamed A. Al-Shenkiti**
  VLSI Graph Theory & Network Theory
  1994 University of Illinois, USA

- **Muhammad S. Shaikh**
  Computer Engineering
  2002 Muroran Inst. of Tech. Japan

- **Muntasir M. Sheikh**
  ElectronicsandCommunicationsEng.
  1999 University of Arizona, USA

- **Mustafa A. Jiffry**
  ConcurrencyandLanguageCompiling
  2000 London University, UK

- **Ramzy R. Obaid**
  Power Electronics
  2003 Georgia Institute of Tech , USA

Lecturers

- **Adnan H. Kaki**
  Computer Eng.
  1979 Oklahoma State University, USA

- **Umit M. Tas**
  Computer Engineering
  2002 Mersin University, Turkey

- **Waddah H. Fatani**
  Computer Science
  1981 Miami University, USA
**Department Contact:**

Chairman’s Office  
Tel : 6952186  Fax : 6952179 Ext. 68139  
Email : ene-le@kau.edu.sa  
Web Site : http://ie.kau.edu.sa/

**History:**  
The Department of Industrial Engineering was established in 1975.

**Vision:**  
To be a leader in Industrial Engineering education, community services and research.

**Mission:**  
To prepare Industrial Engineering graduates equipped with the world-class professional competencies capable of conducting scientific research and rendering community services allowing for a sustainable development.

**Departmental Requirements:**  
Students are required to complete 155 credit hours distributed as follows:  
- University requirements 41 credit hours  
- Faculty requirements 37 credit hours  
- Department requirements 77 credit hours

**Department Core Courses: Credit Hours (65 Credit Hours)**

<table>
<thead>
<tr>
<th>No.</th>
<th>Course Code</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<td>Linear Algebra</td>
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<td>MENG 130</td>
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<td>Operations Research I</td>
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<td>Fundamentals of Computer Systems</td>
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<td>Computer Applications in Industrial Engineering I</td>
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<td>Computer Applications in Industrial Engineering II</td>
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<td>Senior Project</td>
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**Total**  
65
## Department Elective Courses

Students select 4 courses (12 credit hours) out of those in the Table below.

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<th>No.</th>
<th>Course Code:</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Credit</th>
<th>HOURS</th>
<th>Prerequisite</th>
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### Course Descriptions:

#### IE 200: Technical Communication Skills

Communication skills: art of listening, tools of in-depth reading, information gathering, analyzing, and criticizing; electronic means of communication. Writing skills: writing strategies, general versus technical writing, technical report writing. Presentation skills: use of spoken English, professional computer-based oral presentations. Project-based course work on technical communication.

**Prerequisites:**

- ELC 102

#### IE 201: Introduction to Engineering Design I

Introduction to active learning: team work, team dynamics, team norms and communication, conducting effective meetings and quality assessment. Problem solving procedure: problem definition, generation of solutions, selection methodology, solution implementation, assessment of implementation. Levels of learning and degrees of internalization. Ethical decision. Organization of the work and design notebook. Reverse engineering and design projects.

**Prerequisites:**

- COMM 101, ELC 102

#### IE 202: Introduction to Engineering Design II

Engineering design process. Computer modeling and heuristics for solving problems, in teams, in the areas of comparison of strategies, trade-offs, decision making, stochastic processes, optimization and expert systems. Interpretation of results. Preparation of professional technical reports of engineering work and multimedia presentation.

**Prerequisites:**

- IE 200, IE 201

#### IE 255: Engineering Economy


**Prerequisites:**

- MATH 110

#### IE 256: Engineering Management

Role of engineers in management of organizations. Managerial functions related to production, inventory, and human resources. Project planning and control. Case studies pertaining to engineering problems.

**Prerequisites:**

- IE 202, IE 255

#### IE 311: Operations Research I


**Prerequisites:**

- MATH 241

#### IE 321: Fundamentals of Computer Systems

Fundamentals of computer: hardware, software and computer systems concepts. Introduction to operating systems and data processing. Overview of programming languages. Internet and computer security. Introduction to software packages for Industrial Engineering applications.

**Prerequisites:**

- EE 201
IE 322: Computer Applications in Industrial Engineering I
Basics of computer programming languages. Object oriented programming concepts. Development of application and appropriate algorithms for solving Industrial Engineering problems.
Prerequisites:
EE 251, IE 321

IE 323: Computer Applications in Industrial Engineering II
Introduction to computer applications, databases and relational database management systems. Design and development of databases. Management of database users and security. Introduction to front-end and its connectivity with the database.
Prerequisites:
IE 322

IE 331: Probability and Engineering Statistics
Prerequisites:
STAT 110, MATH 202

IE 332: Engineering Statistics
Prerequisites:
IE 331

IE 341: Work Study
Prerequisites:
IE 331

IE 342: Human Factors Engineering
Prerequisites:
IE 341

IE 351: Industrial Management
Prerequisites:
IE 256

IE 352: System Analysis and Design
Prerequisites:
MATH 204

IE 390: Summer Training
On-site industry based training spanning over a period of 10 weeks in a manufacturing or service industry under the supervision of an industry based advisor. Documentation of the training in the form of an Industrial Training report presenting details of the work undertaken. Multimedia presentation illustrating the achievements of training.
Prerequisites:
IE 422, IE 432

IE 400: Cooperative Program
Undertaking practical training for 26 weeks under supervision of an academic advisor and a company supervisor in a company performing industrial engineering activities. Submitting, as per schedule, three coop progress reports. Submitting a coop final report containing matters as specified in the cooperative education program document. Multimedia presentation of achieved work.
Prerequisites:
IE 422, IE 432

IE 411: Operations Research II
Non-linear programming. Dynamic programming. Inventory models. Waiting line models. Markov analysis. Introduction to Game theory. Applications in industrial, service and public systems.
Prerequisites:
IE 311, IE 332

IE: 412 Decision Analysis
Prerequisites:
IE 255, IE 331

IE 413: Network Analysis
Prerequisites:
IE 311, IE 331

IE 415: Project Management
Prerequisites:
IE 351
IE 421: Industrial Information Systems
General concepts. Values and attributes of information. Different types of information systems. Concepts of managerial information systems. Emphasis on analysis, design, and development of industrial information systems. Developing information systems by using microcomputers.
Prerequisites: IE 323

IE 422: Industrial Systems Simulation
Prerequisites: IE 322, IE 332

IE 423: Computer Aided Manufacturing Systems
Prerequisites: IE 321, MENG 130

IE 424: Data Processing Operations
Prerequisites: IE 323

IE 431: Industrial Quality Control
Prerequisites: IE 332

IE 432: Design of Industrial Experiments
Prerequisites: IE 332

IE 433: Reliability Engineering
Prerequisites: IE 332

IE 434: Industrial Stochastic Systems
Prerequisites: IE 331

IE 435: Queuing Systems
Prerequisites: IE 331

IE 436: Dynamic Forecasting
Prerequisites: IE 332

IE 441: Industrial Safety Engineering
Prerequisites: IE 342

IE 442: Industrial Hygiene Engineering
Prerequisites: IE 342

IE 443: Industrial Environmental Engineering
Prerequisites: IE 342

IE 444: Occupational Biomechanics
Prerequisites: IE 342
Financial feasibility: project selection, material, labor, equipment, knowhow, and shipping. Technical feasibility: site mix and scope. Marketing feasibility: present and future market analysis, pro-

IE 450: Marketing Management and Research
Study of marketing theory. Methods of marketing. Interrelation-
ship of the different phases of marketing strategies. Consumer
decision processes through behavioural sciences. Theories and
techniques of planning, analyzing and presenting market studies.
Methodologies of marketing research with emphasis on primary
research including questionnaire design.
Prerequisites: IE 351

IE 451: Production Planning and Control
Basic concepts of Production and Operations Management
(POM). Design of products and services. Processes and tech-
nologies. E-commerce and operations management. Inven-
tory management. Supply-Chain management. Just-in-time and
lean production. Forecasting. Material Requirements Planning
(MRP). Introduction to Enterprise Requirement Planning (ERP).
Capacity and Aggregate planning. Scheduling.
Prerequisites: IE 341, IE 351

IE 452: Maintenance and Replacement Policies
Maintenance systems. Maintenance operation and control. Pre-
vective Maintenance: concepts, modeling, and analysis. Main-
tenance planning and scheduling. Maintenance material control.
Computerized Maintenance Management Systems. Replace-
ment studies. Case studies.
Prerequisites: IE 332, IE 351

