برنامجدراسة لدورة البكالوريوس في الهندسة الكيميائية

وصف كاروليتي لجوان للكورسات

يحتوي هذا الفصل على وصف كاروليتي لجوان للكورسات باللغة الإنجليزية والعربية مع بيان

بالتجارب المطلوبة إجرائها للموروثات التي يصاحبها ساعتها وصوب لها أو موضوعية، كذلك يتضمن قائمة

استرشادية بالمراجع التي يمكن الاستفادة بها وأخبار مفصل من وجهة نظر الخبر الذي أعد محتوى

المقرر، كما تم ذكر اسلوب تقييم الطلاب المسجلين بالمقرر.
Basic Science

BAS011 Mathematics 1

3 Cr. Hrs. = [2 Lect + 2 Tut. + 0 Lab] Prerequisite: None


References:
• Mary Attenborough, Engineering Mathematics, McGraw Hill Book Company Europe, 1994

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%
# BAS012 Mathematics 2

**3 Cr. Hrs. = [2 Lect + 2 Tut. + 0 Lab]**

**Prerequisite:** BAS 011

**Analytic geometry:** Equation of second degree, Equation of pair of straight lines, Translation and rotation of axes, Conic sections, Cartesian, Cylindrical and Polar spherical coordinates, Method of representing a vector in space, Equation of sphere and surface of revolutions, Plain equation in space, Equation of second order, Translation, Rotation of axis in space.

**Integral Calculus:** Indefinite integral Method of integration (theory and functions), Definite integral (direct and indirect), Application on definite integral (areas and volumes), Numerical Integration, Numerical integration.

**References:**

**Assessment:**
- Final Exam: 60%
- Quizzes: 20%
- Term Work: 20%
BAS021 Physics 1

3 Cr. Hrs. = [2 Lect + 1 Tut. + 2 Lab] Prerequisite: None

Measurements: Physics and measurements, Basic standard units (length, mass, time, the international system of units SI), Dimensional Analysis.

Physics of Materials: Elastic properties of solids (stress, strain, elastic modules...), Thermal expansion and expansion coefficient, Newton’s law of gravitation and applications (Potential energy, Fluid statics, Pascal and Archimedes laws), Dynamic of ideal fluid (Continuity equation, Bernoulli equation and applications, Energy, Viscosity concept)

Oscillatory motion: Oscillations, simple harmonic motion, Wave motion, Sound waves,

Electrostatics: Electric charge and Coulomb's law, Gauss law, Electrostatic field, Electrostatic potential, Dielectrics and capacitances, Field stored energy.

BAS021

Physics 1

3 Cr. Hrs. = [2 Lect + 1 Tut. + 2 Lab] Prerequisite: None

Measurements: Physics and measurements, Basic standard units (length, mass, time, the international system of units SI), Dimensional Analysis.

Physics of Materials: Elastic properties of solids (stress, strain, elastic modules...), Thermal expansion and expansion coefficient, Newton’s law of gravitation and applications (Potential energy, Fluid statics, Pascal and Archimedes laws), Dynamic of ideal fluid (Continuity equation, Bernoulli equation and applications, Energy, Viscosity concept)

Oscillatory motion: Oscillations, simple harmonic motion, Wave motion, Sound waves,

Electrostatics: Electric charge and Coulomb's law, Gauss law, Electrostatic field, Electrostatic potential, Dielectrics and capacitances, Field stored energy.

Laboratory:
2. Uniformly Accelerated Motion.
4. Equilibrium, and Center of Gravity.
5. SIMPLE Harmonic Motion.
6. Fields and Equipotential.
8. Voltmeter Methods and Wheatstone Bridge Method.

References:
- Raymond A. Serway, John W. Jewett, Physics for Scientists and Engineers, Cengage Learning; 9 ed., 2013
- Richard T. Weidner, Physics, Revised Version, Allyn and Bacon, Boston, USA, 1989

Assessment:
- Final Exam: 50%
- Quizzes: 20%
- Term Work: 15%
- Experimental/Oral: 15%