IE 453: Facilities Planning
Fundamentals of facilities planning. Facilities design. Flow,
space, and activity relationships. Material handling systems.
Layout planning models. Warehouse operations. Quantitative
facilities planning models. Preparing, presenting, implementing
and maintaining facilities plan.
Prerequisites: IE 342, IE 352

IE 454: Engineering Cost Analysis
Importance of cost analysis in engineering. Cost terms and con-
ccepts. Cost estimation for decision making: cost-volume-profit
analysis, measuring relevant costs and revenues, cost assign-
ment, and activity-based costing. Cost evaluation of engineering
alternatives. Case studies.
Prerequisites: IE 255

IE 455: Material Handling and Packaging
Historical development of material handling and packaging. Ob-
jectives and principles of material handling. Material handling
concepts: unit load, containerization, ASRS. Types of material
handling equipment and their economics. Role of packaging in
material handling. Areas of special importance to pack-aging.
Package design. Economics of packaging. Pack-age research
testing. Management of the packaging function.
Prerequisites: IE 255, IE 331

IE 456: Feasibility Studies
Introduction to feasibility studies: project identification, product
mix and scope. Marketing feasibility: present and future market
study, demand, pricing, and revenue. Technical feasibility: site
selection, material, labor, equipment, knowhow, and shipping.
Financial feasibility: project financing, production cost, break-
even analysis, profitability analysis Organizational and adminis-
trative feasibility: Organizational structure, governmental regu-
lations, safety and environmental standards, patents and human
relations. Reporting and presentation. Case studies.
Prerequisites: IE 255, IE 352

IE 457: Supply Chain Management
Introduction to Supply Chains (SC). Flow across SC of products,
information and revenue. SC operations: issues, opportunities, tools,
approaches, inter-corporate relationships, incentives and risk fac-
tors. SC design: customer service, quality, logistics, inventory, busi-
ness processes, system dynamics, control, design, and re-engineer-
ing. Integrated SC management: forecasting, global sourcing, and
virtual integration. Technology as an SC tool: internet technologies
and digital coordination of decisions and resources. Casestudies.
Prerequisites: IE 351, IE 451

IE 458: Strategic Management in Industry
Overview of operations strategy for competitive advantage.
Evaluation of a firm’s external environment using Porter Five
Forces Model. Evaluation of a firm’s internal capabilities
in the VRIO framework. Cost leadership versus product differen-
tiation strategies. Vertical integration and corporate diversifica-
tion. Strategic alliances, mergers and acquisitions. Real life ex-
amples and case studies from industry.
Prerequisites: IE 351

IE 459: Introduction to Entrepreneurship
Basic framework for understanding the process of entrepreneurship,
principles of management and related techniques in decision making,
planning, marketing, and financial control. Exercises in product design
and prototype development, preparation of workable project feasibility
reports, practical ideas about launching private enterprises. Classroom
lectures are combined with field study and exercises supplemented with
guest lectures and case studies on small and medium scale industries.
Prerequisites: IE 351

IE 460: Special Topics in Industrial Engineering
An in-depth study of relevant industrial engineering topics not
covered in other courses of the program in order to enhance their
knowledge in the field of industrial engineering.
Prerequisites: Departmental Approval

IE 461: Industrial Engineering Practice
Overview of all areas of Industrial Engineering (IE). Identification
of specific IE tools for industrial and business enterprises. Brainstorm-
ing sessions of several pre selected industrial and business enterpris-
es. Visiting the sites and conducting walk-through surveys. On-site
studies of IE applications and practices. Preparation of visit-reports
containing findings, comments and recommendations pertaining to
each visit. Multimedia-based presentation of visit-reports.
Prerequisites: Departmental Approval

IE 499: Senior Project
Technical writing skills. Project work: a team-based capstone de-
sign work involving a practical, open ended, real life unstructured
problem having a set of alternative solutions; emphasis on synthe-
sis of knowledge and skills to assimilate and demonstrate pro-
fessional attitude and ethics in problem solving with assessment of
environmental, cultural and social impacts; final output in the form
of written report based on specified standard format, followed by a
multimedia presentation of the work undertaken in the project.
Prerequisites: IE 442, IE 432
### Department of Industrial Engineering

**Faculty Members**

<table>
<thead>
<tr>
<th><strong>Professors</strong></th>
<th><strong>Associate Professors</strong></th>
<th><strong>Assistant Professors</strong></th>
<th><strong>Lecturers</strong></th>
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</table>
| Madbuli H. Noweir  
Human Factors Eng & Eng. Management  
1964 Pittsburg University, USA | Md Rashidur Rotab Khan  
Industrial Engineering, Simulation Modeling, Quality Engineering  
1990 University of Leeds, UK | Ayman A. Hashem  
1999 Michigan University, USA | Imran I. Sheikh  
Operation Research, Engineering Management  
2000 Aligarh Muslim University, India |
| Mohammad S. Al-Jifry  
Operation Research, Human Resource Planning  
1983 Oklahoma State University, USA | Ibrahim A. Al-Darrab  
Eng. Econ. Sys. O.R. & Statistics  
1987 Stanford University, USA | Hani M. Aburas  
Simulation Modeling and Analysis  
2002 University of Central Florida, USA | Mohammad A. M. Zaytoon  
Industrial Engineering, Human Factors  
2007 Alexandria University, Egypt |
| | Ibrahim M. Jomoah  
Human Factors Eng. - Eng. Management, Ind. Safety and Hygiene  
1994 Miami University, USA | Manzoor H. Sheikh  
System Analysis and Design Cyber Security  
2001 Preston University, USA | Mohammad R. Maqbool  
Computer Sciences, Information Systems Finance  
2000 Preston University, USA |
| | | | Mohammad S. Ullah  
Computer Systems and Information Technology  
2004 Washington Intl. University, USA |
| | | | Wael S. A. Hussein  
Facility Layout, Genetic Algorithms, Operations Research  
2005 Zagazig University, Egypt |
| | | | Wajdi A. Wazzan  
Information Systems, Engineering Management, Human Factors  
2007 Central Florida, USA |
| | | | Waqar A. Gulzar  
Information Systems, Software Development  
2000 Preston University, USA |
| | | | Seraj Y. Abed  
1982 Iowa state University, USA |
| | | | Said Ali Hassan  
Information System Operations Research  
1981 Tech. National Institute, France |
| | | | Muhammad E. Ulhaque  
System Analysis and Design, Software Engineering Industrial Management  
1999 Preston University, USA |
| | | | Mohammad A. M. Zaytoon  
Industrial Engineering, Human Factors  
2007 Alexandria University, Egypt |
| | | | Zaid A. Khan  
Human Factors Engg. & Quality Control Application of ANN and Fuzzy Control  
2001 Jamia Millia Islamia, India |
| | | | Imran I. Sheikh  
Operation Research, Engineering Management  
2000 Aligarh Muslim University, India |
| | | | Hani M. Aburas  
Simulation Modeling and Analysis  
2002 University of Central Florida, USA |
| | | | Manzoor H. Sheikh  
System Analysis and Design Cyber Security  
2001 Preston University, USA |
| | | | Mohammad A. M. Zaytoon  
Industrial Engineering, Human Factors  
2007 Alexandria University, Egypt |
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Facility Layout, Genetic Algorithms, Operations Research  
2005 Zagazig University, Egypt |
| | | | Wajdi A. Wazzan  
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2007 Central Florida, USA |
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1999 Preston University, USA |
| | | | Mohammad A. M. Zaytoon  
Industrial Engineering, Human Factors  
2007 Alexandria University, Egypt |
| | | | Zaid A. Khan  
Human Factors Engg. & Quality Control Application of ANN and Fuzzy Control  
2001 Jamia Millia Islamia, India |
History:
The department of Mining Engineering was established in 1975.

Vision:
To be a leader in the field of Mining Engineering, applied research and community services.

Mission:
To prepare motivated and qualified mining engineers and promote research applied to exploitation of indigenous mineral resources so as to contribute to the national wealth of Saudi Arabia.

Departmental Requirements:
Students are required to complete 155 credit hours distributed as follows:
- University requirements 41 credit hours
- Faculty requirements 37 credit hours
- Department requirements 77 credit hours

Department Core Courses: Credit Hours (68 Credit Hours)

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Total 71
Course Descriptions:

Mine 300: Ore Deposit Characteristics

Prerequisites: EMR 201

Mine 301: Principles of Mining and Metallurgical Engineering
General introduction of ore extraction from earth crust: Importance of minerals, Past mining activities, present production, local ore deposits- Mineral exploration, ore reserve classifications, orebody delineation, and ore grades - Surface mining and u/g mining methods, mining equipment, and developed techniques - Drilling, ore extraction and haulage- Mine ventilation and safety- Mining terms- Stages of mine development, production planning- Ore upgrading, and environmental impact - Mineral processing, milling, smelting, refining and metals extraction. Computer applications in mining and metallurgy.

Prerequisites: MENG 102, EMR 201

Mine 302: Mining Field Practice

Prerequisites: EMR 201

Mine 303: Mining Operation Systems
Applications of mathematics to the solution of management, operations and engineering decision making problems in order to attain some predefined goal or optimum conditions. Using computer programs e.g., spreadsheets to solve common operations research problems. Solution techniques in operation research such as Linear Programming, network formulations, project scheduling and Monte Carlo simulation will be discussed in their relation to problems in the minerals industries.

Prerequisites: EMR 201

Mine 311: Rock Mechanics
Geological considerations; Physical properties of rocks; Engineering properties of rocks; Failure criteria of rock; Rock testing; Stress distribution around underground openings; Rock quality and design of rock supporting system; Principles of rock slopes; Computer applications in rock mechanics.

Prerequisites: Mine 300, CE 202

Mine 312: Drilling and Blasting in Mining

Prerequisites: MinE 301, MinE 311

Mine 321: Mine Planning
Design and planning of Mine operations with emphasis on design and planning of surface lay-outs. Main access entries and secondary development openings. Underground layouts, etc. Long and short-term planning. Project planning to extract Minerals. Project scheduling and systems analysis. Application of computer methods to Mine planning and scheduling.

Prerequisites: Mine 301

Mine 322: Surface Mining

Prerequisites: Mine 301

Mine 323: Mining Methods
Underground Mining Terms - Geological factors affecting Mining Methods - Prospecting & Exploration Stages - Development & Exploitation Stages - Drilling & Blasting of Underground Mine - Loading and Haulage Operations & equipment in Underground Mining - Types of Roof Mine Supports - Different Types of Underground Mining Methods - Selection of Suitable Mining Methods according to Geological and Ore Condition.

Prerequisites: Mine 301

Mine 330: Ore Transportation and Handling
A review of material and ore handling - Classification of mine plant and equipment - Design parameters and selection of ma-
Department of Mining Engineering

chines and other miscellaneous underground equipments - Design of haulage systems: locomotives, conveyors, elevators, trucks and fluid transport - Design of hoisting and rope haulage systems, including monorails and aerial ropeways - Applying computer-aided design programs.

**Prerequisites:** Mine 301

**Mine 331: Mine Plant Design (I)**
A review of applied mechanics principles. Classification of Mine plant and equipment. Design parameters and selection of drills, excavators, loaders, scrapers, LHD machines and other miscellaneous underground equipment. Design of hoisting and rope haulage systems, including monorails and aerial ropeways. Applying computer-aided design programs.

**Prerequisites:** Mine 301

**Mine 342: Mineral Processing (I)**

**Prerequisites:** CHEM 281, Mine 301

** Mine 390: Summer Training (10 Weeks)**
10 weeks of supervised hands-on work experience at a recognized firm in a capacity which ensures that the student applies his engineering knowledge and acquires professional experience in his field of study at KAU. The student is required to communicate, clearly and concisely, training details and gained experience both orally and in writing. The student is evaluated based on his abilities to perform professionally, demonstrate technical competence, work efficiently, and to remain business focused, quality oriented, and committed to personal professional development.

**Prerequisites:** Mine 301, Mine 322, Mine 323

** Mine 400: Cooperative Work Program**
Extensive 26 weeks of supervised hands-on work experience at a recognized firm in a capacity which ensures that the student applies his engineering knowledge and acquires professional experience in his field of study at KAU. The student is required to communicate, clearly and concisely, training details and gained experience both orally and in writing. The student is evaluated based on his abilities to perform professionally, demonstrate technical competence, work efficiently, and to remain business focused, quality oriented, and committed to personal professional development.

**Prerequisites:** Mine 301, Mine 322, Mine 323

** Mine 401: Mine Surveying**
Triangulation figures (design, measuring and correction), Introduction to mine surveying, Underground Traversing workings (design, measuring orientation connection and correction), Apply the theory of errors and probability in mine survey, Computer application in mine survey, application of mine survey in tunnels construction.

**Prerequisites:** Mine 301, CE 371

** Mine 402: Mining and Metallurgical Economics**
Minerals contributions to economic development - Economic minerals, resources, reserves, new supplies, research demands, consumption, recycling and depletion - Ore reserve estimation and grades; mineral sales prices projection and NSR - Concept of time value of money, interest rate, inflation, and cost indices - Estimating cost of mine development and ore production operation, and smelter schedule - Cashflow construction, time diagram, tax structure, and project viability - Spreadsheet computer applications - Introduction to sensitivity and statistical analysis and review initial feasibility reports.

**Prerequisites:** Mine 301

** Mine 403: Mine Laws and Management**

**Prerequisites:** Mine 301, IE 256

** Mine 404: Mine Data Analysis**

**Prerequisites:** MinE 301, IE 256

** Mine 405: Computer Application in Mining and Metallurgy**

**Prerequisites:** EE 201

** Mine 411: Rock Mechanics (II)**

**Prerequisites:** Mine 311

** Mine 412: Rock Blasting**
Fragmentation principles, Types of Explosives, Properties and characteristics of explosives, Blasting agents (Initiation devices and Safety fuse, Electric shot-firing and detonating cords, Primers & boosters), Blasting theory, Design of electrical blasting circuits, Blasting cuts design, Design of bench blasting, Design of round blasting, Practical usage of explosives (Blasting in quarries, Blasting in shaft, tunnels, Blasting in stop operations, Blasting in coal mines).

**Prerequisites:** CHEM 281, Phys 202
Department of Mining Engineering

Mine 421: Tunneling Engineering

Prerequisites: IE 256, MinE 401

Mine 422: Mine Ventilation and Safety

Prerequisites: EE 201

Mine 423: Mine Law, Planning and Management
Mine layout for surface and underground operations - Surface and underground accesses - Selection of a suitable mining method and equipment for a certain ore body - Pit and stope optimization performance - Plan and schedule mine development and production. Select a suitable mineral processing plant - Estimate capital operation cost and productivity - Use a mining software and spreadsheets for mine planning - Manage-ment structure of a modern mining industry - Co-ordination and control - Human relations - Principles of Operations research and its application in mining, using a computer software, PERT, CPM, and other determinis-tic methods. A review of current applicable mining regulations in the kingdom of Saudi Arabia.

Prerequisites: MEP 290, MinE 323, MATH 205

Mine 424: Mine Environment

Prerequisites: IE 256, MinE 401

Mine 425: Analysis of Mining and Metallurgical Data

Prerequisites: Min 301, Min 331

Mine 432: Method of Ore Analysis

Prerequisites: Chem 281

Mine 441: Applied Mineral Processing

Prerequisites: Mine 342

Mine 444: Principles of Metallurgy

Prerequisites: Mine 342

Mine 451: Extractive Metallurgy and Alloys Production
Extraction and production of iron ore by blast furnace, and direct reduction processes, - Batch and continuous steel –making - Extraction of non–ferrous metals, e.g. aluminum, copper, titanium, uranium and manganese. – Hydrometallurgy - Metals refining. Melting and solidification of metals - Design of some units and role of transport phenomena in metallurgical processes. Site and layout of metallurgical plants - Pollution control - Waste heat recovery - Production of alloys and alloys characterization- Computer application in metallurgical engineering.

Prerequisites: Mine 301,Mine 342

Mine 502: Powder Metallurgy
Introduction and historical background - Production and character-ization of metallic powders - Pressing technology - Sintering theory of metallic compacts and its application - Mechanical properties of sintering parts - Investigation and quality control of products - Properties and applications fields of some powder systems.

Prerequisites: CHEM 281

Mine 470: Special Topics in Mining
Selected topics in major to specialize in one of the Mining Engineering areas.

Prerequisites: Min 301
Mine 499 : Senior Project
The student is required to function in a multidisciplinary team to design a system, component, or process to meet desired needs within realistic constraints. A standard engineering design process is followed including the selection of a client defined problem, literature review, problem formulation (objectives, constraints, and evaluation criteria), generation of design alternatives, work plan, preliminary design of the selected alternative, design refinement, detailed design, design evaluation, and documentations. The student is required to communicate, clearly and concisely, the details of his design both orally and in writing in several stages during the design process including a final public presentation to a panel composed of several subject-related professionals.