### BAS022 Physics 2

<table>
<thead>
<tr>
<th>3 Cr. Hrs. = [2 Lect + 1 Tut. + 2 Lab]</th>
<th>Prerequisite: BAS 021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Principal of heat and Thermodynamics:</td>
<td>Energy and Temperature concepts • Internal energy, flow energy and enthalpy, Heat and work • Specific heats, First law of thermodynamic, Entropy and the second law of thermodynamic, Carnot engine, the absolute temperature scale.</td>
</tr>
<tr>
<td>Electricity and Magnetism:</td>
<td>Electrical current and resistance, Ohm’s law, Electric power, Semiconductors, Electromotive force, Kirchhoff’s rules, Magnetic fields, Maxwell equations, Ampere’s law, Maxwell’s equations, Fraday’s law, Gauss’s law.</td>
</tr>
</tbody>
</table>
الرياضي مضز العزبًُ 
وسارَ التعلًه العالى 
المعَد العالى للَيدصُ والتهيىلىجًا ببرج العزب
قزار وسارٍ رقه

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Arab Republic of Egypt
Ministry of Higher Education
Higher Institute of Engineering & Technology, 
Borg Al-Abab - Alexandria

اللائحة الداخلية لمرحلة البكالوريوس

الكوارث الكهربائيّة والغلافات: التيار الكهربائي والمقاومة الكهربائيّة، قانون أوم، القدرة الكهربائيّة، أشياء الموصلات، القوة الدافعة الكهربائيّة، فرق الجهد، قانون كيرشوف، قانون أمبير، قانون فاراداي، قانون جاوس.

Labatory:
1. Latent Heats: Heats of Fusion and Vaporization of Water:
5. Multiloop Circuits: Phase Measurements and Resonance in ac Circuits.

References:
- Richard T.Weidner, Physics - Revised Version, Allyn and Bacon, Boston, USA, 1989
- Douglas C. Giancoli, Physics for Scientists & Engineers with Modern Physics, Addison-Wesley; (4th Edition), 2008

Assessment:
Final Exam: 50%, Quizzes: 20% Term Work: 15%, Experimental/Oral: 15%

BAS031 Mechanics

4 Cr. Hrs. = [3 Lect + 2 Tut. + 0 Lab] Prerequisite: None

Application on Space Vectors: Resultant of forces, Moment of forces, Equivalent of Couples, Equivalent of systems, Equation of equilibrium of rigid body, Types of supports, Equilibrium of plane systems, Equilibrium of space systems of forces and couples acting on rigid body, The mass center of a system of particles, The mass moment of inertia of a system of particles.

Dynamic: Displacement, velocity and acceleration of particle, Trajectory equations, Projectile particle motion on a straight path, Newton’s law of motion, Simple harmonic motion of a particle, Motion on circular path, Work and kinetic energy, Vibration of rigid body.
تقنية: مجموعة مكونة من القوى والعزم، الازدواجيات المكافئة، المجموعات المكافئة، معدلات ألتزاان للجسم الجسي، أنواع الدعائم والركائز، ألتزاان تحت تأثير القوي المستوية، ألتزاان مجموعة من القوى الفراغية، ألتزاان جسم جاسى تحت تأثير مجموعة القوى الفراغية، الازدواجيات الفراغية، عزم القصور الذاتي، المحور الرئيسية، الأسلاك المتساوية

الكيمايكيا: الإنسالة والسرعة والعملة للجسم، وصف الحركة المستوية، المقذوفات، الحركة التوازيقية البسيطة والحركة المختومة، بدأ الشغل والطاقة، قانون موري للكرى، القوى المحافظة، بدأ حفظ الطاقة الميكانيكية، بدأ الدفع وكمية الحركة، المحاور القطبية والحركة لجسم جاسى في المستوى، الشغل والطاقة، التصادم غير المرف، الحركة الاحتفازية الحرة للأجسام الجاسية

Textbook:

References:
• Bichara B., John W., Static For Engineers, Springer Verlag, New York, 1997.
• Bichara B., John W., Dynamic for Engineers, Springer Verlag, New York, 1997

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%

BAS041 Engineering Chemistry

3 Cr. Hrs. = [2 Lect + 1 Tut. + 2 Lab] Prerequisite: None

Laboratory:
1. Acid - Base Titration.
2. pH measurement and application in acid base titration.
3. Predicting heating and cooling curves and interrelating with phase diagram.
4. Molecular weight Determination from General Properties of Solutions.
5. Determination of solubility and evaluating solubility product constant (ksp).
6. Determination of acid and base constants for weak acids (ka) and for weak bases (kb).
7. Determination of Dissolved oxygen in water.
8. Determination of iron in cement powder.