Prerequisites: Mine 330, Mine 342

Professors

Mahmoud A. Darwish
Rock Blasting (Fragmentation) Mining Methods
1984 West Virginia University, USA

Mahmoud Aboushook
Rock Mechanics, Rock and Soil Engineering, Engineering Geology
1984 Polytechnique, France

Abbas A. Fadol
Mining Engineering, Mining Economics, Mine Project Planning, Spreadsheet Simulation
1991 University of Wisconsin-Madison, USA
afadol@kau.edu.sa

Mohammad N. Al-maghrabi
Mineral Processing, Rock Mechanics, Engineering Management
1994 Nottingham University, UK

Mohammad S. Aljuhani
Engineering (Planning and management), Surface Mining
1994 West Virginia University, USA
mjuhani@kau.edu.sa

Assistant Professors

Gamal S. Abdel Haffez
Mining Engineering, Mineral Processing, Mine Survey
2005 Assiut University, Egypt

Hussin A.M. Ahmed
Mining Engineering, Mineral Processing, Economics
2005 Wroclaw University, Poland

Salah A.E. Badr
Mining and Earth System Engineering
2004 Colorado University, USA

Lecturer

Hassan M. Meriky
Mining Engineering, Mine Ventilation, Environmental Safety
1990 University of Pittsburgh, USA
Department of Nuclear Engineering

Department Contact:
Chairman’s Office
Tel.: 6952185 Ext. 68130
Email: eng-ne@kau.edu.sa
Web Site: http://ne.kau.edu.sa/

History:
The Department of Nuclear Engineering was established in the year 1977 to meet the demands of Saudi Arabia for graduates in the fields of Radioisotope Applications and Health Physics.

Vision:
To be on the leading edge of technology, teaching and research in the fields of Nuclear Engineering, Engineering Medical Physics and Engineering Radiation Protection.

Mission:
To prepare eminent nuclear engineers, medical physicists, health physicists and faculty who are capable of serving the community and the government of Saudi Arabia to a level that meets international standards and the demands of the century.

Departmental Requirements:
Students are required to complete 155 credit hours distributed as follows:
- University requirements 41 credit hours
- Faculty requirements 37 credit hours
- Department requirements 77 credit hours

Department Study Plan:
Department Core Courses All Programs Credit Hours 25

<table>
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<tr>
<th>No.</th>
<th>Course Code:</th>
<th>Course No.</th>
<th>Course Title</th>
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Sub major Compulsory Courses: Credit hours 37

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<th>No.</th>
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### 2. Engineering Medical Physics Specialization: Credit hours 34

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<td>Technology of Radiation Equipments</td>
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**Total 37**

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### 3. Radiation Protection Engineering Specialization: Credit hours 37

<table>
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<tr>
<th>No.</th>
<th>Course Code</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Credit</th>
<th>HOURS</th>
<th>Prerequisite</th>
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<td>Theory</td>
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<td>Experimental Data Analysis</td>
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<td>Nuclear Electronics I</td>
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<td>4</td>
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<td>Introduction to Medical Physics</td>
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<td>Dosimetry</td>
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</table>

**Total 37**

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**Sub major Elective Courses:**

1. Nuclear Power Engineering Specialization: Students select 3 courses (9 credit hours) out of those in the Table below.
2. Engineering Medical Physics Specialization: Students select 4 courses (12 credit hours) out of those in the Table below.
3. Radiation Protection Engineering Specialization: Students select 3 courses (9 credit hours) out of those in the Table below.
## Course Descriptions:

### NE 300: Fundamentals of Nuclear Engineering Calculation
**Prerequisites:** MATH 204, MATH 205

### NE 301: Atomic and Nuclear Principles for Nuclear Engineers
**Prerequisites:** PHYS 202

### NE 302: Nuclear Engineering Fundamentals
**Prerequisites:** NE 301

### NE 303: Energy and the Environment
Renewable and non-renewable energy resources including oil, coal, nuclear, hydro, solar, wind, and geothermal. Utilization, services, production, consumption and geographical distribution of energy sources. Environmental and economic implications of energy production and utilization. Energy conservation and policies.  
**Prerequisites:** PHYS 102

### NE 304: Introduction to Nuclear Engineering
Application of radioactive decay equations, energy from fission and fuel burn up, radiation shielding, selection of nuclear materials for reactor cooling, moderation, and cladding, multiplication factor (k), neutron diffusion, criticality equation, rate of heat production and types of reactors.  
**Prerequisites:** NE 302

### NE 305: Special Topics in Nuclear Engineering (I)
Department Approval

### NE 306: Special Topics in Nuclear Engineering (II)
Department Approval

### NE 307: Experimental Data Analysis
Binomial distribution, Poisson distribution, normal distribution, linear and non-linear fitting, error distribution, Chi square test, F test, Statistical data processing. Application to radiation Protection and Medical Physics.  
**Prerequisites:** IE 331

### NE 311: Nuclear Reactor Analysis
**Prerequisites:** NE 300, NE 302

### NE 312: Nuclear Heat Transport
**Prerequisites:** NE 311, MEP 261

### NE 330: Nuclear Materials
**Prerequisites:** PHYS 102

### NE 340: Introduction to Nuclear Engineering
Application of radioactive decay equations, energy from fission and fuel burn up, radiation shielding, selection of nuclear materials for reactor cooling, moderation, and cladding, multiplication factor (k), neutron diffusion, criticality equation, rate of heat production and types of reactors.  
**Prerequisites:** NE 302

### NE 350: Special Topics in Nuclear Engineering (I)
Department Approval

### NE 351: Special Topics in Nuclear Engineering (II)
Department Approval
Department of Nuclear Engineering

NE 302: Computational Methods in Nuclear Engineering
Introduction to numerical methods commonly encountered in nuclear engineering calculations, finite differencing, explicit and implicit techniques, convergence and stability criteria. Application of the above techniques to one group diffusion equation, multi-group diffusion equation, coupled diffusion equation with delayed neutrons, heat conduction and convection, criti-cality search method. Generation of heterogeneous cross-sections.
Prerequisites:
NE 340, NE 451

NE 311: Medical Terminology
Prerequisites:
BIO 110

NE 372: Radiobiology
Physico-chemical aspects of interaction of ionizing radiation with the cell, Radiation effects on macromolecules, cellular radiation biology, radiobiology of tissues and organs, radiobiology as applied to radiation therapy, effects of radiation on the environment and man.
Prerequisites:
BIO 110, CHEM 281

NE 389: Practical Applications
Practical clinical rotation in hospitals to prepare students to be competent in their field.
Prerequisites:
NE 340, NE 451

NE 390: Summer Training (10 weeks)
Training is usually arranged at an industrial establishment under the supervision of a faculty member. Students have to submit a report regarding their achievements in addition to any other requirements as assigned by the department.
Prerequisites:
NE 340, NE 451

NE 402: Thermal Reactor Dynamics and Kinetics
Reactor kinetics, effect of delayed neutrons, reactor control by control rods and chemical shim methods, temperature effects on reactivity and fission products poisoning.
Prerequisites:
NE 311

NE 411: Nuclear Energy Conversion
Reactor coolant properties and core thermal design. Heavy water reactors and advanced reactor concepts. Emphasis is placed on the use of available computer codes.
Prerequisites:
NE 321

NE 422: Nuclear Power Planning & Project Implementation
Methods of long-range forecasting of power demand, calculations of cost of generation of electricity from nuclear and conventional power plants, selection of an optimum system expansion program, preparation of feasibility studies, bid documents and evaluation of bids, type of contracts and introduction to project management and use of available nuclear power planning computer codes.
Prerequisites:
NE 311
NE 423: Nuclear Reactor Safety
Safety criteria, probabilistic risk assessment, reactor accidents, engineering safety features, release and dispersal of radioactive materials and reactor licensing.
Prerequisites: NE 321, NE 411

NE 424: Thermo Nuclear Fusion Technology and Engineering
Fusion requirements, current fusion engineering and concepts. Plasma confinement and heating, materials, reactor control, plant construction and maintenance, fusion fuel production. Fusion-fission hybrid reactor, radiation sources in fusion plants and safety of nuclear fusion.
Prerequisites: MEP 261, NE 302

NE 425: Nuclear Power Plant Operation
A PC based nuclear power plant simulator is used to elucidate the basic principles behind the operation of nuclear power plants. Simulations include introduction to reactor start-up, shutdown, abnormal conditions and reactor accident scenarios.
Prerequisites: NE 321, NE 411

NE 427: Nuclear Reactor Design
Specifications of the principal parameters in reactor design. Use of computer codes to solve realistic design problems involving, criticality, fuel management, thermal hydraulics and shielding. Design and subsequent optimization of an entire system.
Prerequisites: NE 411, NE 421

NE 429: Nuclear Power Plant Instrumentation and Control
Elementary servomechanism, open and closed loop systems, automatic control of a reactor, reactor control mechanism, control rod drive mechanism, chemical shim control, nuclear power plant control. Current design of nuclear power plant protection systems. Instrumentations used in operating power plants, in-core instrumentations such as neutron flux measuring devices, temperature sensors, pressure measuring devices and flow meters.
Prerequisites: NE 340, NE 411

NE 440: Nuclear Electronics
Conduction in solids. Semi-conductor devices, pulse amplifiers, pulse height discriminators, digital storage and counting circuits, timing circuits, multi-channel pulse height analysis.
Prerequisites: NE 340, NE 431

NE 441: advanced Nuclear Radiation Measurements
Advanced radiation measuring equipment that includes: scintillation detectors, solid state detectors, neutron detectors and other types of detectors used for x-ray, gamma ray, neutron detection and spectrometry. Design of experiments; measurements of XRF, gamma rays and neutrons.
Prerequisites: NE 340, EE 311

NE 450: Radiation Shielding Design
Principles of radiation shielding design, attenuation of nuclear radiation, shield layout analysis and design, gamma ray, x-ray and neutron shielding, principles of reactor shielding and use of computers to solve shielding problems.
Prerequisites: NE 311, NE 351

NE 451: Radiation Protection II
Radiation protection guides such as ICRP, NCRP etc. Radiation safety criteria, Allowable Limit on Intake (ALI), Derived Air Concentration (DAC), Maximum Permissible Concentration (MPC). Health Physics instruments, diagnostic and therapeutic x-ray shielding, basic principles for external and internal radiation protection and radioactive waste management.
Prerequisites: NE 351

NE 452: Technology of Radiation Equipment
Production and characteristics of x-rays, diagnostic radiology, quality of an image, special radiographic techniques in diagnostic radiography. High energy machines in medical applications: linear accelerators, cyclotrons, neutron generators and betatrons.
Prerequisites: NE 340, NE 351

NE 453: Radiation for Diagnosis
In this course the student will know rules and regulations of Nuclear radiation (local & international), recommendations of International Atomic Energy Agency (IAEA), International Commission of Radiation Protection (ICRP), and other international recommendations. He will also learn how to compare between those recommendations and their application in medical, industrial and environmental fields.
Prerequisites: NE 451

NE 454: Environmentnal Radioactivity
Natural radioactivity: radionuclides in the earth, cosmogenic radioactivity, cosmic radiation, external and internal doses from natural radioactivity, and sources of man-made radioactivity contamination covering fallout, radiation accidents, and radioactive waste. Pathways of radionuclides from environment to man.
Prerequisites: NE 351

NE 455: Principles of Diagnostic MRI and Ultrasound
Prerequisites: NE 3 40, NE 452 , NE 474

NE 456: Operational Radiation Protection
Laboratory operation and good work practice, use of radiation survey meters, calibration, frequency of calibration. Radiation dose limits, limits of radionuclides in water in unrestricted areas, limits in sewerage, leakage and surface contamination limits, accessibility control, labeling, use of protection equipments, emergency procedures, low and intermediate waste managements.

NE 457: Low Level Radioactive Waste Management
Prerequisites: PHYS 102, BIO 321
Department of Nuclear Engineering

NE 458: Radiation Emergency Planning
Plans and simulations of a real emergency case, spilling of open sources, losing radioactive sources, safety of sources during fire, spreading of radioactive sources, and calibration of Radiation Protection related equipment. Visits to radiation facilities and reviewing their radiation protection rules and regulations and emergency plans. Calculation and assessment of doses following an accident, dealing with workers and public in emergency, reasonability of the workers in emergency, treating highly exposed people, emergency records.

Prerequisites: NE 451

NE 459: Radiation Dosimetry Using MCNP
Modeling and characterizing TLDs, ionization chambers, scintillation detectors and advanced radiotherapy detectors using MCNP. Comparison with experimental results.

Prerequisites: NE 451

NE 460: Radioisotope Application II
Advanced applications of radioisotopes in medicine, agriculture and industry. Irradiation technology, radiography with neutrons, x-ray fluorescence. Sterilization of medical equipment, food irradiation, irradiation of polymers to improve their characteristics.

Prerequisites: NE 451

NE 461: Industrial Radiography
Radiation and sources used in radio-therapy such as x-rays, gamma-rays and neutrons. Principles of radiography. x-ray films and intensifying screens. Structure of x-rays films and types. Intensifying screen types and structure and sensitometric properties of x-ray films. Radiographic Techniques. Other non-destructive methods as liquid penetrant, eddy current and ultrasound.

Prerequisites: NE 360

NE 462: Nuclear Techniques in NDT
Nuclear techniques in Radiography, neutron capture gamma-rays, neutron diffusion methods, transmitted gamma-ray and backscattering methods. Ultrasonic testing techniques: basic principles, generation of ultrasonic waves, properties of ultrasonic waves, methods and instruments for ultrasonic testing. Electrical techniques: Magnetography, Eddy current and potential drop. Other techniques: penetrating dye and acoustic emission methods.

Prerequisites: NE 340, NE 451

NE 463: Radioanalytical Techniques

Prerequisites: NE 340

NE 464: Prompt Gamma Applications in Well-logging
Principles of interaction of neutrons with matter, neutron and prompt gamma application in well-logging.

Prerequisites: NE 340

NE 466: Principles of Radiation Activation
The student will learn the principles of radiation starting from interaction of radiation with matter, prompt and delayed gamma, how to differentiate mathematical equations controlling radio activation. Some laboratory experiments.

Prerequisites: NE 340

NE 467: Radiochemistry
Chemical phenomenon in reactions and reactors, Chemical separation methods, Chemical aspect of nuclear energy, isotope exchanges and tracer’s application.

Prerequisites: NE 351

NE 468: Radiation Protection Calculation
Concepts for treatment of internal and external radiation hazards. Precautions against internal contamination and shielding against external radiation hazard. Critical organ and organ burden. Dose fractions to different organs from sources inside it as well as from other organs. Advanced concepts of dosimetry and dose fractions.

Prerequisites: NE 451

NE 470: Radiotherapy
Dose and exposure calculations, patient dose calculation, treatment plans and use of computer in radiotherapy, treatment by linear accelerator and sealed and open sources.

Prerequisites: NE 370, NE 371, NE 372

NE 471: Medical Imaging
Introduction to medical image processing and medical image quality. Medical imaging modalities based on ionizing radiation. Physical principles and components of X-ray Radiography. X-ray spectrum and factors that affect its shape. Physical principles and components of X-ray Computed Tomography. Mathematical algorithms used to reconstruct CT and Nuclear Medicine images: Center Slice Theorem, Radon Transform, Filter Back-projection and iterative reconstruction techniques. Introduction to medical imaging modalities based on non ionizing radiation; such as MRI and US Imaging.

Prerequisites: NE 341, NE 370, NE 371

NE 472: Nuclear Medicine
Production of radionuclide, radiopharmaceuticals, nuclear medicine instrumentsations ( NaI(TI) detector, well counter, Thyroid probe, dose calibrator, gamma camera, SPECT, and PET), quality control, clinical applications, internal radiation dosimetry, safe handling of radionuclides, and statistics of radiation counting.

Prerequisites: NE 370, NE 451

NE 473: Dosimetry
Radiation exposure, radiation absorbed dose, dose units, kinetic energy absorbed in unit mass, dose equivalent, Bragg-gray theory, measurement methods and detection by ionization chambers, proportional detectors and solid state detectors, Geiger tubes, TLD, calorimetric method, and scintillation detectors.

Prerequisites: NE 451, NE 470

NE 474: Medical Imaging II
Evaluation techniques of medical images using ROC analysis, Contrast Detail curve, Rose Model, MTF, NPS, and DQE. Medi-
cal imaging modalities based on non ionizing radiation. Physical principles and components of Magnetic Resonance Imaging. Intrinsically and Extrinsic parameters that affect the NMR and the MRI signal. Fundamental MRI pulse sequences. MRI gradient and image formation. Factors that affect MR image quality. Mathematical formulation, physical principles and components of Ultrasound Imaging. Advanced applications of X-ray Radiography; such as Mammography, Fluoroscopy, and DSA.