Textbook:

References:
- Larry Brown, Tom Holme Chemistry for Engineering Students (William H. Brown and Lawrence S. Brown), Cengage Learning; 2010
- Larry Brown, Tom Holme, Chemistry for Engineering Students, Cengage Learning; 2014

Assessment:
Final Exam: 50% , Quizzes: 20% Term Work: 15% , Experimental/Oral: 15%
**BAS111  Mathematics 3**

3 Cr. Hrs. = [2 Lect + 2 Tut. + 0 Lab]  
Prerequisite: BAS 012


**Assessment:**
- Final Exam: 60%, Quizzes: 20%, Term Work: 20%,

**Textbook:**
- Murray Spiegel, Schaum's Outline of Advanced Mathematics for Engineers and Scientists (Schaum's Outline Series), McGraw-Hill; 1 edition 2009

**References:**
- Swokowski, E., Olinick, M and Pence, D., Calculus, PWS Publishing Company - Boston, 1994
BAS211  Mathematics 4

3 Cr. Hrs. = [2 Lect + 2 Tut. + 0 Lab]  Prerequisite: BAS 111

Functions of complex variables, Matrices, Eigenvalues, Eigenvectors of Matrices, Special Functions (Gama, Beta, Legrander, Bessel), System of Differential Equations, Geometric Approaches, Mathematical Modeling of real-world phenomena, Mathematical Models, Numerical Methods, Linear Systems and Matrices, Vector Spaces.


Textbook:

References:
- Murray Spiegel, Schaum's Outline of Advanced Mathematics for Engineers and Scientists (Schaum's Outline Series), McGraw-Hill; 1 edition 2009

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%,
BAS212 Statistics & Probability Theory

3 Cr. Hrs. = [2 Lect + 2 Tut. + 0 Lab]  
Prerequisite: None


Sets and Probabilities: random experiments, sample spaces, sets operations, counting data, probability, conditional probabilities, Bayes’ theorem.

Tendency and Dispersion Measures: Introduction, different types of data, tendency measures, variability measures, frequency distributions.

Random Variables: Discrete random variables, the Hyper - geometric distribution, Binomial distribution, the Poisson distribution, Poisson approximation of binomial probabilities, continuous random variables.

Moments: central moments, Skewness measures, kurtosis measures, moment generating function.

Sampling Theory and Inferences: The concept of a sampling distribution, sampling distribution of the mean, central limit theorem, tests of hypothesis and Confidence intervals for the mean, tests of hypothesis and confidence intervals for the difference between two means, tests of hypothesis and confidence intervals for the population proportion, tests of hypothesis and confidence intervals for the difference between two proportions, tests of hypothesis and confidence intervals of sample variance, tests of hypothesis and confidence interval for ratio of sample variances. Simple regression and correlation: Simple linear regression by least square method, validation the model, correlation coefficient.
نظرية المعادلة والاستدلال الإحصائي: مفاهيم المعاينة، توزيع معاينة المتوسط، نظرية النهاية المركزية، اختبارات الفروض وحدود الثقة لمتوسطي مجتمعين، اختبارات الفروض وحدود الثقة لتنبؤ مجتمع، اختبارات الفروض وحدود الثقة لتنبؤ مجتمع، اختبارات الفروض وحدود الثقة لتنبؤ مجتمع، اختبارات الفروض وحدود الثقة لتنبؤ مجتمع. الانحدار الخطي والالتباط: طريقة المربعات الصغرى، تقييم النموذج، معامل الالتباط.

References:

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%.

BAS311 Mathematics 5

3 Cr. Hrs. = [2 Lect + 2 Tut. + 0 Lab]  Prerequisite: BAS 211

Power Series Methods, Functions of a complex variable including Cauchy, Riemann conditions, Conformal mappings, Complex series, Complex integral, Special functions,
Textbook:

References:

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%

BAS312 Numerical Methods in Engineering

3 Cr. Hrs. = [2 Lect + 2 Tut. + 0 Lab] Prerequisite: BAS211

This course provides the basic knowledge and techniques for analyzing various problems in engineering science. Applications of numerical methods and computer programming techniques for the creation of mathematical models of engineering systems are considered.