Prerequisites: NE 471

NE 475: Oncology
Tumor treatment with high energy X-ray and electrons from linear accelerators, neutron therapy through neutron capture, ionizing radiation treatment of tumor by means of directed beam, treatment by radioactive sources, measurement of dose, treatment plan.

Prerequisites: NE 470

NE 476: Neutron Therapy
New technologies in neutron radiotherapy, boron neutron capture therapy (BNCT) and Gadolinium neutron capture therapy (GNCT).

Prerequisites: NE 470

NE 477: Advanced Medical Imaging
Image processing, image enhancement, line and nonlinear filters, segmentation techniques, rigid and affine registration techniques, and 3D visualization techniques; surface and volume rendering, morphometric quantitative measurements from medical image data; surface area, volume, and shape index.

Prerequisites: NE 474

NE 478: Quality Assurance Of Medical Equipments
Quality assurance of radiation protection in medical centers. Quality control and testing techniques for all types of diagnostic x-ray machine and nuclear medicine imaging equipment.

Prerequisites: NE 340, NE 370, NE 451

NE 479: Brachytherapy
Use of radiation sources in radiotherapy, materials used, dose measurement theory, preparation of sources and their applications, positioning, fast and slow dose rate.

Prerequisites: NE 470

NE 481: Diagnostic Radiations
Use of radionuclides in diagnostic imaging, computer tomography, positron emission tomography, fluoroscopy, and other advanced imaging techniques and quality of radiological images.

Prerequisites: NE 370

NE 482: Principles of Diagnostic MRI and Ultrasound

Prerequisites: NE 471

NE 483: Diagnostic Radiography
Students of the engineering medical physics track are assigned practical clinical rotational training in different radiological departments at hospitals to familiarize them with actual procedures and practices in the field of medical physics.

Prerequisites: NE 340, NE 451, NE 470, NE 471

NE 492: Special Topics in Radiation Protection Engineering (I)
Focused or specialized advanced subjects of current Radiation Protection Engineering not available in regularly scheduled courses. Topics will be determined by the department.

Prerequisites: Department Approval

NE 493: Special Topics in Radiation Protection Engineering (II)
Focused or specialized advanced subjects of current Radiation Protection Engineering not available in regularly scheduled courses. Topics will be determined by the department.

Prerequisites: NE 340

NE 494: Special Topics in Medical Physics Engineering (I)
Focused or specialized advanced subjects of current Medical Physics Engineering not available in regularly scheduled courses. Topics will be determined by the department.

Prerequisites: Department Approval

NE 495: Special Topics in Medical Physics Engineering (II)
Focused or specialized advanced subjects of current Medical Physics Engineering interest not available in regularly scheduled courses. Topics will be determined by the department.

Prerequisites: Department Approval

NE 496: Special Topics in Nuclear Engineering I
Focused or specialized advanced subjects of current nuclear engineering interest not available in regularly scheduled courses. Topics will be determined by the department.

Prerequisites: Department Approval

NE 497: Special Topics in Nuclear Engineering II
Focused or specialized advanced topics of current nuclear engineering interest not available in regularly scheduled courses. Topics will be determined by the department.

Prerequisites: Department Approval

NE 498: Practical Training
Focused or specialized advanced subjects of current Medical Physics Engineering interest not available in regularly scheduled courses. Topics will be determined by the department.

Prerequisites: NE 340, NE 451, NE 470, NE 471

NE 499: Senior Project
Focused or specialized advanced subjects of current Medical Physics Engineering interest not available in regularly scheduled courses. Topics will be determined by the department.

Prerequisites: Department Approval

NE 584: Advanced Topics in Nuclear Engineering
Focused or specialized advanced subjects of current Nuclear Engineering interest not available in regularly scheduled courses. Topics will be determined by the department.

Prerequisites: Department Approval

NE 585: Advanced Topics in Nuclear Engineering
Focused or specialized advanced advanced subjects of current Medical Physics Engineering interest not available in regularly scheduled courses. Topics will be determined by the department.

Prerequisites: Department Approval

NE 586: Advanced Topics in Nuclear Engineering
Focused or specialized advanced subjects of current Radiation Protection Engineering interest not available in regularly scheduled courses. Topics will be determined by the department.

Prerequisites: Department Approval

NE 587: Advanced Topics in Nuclear Engineering
Focused or specialized advanced subjects of current Radiation Protection Engineering interest not available in regularly scheduled courses. Topics will be determined by the department.

Prerequisites: Department Approval
Department of Nuclear Engineering

FACULTY MEMBERS

**Professors**

**Hamed M. Farag**  
Reactor Analysis, Heat Transport, Nuclear Safety, Decision Theory  
1983 Iowa State University, USA

**Ibrahim I. Kutbi**  
Reliability and Availability of Nuclear Desalination System Nuclear Safety, Desalination Plants, Nuclear Power Planning 1981  
Iowa State University, USA  
ikutbi@kau.edu.sa

**Samir A. Alzaidi**  
Radiation Technology, Radiation Measurement, Nuclear Medicine 1976 Georgia Inst. Of Tech. Atlanta, Georgia, USA

**Associate Professors**

**Abdul-ghani M. Melaibari**  
Specialization Reactor Physics, Numerical Analysis, Nuclear Power  
1987 Iowa State University, USA  
amelaibari@kau.edu.sa

**Abdul Raheem K. Kinsara**  
Radiation Protection, Radio-Aerosol Study  
1991 University of Missouri Columbia, USA

**Professor**

**Hamed M. Farag**  
Reactor Analysis, Heat Transport, Nuclear Safety, Decision Theory  
1983 Iowa State University, USA

**Ibrahim I. Kutbi**  
Reliability and Availability of Nuclear Desalination System Nuclear Safety, Desalination Plants, Nuclear Power Planning 1981  
Iowa State University, USA  
ikutbi@kau.edu.sa

**Associate Professors**

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Specialization Reactor Physics, Numerical Analysis, Nuclear Power  
1987 Iowa State University, USA  
amelaibari@kau.edu.sa

**Abdul Raheem K. Kinsara**  
Radiation Protection, Radio-Aerosol Study  
1991 University of Missouri Columbia, USA

**Assistant Professors**

**Abdullah S. Almasoumi**  
Industrial Applications of Nuclear Techniques, Monte Carlo Modeling of Transport Phenomena  
1990 Oregon State University, USA

**Farthi Djouider**  
Nuclear Engineering  
1994 University of Leeds, UK

**Mohammed A. Enani**  
Nuclear Reactor, Thermal Hydraulics and Simulation, Nuclear Radiation Safety and Detection, Reactor Physics and Safety, Radioactivity levels in food.  
1997 University of Missouri Columbia, USA

**Tareq G. Abulfaraj**  
Nuclear Reactor Physics and Kinetics, Numerical Analysis, Radiation Shielding  
1989 Name of University Michigan State University, USA

**Lecturers**

**Emad I. Ghandourah**  
Specialization Nuclear Engineering  
2003 King Abdul-Aziz University, Saudi Arabia

**Mahmoud E. Elgohary**  
Simulation of Radiation Interaction Using Mol. Dynamic Technique  
2001 University of Alexandria, Egypt

**Syed M. Farid**  
Radiation Physics, Health Physics  
1984 University of Birmingham, UK
Department of
Production Engineering and Mechanical System Design

Department Contact:
Chairman’s Office
Tel.: 6402000 Ext. 68242 Fax: 6952181
Email: eng-pe@kau.edu.sa
Web Site: http://meng.kau.edu.sa

History:
The Department of Mechanical Engineering was established in 1975.

Vision:
Innovation and leadership in education of mechanical and production engineering, applied research and community service.

Mission:
To educate, train and produce highly qualified mechanical engineering personnel inspired with ethical and Islamic values and to conduct scientific research and studies, which collectively allow for a sustainable development of the society.

Departmental Requirements:
Students are required to complete 155 credit hours distributed as follows:
• University requirements 41 credit hours
• Faculty requirements 37 credit hours
• Department requirements 77 credit hours

Department Study Plan: Department Core Courses Credit Hours 71

<table>
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<th>No.</th>
<th>Course Code</th>
<th>Course No.</th>
<th>Course Title</th>
<th>Credit</th>
<th>HOURS</th>
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Total 71
Elective Courses: Students select 2 courses (6 credit hours) out of those in the Table below. Credit Hours 6

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<th>Course Title</th>
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Total 60

Course Descriptions:

MENG 102: Engineering Graphics

MENG 130: Basic Workshop
Introduction to principles of production. Engineering materials, Metal forming; foundry and pattern making, forging processes, rolling, extrusion, sheet metal work, bench work and fitting. Metal machining, drilling, turning, shaping, milling, grinding, joining of materials (fastening, riveting, welding), industrial safety. Measurements, interchangeability and standards, specifications. Quality control, production planning, and management.