اسم 212

الطرق العددية في الهندسة

يقدم هذا المقرر المعلومات والتقنيات التي تستخدم لتحليل مختلف المسائل في العلوم الهندسية، دراسة تطبيق لطرق العددية وتقنيات برمجة الحاسب على بعض النماذج الرياضية لأنظمة هندسية. يشمل هذا المقرر حساب الدوال باستخدام متسلسلات القدرة، جذور المعادلات، حساب المصفوفات، المعادلات الخطية الأدبية، التكامل العددي، تقدير القيم الثنائية وتوقيف المنحنى، الحلول العددية للمعادلات التفاضلية الاعتيادية، الحلول العددية للمعادلات التفاضلية الجزئية، أمثلة لتطبيقات حلول العددية.

Textbook:

References:

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%
Structure Engineering

CIS111 Principles of Construction & Building Engineering

2 Cr. Hrs. = [2 Lect + 1 Tut. + 0 Lab]  
Prerequisite: None


Textbook:

References:

Assessment:
- Final Exam: 60%, Quizzes: 20%, Term Work: 20%,
Public Works

CIW 331 Environmental Impact of Projects

1 Cr. Hrs. = [1 Lect + 0 Tut. + 0 Lab]


Textbook:

Assessment:
- Final Exam: 50% , Quizzes: 20% , Term Work: 20%.
**Architectural Engineering**

**ARC111 Arts & Architecture**

2 Cr. Hrs. = [2 Lect + 1 Tut. + 0 Lab]

History of Arts, Fine Arts (Painting - Sculpture - Ornaments... etc.), Artistic Movements in the twentieth century: Cubism, Expressionism, Futurism and Surrealism. Artist groups like de Stijl and Bauhaus and their new ideas about the interrelation of the arts, architecture, design, and art education. Trends of Art through historical eras and parallel trends of Architecture - Contemporary trends of Art and its influence on architecture. Values in art works (contrast, balance, proportion, color, rhythm, movement,...), Artistic values and design principles in architecture.

**References:**

- ألفي حمودة، نظريات وقيم الفن المعماري، دار المعارف، القاهرة، 1981
- ريد هيربرت، ترجمة خشبة، مفاهيم الفن، الهيئة المصرية العامة للكتاب - القاهرة 1998
- على رافع، ثلاثية الإبداع المعماري، الإبداع الفني في العمارة، مركز أبحاث التكنولوجيا، القاهرة 1997
- فيشر، إمساك، نزول الفن، ترجمة حليم، الهيئة المصرية العامة للكتاب - القاهرة 1998
- محمد عثمان، عبقرية الفن، أساليب الفن، نجوم الفن، دار المعارف، القاهرة، 1995

**Assessment:**

Final Exam: 60%, Quizzes: 20%, Term Work: 20%,
# Electrical Power Engineering

## ELP111 Principles of Electrical Engineering

<table>
<thead>
<tr>
<th>2 Cr. Hrs. = [2 Lect + 1 Tut. + 0 Lab]</th>
<th>Prerequisite: BAS 022</th>
</tr>
</thead>
</table>


**Textbook:**
- W. Roadstrum and D. H. Wolaver, Electrical Engineering for All Engineers, J. Wiley & Sons, Inc...New York, 1994

**Assessment:**
- Final Exam: 60%
- Quizzes: 20%
- Term Work: 20%
# Electronics & Communications Engineering

**ELE121 Principles of Electronic Engineering**

2 Cr. hrs. = [2 Lect. + 1 Tut + 0 Lab]

Electronic components: PN junction diodes, special diodes, diode circuits applications, rectifiers and peak detectors - Bipolar junction transistors (BJT), Operational amplifiers, Analog signals and measurement, Digital signals and logic circuits - Introduction to microprocessors, CPU - Interfacing with memory - Interfacing with input and output ports.

**Textbook:**
- Renu Singh, B. P. Singh, Microprocessors Interfacing and Application, New Age international Publishers. 2002

**Assessment:**
- Final Exam: 60%
- Quizzes: 20%
- Term Work: 20%
MED011  Engineering Drawing & Projection

3 Cr. hrs. = [1 Lect. + 3 Tut + 3 Lab]


Laboratory:
1. Practice on computer graphics packages such as AUTOCAD, SOLIDWORKS,....etc.
2. Practice on Inserting Dimensions with simple examples.
3. Practice on Normal and Auxiliary Projection using Computer Drafting Packages....etc.
4. Practice on Sectioning and Documentation with simple examples.

References:

Assessment:
Final Exam: 50% , Quizzes: 20% , Term Work: 30%
MED021 History of Engineering & Technology

1 Cr. hrs. = [1 Lect. + 0 Tut + 0 Lab]

History of Civilization and Technology Development, Humanities and social sciences, Engineering Education and its Disciplines, Scientific thinking and analysis. Technology and Training, Different work methodologies and ethics, Application examples, Course Project.

References:

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%,

MED022 Principles of Manufacturing Engineering

2 Cr. hrs. = [2 Lect. + 1 Tut + 1 Lab]

Engineering Materials, Manufacturing Processes: Casting and molding processes, metal forming, forming of plastics, powder metallurgy; Material Joining processes welding, soldering, brazing, riveting, joining by mechanical elements; Material removal processes, metal cutting and finishing processes; Practical training.
Laboratory:
1. Practice on standard machining operations.
2. Practice on standard welding operations.
3. Practice on standard Soldering operations.
4. Practice on standard Brazing operations.
5. Practice on standard riveting operations.

References:
- Serope Kalpakjian, Steven Schmid Manufacturing Engineering & Technology, Prentice Hall. 6th Ed., 2009

Assessment:
Final Exam: 50% , Quizzes: 20% , Term Work: 20% , Experimental/Oral: 10%

MED111 Principles of Design & Manufacturing Engineering

2 Cr. hrs. = [2 Lect. + 1 Tut + 0 Lab]

Mechanical components, Motion and power transmission elements, Standard machine elements (threads, fasteners, locking devices, keys, splines, gears, pulleys, bearings, pipe connections, etc.), Welding and riveting conventions. Basics of Machine elements design, Stress analysis, Basic machining processes, Applications of robotics technology.

References:

Assessment:
Final Exam: 60% , Quizzes: 20% , Term Work: 20%,
MEP111  Principles of Mechanical Power Engineering

2 Cr. Hrs. = [2 Lect + 1 Tut. + 0 Lab]  Prerequisite: BAS 022, BAS 031

First Law of Thermodynamics - Energy conversion - Power cycles - principles of fluid mechanics - Prime movers(Gasoline & Diesel Engines) - Pumps & Turbines
Principles of heat transfer - Simple steam plants - Refrigerators.

Textbook:

Assessment:
Final Exam: 60 %, Quizzes: 20%, Term Work: 20%.
Industrial Engineering

IEN131 Monitoring & Quality Control Systems

1 Cr. hrs. = [1 Lect. + 0 Tut + 0 Lab]


Textbook:
References:


Assessment:

Final Exam: 60%, Quizzes: 20%, Term Work: 20%

IEN314  Project Management

2 Cr. hrs. = [2 Lect. + 1 Tut + 0 Lab]

Project management overview, organizational structures, assessing success, planning, learning curves, network scheduling techniques, CPM analysis, precedence networking, resource allocation and constraints, cost management, risk management, project performance measurement and control.

References:


Assessment:

Final Exam: 60%, Quizzes: 20%, Term Work: 20%
IEN351 Engineering Economics

2 Cr. hrs. = [2 Lect. + 1 Tut + 0 Lab]

Computations: Rate of Return calculations using A Present worth PW, Rate of Return Calculation by Using Annual worth EAW, Rate of Return Evaluation for Multiple Alternatives. Depreciation Models: Nature of Depreciation, Depreciation Conventional Methods, Methods Based on Asset Usage, Switching Between Depreciation Models.

Textbook:

References:

Assessment:
- Final Exam: 60%
- Quizzes: 20%
- Term Work: 20%
Chemical Engineering

CHE111  Physical Chemistry

3 Cr. hrs. = [2 Lect. + 0 Tut + 3 Lab]  Prerequisite: BAS 022, BAS 041

Concept of Equations of state as applied to ideal gas and real gas - Phase equilibrium and phase diagram. Ideal solutions and deviations from ideality - Properties of solutions - Fugacity - Activity of ideal solutions - Activity coefficients - Excess properties - Dynamic equilibrium in physical and chemical changes: Vapor liquid equilibrium calculations, Solid liquid phase, Equilibrium Solution thermodynamics, Partial molar properties - Chemical reaction equilibrium for homogeneous and heterogeneous reactions - multi-reaction equilibrium - Statistical mechanics, and transport phenomena.