Prerequisites: MENG 102

MENG 204: Mechanical Engineering Drawings
Introduction to CAD. Skills of using a drafting package. (AutoCAD)Types of assembly and detail drawings. Representation of mechanical elements (bolted, welded and riveted joints, shafts and keys, springs, gears). Geometrical and dimensional tolerances Applications on assembly and working drawings (valves, presses, bearings, vices etc.).

Prerequisites: MENG 130

MENG 262: Engineering Mechanics, (Dynamics)

Prerequisites: CE 201

MENG 270: Mechanics of Materials
Types of loads and stresses. Mechanical behavior of materials. Shearing forces and bending moment diagrams. Shearing stresses in beams. Stresses in compound bars. Bending stresses and deflection. Torsion of bars. Principal stresses, and Mohr’s circle. 3-Dimensional stresses. Principal strains and Mohr’s circles of strain. Stress-strain relations. Strain energy. Yield criteria. Thin and thick cylinders, fatigue analysis. Lab work. (Tension, bending, hardness, fatigue, creep.).

Prerequisites: CE 201

MENG 310: Machine Elements Design

Prerequisites: IE 202, MENG 270

MENG 332: Manufacturing Technology

Prerequisites: MENG 130, ChE 210
Department of Production Engineering and Mechanical System Design

MENG 364: Machine Dynamics
Prerequisites: MENG 262

MENG 366: System Dynamics and Control
Prerequisites: MENG 262, EE 251

MENG 390: Summer Training (10 weeks)
10 weeks of supervised hands-on work experience at a recognized firm in a capacity which ensures that the student applies his engineering knowledge and acquires professional experience in his field of study at KAU. The student is required to communicate, clearly and concisely, training details and gained experience both orally and in writing. The student is evaluated based on his abilities to perform professionally, demonstrate technical competence, work efficiently, and to remain business focused, quality oriented, and committed to personal professional development.  
Prerequisites: MENG 332

MENG 400: Cooperative Work
Extensive 26 weeks of supervised hands-on work experience at a recognized firm in a capacity which ensures that the student applies his engineering knowledge and acquires professional experience in his field of study at KAU. The student is required to communicate, clearly and concisely, training details and gained experience both orally and in writing. The student is evaluated based on his abilities to perform professionally, demonstrate technical competence, work efficiently, and to remain business focused, quality oriented, and committed to personal professional development.  
Prerequisites: MENG 332

MENG 408: Reverse Engineering
Basic concepts, history, prescreening and preparation for the four stages process, stage 1: evaluation and verification, stage 2: technical data generation, stage 3: design verification and stage 4: project implementation.  
Prerequisites: MENG 310

MENG 410: Mechanical Design
Introduction, design methodology (concept, alternatives, considerations, skills of teamwork, reports, construction and detail drawings of machines). Comprehensive design projects include: fixed and moveable joints, shafts, sliding and rolling bearings, gears, couplings, clutches and brakes, belt drivers. Use of standards and technical manuals. Application of computer programs. Applications on design of production facilities.  
Prerequisites: MENG 204, MENG 310

MENG 412: Computer Aided Design
Prerequisites: MENG 410

MENG 414: Materials Selection in Design and Manufacturing
Prerequisites: MENG 270, MENG 332

MENG 418: Machine Tool Design
Design and working principles of machine tool elements (Speed and feed of gear boxes, spindle and spindle bearings, rigidity and strengthening of structures- frames, beds and design of slideways against wear). Power sources and types of drives. Mechanisms design, motion control and transmission systems in machine tools. Safety devices. Static and dynamic acceptance tests for machine tools.  
Prerequisites: MENG 332, MENG 410

MENG 420: Introduction to Finite Element Methods
Prerequisites: MENG 204, MENG 270

MENG 422: Tribology
Prerequisites: MENG 410

MENG 424: Design of Production Facilities
Prerequisites: MENG 410, MENG 434

MENG 428: Special Topics in Mechanical Systems Design
Topics relevant to specialization of Mechanical Systems Design to strengthen student’s knowledge in the field.  
Prerequisites: MENG 310
MENG 434: Material Removal Processes
Prerequisites: MENG 332

MENG 436: Metrology and Quality Control
Prerequisites: IE 331, MENG 332

MENG 446: Advanced Manufacturing Technology
Prerequisites: MENG 434

MENG 448: Composite Materials
Prerequisites: MENG 270, MENG 332

MENG 450: Computer Aided Manufacturing
Prerequisites: MENG 204, MENG 434

MENG 452: Manufacture Planning and Shop Loading
Prerequisites: MENG 255, MENG 332

MENG 454: Welding Technology
Prerequisites: MENG 332

MENG 468: Plasticity and Metal Forming
Prerequisites: MENG 270, MENG 332

MENG 470: Mechanical Vibrations
Prerequisites: MATH 364

MENG 472: Fault Diagnosis of Mechanical Systems
Prerequisites: MENG 470

MENG 476: Mechanical Systems Modeling and Simulation
Prerequisites: MENG 332

MENG 478: Mechanisms
Prerequisites: MENG 364

MENG 480: Introduction to Robotics

**Prerequisites:**
- MENG 364

**MENG 482: Mechatronics**

**Prerequisites:**
- MENG 366

**MENG 488: Special Topics in Applied Mechanics**
Topics relevant to specialization of applied mechanics to strengthen the student’s knowledge in the field.

**Prerequisites:**
- MENG 364

**MENG 490: Strategic Management and Leadership Skills**
Understanding good leadership behaviors, differences between leadership and management, preparation for strategic planning, setting strategic end point: developing/updating vision, mission statement, values, gaining insight into your patterns, beliefs and rules, strategic analysis, environmental scan(taking a wide look around), looking at organizations SWOT, strategies to achieve the goals and Gantt charts, Balanced Scorecard (BSC), creative leadership skills using TRIZ, polishing Intrapersonal and Interpersonal communication skills, applications on i-plan 2.0 software.

**Prerequisites:**
- IE 202

**MENG 499: Senior Project**
The student is required to function in multidisciplinary team to design a system, component, or process to meet desired needs within realistic constraints. A standard engineering design process is followed including the selection of a client defined problem, literature review, problem formulation (objectives, constraints, and evaluation criteria), generation of design alternatives, work plan, preliminary design of the selected alternative, design refinement, detailed design, design evaluation, and documentations. The student is required to communicate, clearly and concisely, the details of his design both orally and in writing in several stages during the design process including a final public presentation to a panel composed of several subject-related professionals.

**Prerequisites:**
- MENG 410, MENG 434

---

**FACULTY MEMBERS**

**Professors**
- **Abdulmalik A. Aboukhashaba**
  - Production Engineering
  - 1978 Salford University, UK

- **Ahmed K. Abd El Latif**
  - Design Fatigue Graphics
  - 1967 UMIST, UK

- **Hamza Diken**
  - Robotics Control Vibrations
  - 1986 Rensselier Polytech. Inst, USA

- **Mehmet M. Akyurt**
  - Applied Mechanics
  - 1969 Purdue University, USA

- **Mostafa A. Hamad**
  - Applied Mechanics & Machine Design
  - 1981 University of South Carolina, USA

**Associate Professors**
- **Abdulghaffar A. Aljawi**
  - Vibrations FEM Analysis and Applied Mechanics
  - 1993 University of Michigan, USA

- **Abdulmalik A. Aljinaidi**
  - Applied Mechanics and Design
  - 1995 University of Maryland, USA

- **Abdel-Salam Mohammad**
  - Applied Mechanics Vibrations
  - 1985 University of Washington, USA

- **Hassan S. Hedia**
  - Production Engineering
  - 1996 Mansoura University, Egypt

- **Mahmoud Abdalbou**
  - Design Railway Engineering
  - 1995 Cairo University, Egypt

- **Redwan M. Alqasmi**
  - Robotics
  - 2007 University of South Florida, USA

- **Talal M.N. Abu Mansour**
  - Plasticity Applied Mechanics
  - 1988 UMIST, UK

**Assistant Professors**
- **Haitham A. Bogis**
  - Machine Design Applied Mechanics
  - 1994 University of Wisconsin Madison, USA

- **Ismail M.R. Najjar**
  - Metrology and Quality Control
  - 2003 University of Warwick, U.K

- **Khaled A. Almeafia**
  - Mechanical Design, Applied Mechanics, Modal Analysis
  - 2000 University of Central Florida, USA

- **Saeed A. Asiri**
  - Vibrations Applied Mechanics
  - 2003 University of Maryland, USA

**Lecturer**
- **Mohamed Abd El-Wahed**
  - Industrial Engineering
  - 2006 Mansoura University, Egypt
History:
The department of Thermal Engineering was established in 1982. It was initially launched in 1975 as a subdivision within the department of Mechanical Engineering but later upgraded to become an independent department.