Laboratory:
1. Predicting heating and cooling curves and interrelating with phase diagram.
2. Determination of elevation in boiling point and depression in freezing point.
3. Determination of osmotic pressure.
4. Determination of solubility and evaluating solubility product constant (ksp)
5. Determination of acid and base constants for weak acids (ka) & for weak bases (kb).
7. Constructing temperature - composition diagram (Isobaric boiling point-composition) for binary system.
Textbook:

References:
- Farrington Daniels and Robert A. Alberty, Physical Chemistry, John Wiley & Sons, 7th Ed., 1987

Assessment:
- Final Exam: 50%, Quizzes: 15%, Term Work: 15%, Experimental/Oral: 20%

CHE112 Inorganic & Analytical Chemistry

3 Cr. hrs. = [2 Lect. + 0 Tut + 3 Lab]  Prerequisite: BAS 041

Comparative systematic studies for the groups of elements and compounds of industrial importance: Halogens, Sulfur group, Alkaline metals, Alkaline earth metals, The common elements from the fourth and the fifth groups of periodic table, Transition elements,

Principles of qualitative and quantitative chemical analysis: Principles and applications of gravimetric analysis, Principles and applications of volumetric analysis, Principles and applications of Spectrophotometric analysis, Principles and applications of atomic absorption analysis, Principles and applications of absorption Spectrophotometric analysis, Principles and applications of chromatographic analysis,

Laboratory:
1. Identification of acid and base radicals.
2. Precipitation titration (argentimetry).
3. Acid/base titration.
4. Quantitative and qualitative analysis spectrophotometricaly.
Textbook:

References:
- Shriver and Atkins', Inorganic Chemistry, Oxford University Press, 2010

Assessment:
Final Exam: 50%, Quizzes: 15%, Term Work: 15%, Experimental/Oral: 20%

CHE113 Organic & Biochemistry

3 Cr. hrs. = [2 Lect. + 0 Tut + 3 Lab] Prerequisite: BAS 041

An introduction to organic structures, reactions, and reaction mechanisms: Type of carbon, carbon bonds, Electronic theory of valence, Aromatic hydrocarbons, Resonance and electron displacement, Study of paraffins, olefins, aldehydes, Ketones, organic acids, alcohols, phenols, structural isomerism.

Analysis of organic compounds using ultraviolet rays, Chromatography, magnetic resonance.

Laboratory:
1. Methods utilized in purifications of organic compounds.
2. Methods utilized in identification of organic compounds, both qualitative and quantitative.
3. Preparation of some common organic compounds and testing of some of its physical and chemical characteristics.
4. Preparation of some common intermediate organic compounds and testing of some of its physical and chemical characteristics.

Textbook:

References:

Assessment:
Final Exam: 50%, Quizzes: 15%, Term Work: 15%, Experimental/Oral: 20%

**CHE114 Chemical Engineering Thermodynamics**

3 Cr. hrs. = [2 Lect. + 2 Tut + 0 Lab]  
Prerequisite: BAS 022

البخار، دورة كارنوت، دورة رانكيف، دورة التسخيف، دورة لإعادة التوليد، دورة القدرة الغازية، دورة التبريد، دورة التبريد بضغط البخار، دورة البخار، دورة رانكيف، دورة التبريد، دورة المضخات الحرارية، دورة التبريد بالاستسقاء، جداول الديناميكا الحرارية.

**Textbook:**

**References:**
- J. Winnick, Chemical Engineering Thermodynamics: An Introduction to Thermodynamics for Undergraduate Engineering Students, Wiley, 1996

**Assessment:**
- Final Exam: 60%, Quizzes: 20%, Term Work: 20%

**CHE121 Momentum Transfer**

3 Cr. hrs. = [2 Lect. + 2 Tut + 0 Lab]  
Prerequisite: BAS 031

Fluid statics - General molecular transport equation for momentum, heat, and mass transfer - Viscosity of fluids - Types of fluid flow and Reynolds Number - Overall mass balance and continuity equation - Overall energy balance - Shell momentum balance and velocity profile in laminar flow - Design equations for laminar and turbulent flow in pipes - Compressible flow of gases - Flow past immersed objects and packed and fluidized beds - Measurement of flow of fluids - Pumps and gas moving equipment - Agitation and mixing of fluids and power requirements - Non Newtonian fluids - Differential equations of momentum transfer - Dimensional analysis in momentum transfer.
Textbook:

References:

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%.

### CHE211  Applied Electrochemistry & Corrosion Engineering

3 Cr. hrs. = [2 Lect. + 0 Tut + 3 Lab]  
Prerequisite: CHE 111

Electrolytes and electrolytic transport processes, Electrolytic conductance, Ostwald dilution law, Oxidation States and Oxidation, Reduction Reactions, Balancing Oxidation, Reduction Equations, Voltaic Cells, Cell EMF under standard Conditions, Free Energy and Redox Reactions, Nernst Equation and its applications in spontaneity prediction and Cell EMF under nonstandard conditions, Concentration cells, Batteries and Fuel Cells, Electrolysis and nonspontaneous redox reactions.

Chemistry of Polymers

2 Cr. hrs. = [2 Lect. + 0 Tut + 0 Lab] 

Prerequisite: CHE 112

Introduction to Polymers, Polymer Structure (Morphology), Molecular Weight of Polymers, Polycondensation Polymers (Step - Reaction Polymerization), Ionic Chain - Reaction and Complex Coordination Polymerization, Free Radical Chain Polymerization (Addition Polymerization), Copolymerization, Composites and

Laboratory:
1. Measurement of standard electrode potential.
3. Redox titration.
4. Potentiometric titration.
5. Finding the solubility product constant (Ksp) electrochemically.
7. Electroplating

Textbook:

References:

Assessment:
Final Exam: 50%, Quizzes: 15% , Term Work: 15%, Experimental/Oral: 20%

CHE212 Chemistry of Polymers

Textbook:
- Charles E. Carraher Jr., Carraher's Polymer Chemistry, CRC Press, 8th Ed., 2010

References:

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%

CHE213 Environmental Chemistry

Prerequisite: CHE 113

The topics of this course are concerned with the main parameters considered in characterization of water and waste water dealing specifically, for each parameter, with: General considerations, Environmental and health significance, Methods of determination. Application of data: Turbidity, Color, pH, Acidity, Alkalinity, Hardness, Residual chlorine demand, Chlorides, Dissolved oxygen (DO), Biochemical oxygen demand (BOD), Chemical oxygen demand (COD), Total organic carbon (TOC), Nitrogen, Solids, Iron and Manganese, Fluoride, Sulfate, Phosphorus and phosphate, Grease, Volatile acids, Gases: Carbon dioxide, Oxygen, Hydrogen, Methane, Hydrogen sulfide, Trace inorganics.
### CHE221 Heat Transfer & Fuel Engineering

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat Transfer &amp; Fuel Engineering</td>
<td>CHE 114</td>
</tr>
</tbody>
</table>

**Textbook:**

**References:**

**Assessment:**
- Final Exam: 60%, Quizzes: 20%, Term Work: 20%

**Steady state heat transfer:**
- Introduction and mechanisms of heat transfer, Conduction heat transfer, Conduction through solids in series, Steady state conduction and shape factors, Forced convection heat transfer inside pipes, eat transfer outside various geometries in forced convection, Natural convection heat transfer, Boiling and condensation, Heat exchangers, Radiation heat transfer principles, Heat transfer of non-Newtonian fluids, Special heat transfer coefficients, Dimensional analysis in heat transfer. Unsteady state heat transfer Derivation of basic equation, Unsteady state heat conduction in various geometries.

**Fuels:**
- Liquid fuels, Gaseous fuel, Solid fuel, composition and heating value of fuel, Combustion fundamentals, Chemical kinetic and combustion thermodynamics. The impact of fuel properties, operating conditions, and
furnaces design on environment and operational performance. Combustion emissions from COY, NOx, Sox and soot and its effects on environment. Technology facilities, Calculation methods in combustion.

Textbook:

References:
- Christie J. Geankoplis, Transport Processes and Unit Operations, Prentice-Hall International Inc, 1993

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%,
(batch and continuous), single and multiple unit calculations, Recycle, bypass and purge calculations, Balance for reactive systems: balances on reactive systems, balances on single phase systems, Balances on multiple systems: balances on liquid solution, balances on adsorption processes. Fundamentals of Energy Balance: Fundamentals of energy balance, forms of energy, Thermodynamic tables, energy balance for non-reactive systems, pressure and temperature change, mixing operations, energy balance for reactive systems, heat of reactions, heat of formation, heat of combustion.