Vision:
To acquire and maintain a position of excellence in mechanical engineering education.

Mission:
To prepare distinctive students in mechanical engineering, able to apply their acquired knowledge successfully, and equipped with engineering professional ethics based on Islamic values to serve the society, and pursue advanced studies.

Departmental Requirements:
Students are required to complete 155 credit hours distributed as follows:
- University requirements 41 credit hours
- Faculty requirements 37 credit hours
- Department requirements 77 credit hours

Students Study: Department Core Courses Credit Hours 72

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<th>No.</th>
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Total 72
Elective Courses: Students select 4 credit hours from the courses below: Credit Hours 5

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Course Descriptions:

**MEP 261: Thermodynamics I**

Prerequisites: MATH202, PHYS281

**MEP 290: Fluid Mechanics**

Prerequisites: MATH 202, PHYS 281

**MEP 360: Heat Transfer**

Prerequisites: MATH 203, IE 202

**MEP 361: Thermodynamics II**

Prerequisites: MEP 261, MEP 290, IE 331

**MEP 365: Thermal Engineering Measurements**

Prerequisites: MEP261, MEP290, EE251, IE255

**MEP 370: Internal Combustion Engines**

Prerequisites: MEP 261, CHE 210

**MEP 379: Power Plants For Electrical Engineering**

Prerequisites: MEP 261
MEP 390: Summer Training
Training in industry under the supervision of a faculty member. Students have to submit a report about their achievements during training in addition to any other requirements as assigned by the department.
Prerequisites: MEP 360, MEP 361

MEP 392: Bio Fluid Mechanics
Prerequisites: PHYS 102

MEP 400: Cooperative Work
Training in industry under the supervision of a faculty member. Students have to submit a report about their achievements during training in addition to any other requirements as assigned by the department.
Prerequisites: MEP 360, MEP 361

MEP 451: Refrigeration and Air Conditioning I
Prerequisites: MEP 360, MEP 361

MEP 452: Refrigeration and Air Conditioning II
Prerequisites: MEP 364

MEP 460: Applied Heat Transfer
Prerequisites: MEP 360, 361, IE 332

MEP 463: Modeling and Simulation of Thermal Systems
Basic considerations and types of modeling. Numerical modeling and simulation of thermal systems. Optimization and search techniques. Examples and applications using computer.
Prerequisites: EE 201, MEP 360

MEP 466: Control System Engineering
Prerequisites: MEP 360, MEP 460

MEP 471: Combustion and Pollution
Prerequisites: MEP 361, MEP 370

MEP 472: Energy Conversion
Review of indirect energy conversion systems, (ICE, gas turbine engines, steam pp): energy storage; thermoelectric; photovoltaic; magneto hydrodynamic gen.; fuel cells; other energy conversion systems.
Prerequisites: MEP 361

MEP 473: Power Plants
Prerequisites: MEP 360, MEP 361, IE 255

MEP 474: Turbo Machines and Gas Turbines
Prerequisites: MEP 360, MEP 370

MEP 476: Automotive Engineering
Alternative prime movers and electric vehicles; Spark ignition engine and Diesel engine fuel economy. Transmission system; Vehicle aerodynamics; Vehicle design; case studies.
Prerequisites: MEP 370

MEP 478: Renewable Energy
Prerequisites: MEP 360

MEP 481: Thermal Desalination Processes
Phase rule and equilibria, thermodynamics and colligative properties, scales and chemical treatment, multi-effect desalination systems, multi stage flash desalination systems, mechanical and thermo-vapor compression systems, dual purpose plants.
Prerequisites: MEP 360

MEP 482: Membrane Desalination Processes
Intake, pumping, filtration, ion exchange, pretreatment, membranes, membrane technology, reverse osmosis systems (RO), principles, system design, RO membranes characteristics.
trodialysis (ED), other membrane processes, introduction to fouling, computer applications.

Prerequisites: MEP 360, MEP 361

MEP 483: Desalination Plants

Comparison of different desalination systems. Development of desalination processes, characteristics of varies systems. System design and selection, intake and disposal, water pretreatment, post treatment processes, corrosion and material selection. Desalination system economy.

Prerequisites: MEP 482

MEP 490: Applied Fluid Mechanics


Prerequisites: MEP 290

MEP 496: Applications in Thermal Eng.

The contents are directed to a particular application in the field of thermal engineering and prepared by the department.

Prerequisites: MEP 360, MEP 361

MEP 497: Selected Topics in Mech. Eng.

The content of this course will be prepared each year by the Department.

Prerequisites: MEP 360, MEP 361

MEP 498: Senior Project (Coop Program)

Selection of topic; literature review; project design planning arranging for data collection and experimental work, Interim report, experimental work and data collection or field study (if any) data processing analysis and results. Preparation of the first draft of final report. Presentation of the project, Final report.

Prerequisites: MEP 360, MEP 361

MEP 499: Senior Project

Selection of topic; literature review; project design planning data collection and experimental work, Interim report. Data processing analysis and results. Preparation of the first draft of final report. Presentation of the project. Final report.

Prerequisites: MEP 360, MEP 361

Abdul-lateef A. Gari
Computational Heat Transfer, Applied Heat transfer, Air Conditioning 2006 University of South Florida, USA agari@kau.edu.sa

Abdul Rahim A. Khaled
Two phase flow, Energy conversion, thermofluids of Nuclear Reactors 1972 Trondheim University, Norway gzaki@kau.edu.sa

Abdullah M. Al-Turki
Heat transfer, Numerical Calculation, Thermal Science 1984 University of Iowa, USA

Omar M. Al-Rabghi
Modeling of Thermal Systems, Solar energy utilization, Refrigeration and A.C., Energy Conservation. 1988 University of California, USA orabghi@kau.edu.sa

Galal M. Zaki
Two phase flow, Energy conversion, Thermofluids of Nuclear Reactors 1972 Trondheim University, Norway gzaki@kau.edu.sa

Samir E. Aly
Desalination Technology, Energy Conversion, Two-Phase Flow 1975 Trondheim University, Norway

Majed M. Al-Hazmy
Applied Thermodynamics Modelin-gand Analysis of Thermofluid Systems 1998 Oregon State University, USA mHazmy@kau.edu.sa

Nazrul-Islam Abdulhafiz
Heat Transfer, Computational Fluid Dynamics 1997 Indian Institute of Technology, Bombay, India nabdulhafiz@kau.edu.sa

Mansoor M. Siddique
Boiling, Condensation and Heat Transfer 1992 M.I.T., Cambridge, USA

Nadir M. Al-Beirutty
Heat Transfer, Turbulent flows, Re-frig. And Air Conditioning 1987 University of Washington, USA mbeirutty@kau.edu.sa

Nafis Ahmad
Internal Combustion Engines, Thermodynamics/Automotive Engineering 2001 Indian Institute of Technology, New Delhi, India

Badr A. Habeebullah
Thermodynamic Analysis, Combustion 1989 University of Colorado, USA bhabeeb@kau.edu.sa

Abdulhadi A. Fatani
Specialization Heat transfer, Numerical analysis, Fluid mechanics 1983 Oregon State University, USA

Mohammed H. Al-Beirutty
Heat Transfer, Turbulent flows, Refrigeration and Air Conditioning 1987 University of Washington, USA mbeirutty@kau.edu.sa

Anas A. Madani
Freeze Desalination, Crystallization 1985 Cornell University, USA

Associate Professors

Nadir H. Turkmen
Heat Transfer Refrigeration and Air Conditioning 1997 Istanbul Technical University, Turkey nturkmen@kau.edu.sa http://nturkmen.kau.edu.sa

Assistant Professors

Ahmed Y. Bokhary
Thermal Science, Internal Combustion Engines, Air Conditioning 1999 Sheffield University, UK abokhary@kau.edu.sa

Assistant Professors

Nasir Ahmad
Internal Combustion Engines, Thermodynamics/Automotive Engineering 2001 Indian Institute of Technology, New Delhi, India

Abdul-lateef A. Gari
Computational Heat Transfer, Applied Heat transfer, Air Conditioning 2006 University of South Florida, USA agari@kau.edu.sa