Textbook:

References:

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%

CHE232  Chemical Reaction Kinetics

3 Cr. hrs. = [2 Lect. + 2 Tut + 0 Lab]  Prerequisite: CHE 111

Kinetics of chemical reactions, Order and molecularity of reactions, Reactions of the first order, Reactions of the second order, Reactions of the third order, Complex reactions, Temperature effect, Activation energy, Catalytic reactions,
Engineering principles of reactor design, Design of batch and continuous tubular reactors, Design of continuous stirred tank reactors, Catalytic reactors, Isothermal and adiabatic reactions, Concentration and flow rate effect on residence time, Recycling and its effect on reactor volume.

Textbook:

References:

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%.

CHE241 Organic Chemical Industries

3 Cr. hrs. = [2 Lect. + 0 Tut + 3 Lab] Prerequisite: CHE 113

Mechanisms and synthesis applications of organic reactions: Sulfonation, nitration, halogenation, oxidation, intermediate organic compounds, mechanism of polymerization, Technological procedures, on industrial scale demonstrated with flow sheet diagrams, for production of: Dyes, Sugars, Natural and synthetic fibers, Starch and yeast, Explosives, Pesticides.

Practical: Executing the following reaction on laboratory scale: Sulfonation, nitration, halogenations and oxidation, Analysis of organic compounds using ultraviolet rays, Chromatography, magnetic resonance. To accomplish practical part it is recommended to perform site visit to relevant factories even during semester time or during field training.
Laboratory:
1. Executing the following reactions on laboratory scale: Sulfonation, nitration, halogenations and oxidation, Analysis of organic compounds using ultraviolet rays, Chromatography, magnetic resonance.
2. To accomplish practical part it is recommended to perform site visit to relevant factories even during semester time or during field training.

Textbook:

References:

Assessment:
Final Exam: 50%, Quizzes: 15%, Term Work: 15%, Experimental/oral: 20%

CHE242 Inorganic Chemical Industries

3 Cr. hrs. = [2 Lect. + 0 Tut + 3 Lab] Prerequisite: CHE 112

Technological procedures, on industrial scale demonstrated with flow sheet diagrams for production of industrial gases: Carbon dioxide, Hydrogen, Oxygen, Chlorine and hydrochloric acid, Nitrogen industries: Ammonia, Nitric acids, Nitrogen fertilizers: Ammonium nitrate and Urea, Sulfuric acid, Phosphoric acid and phosphate fertilizers, Cement Industry, Building materials and refractories, Alkali industries: Sodium hydroxide and sodium carbonate and bicarbonate. Practical: Executing the following Experiments on laboratory scale: Application
of the Egyptian Standards (ES) on some specifications on the following products:
Ammonium nitrate, Sulfuric acids, Nitric acid, Phosphoric acid, Sodium hydroxide, Cement, Ceramics, Sodium carbonate.

Laboratory:
Execute the following Experiments (Application of the Egyptian Standards) on:
Ammonium nitrate, Sulfuric acids, Nitric acid, Phosphoric acid, Sodium hydroxide, Cement, Ceramics, Sodium carbonate.

Textbook:

References:
- Egyptian Standards issued for the above products.

Assessment:
Final Exam: 50%, Quizzes: 15%, Term Work: 15%, Experimental/Oral: 20%

CHE261 Natural Gas Engineering

3 Cr. hrs. = [2 Lect. + 2 Tut + 0 Lab] Prerequisite: CHE 113

Natural gas technology and earth sciences; properties of rocks; thermodynamics; flow equation; fluid properties; combustion; physical behavior of natural gas systems; physical and thermal properties; phase behavior; analysis; gas hydrates and their prevention; applications of flow equations; pressure drop; compression; metering; drilling and completion of wells; flow in reservoir and adjacent aquifer; gas well testing; reservoir engineering applied to gas; gas/condensate and gas/oil fields;
Simulation: field and reservoir performance; conversion of depleted gas, gas condensate fields to gas storage reservoirs; gas storage in aquifers; monitoring; inventory verification; deliverability assurance and safety in storage operations; natural gas liquid recovery; gas treating and conditioning for the fuel market; storage in salt cacies and mined caverns.

Textbook:

References:
- Donald La Veme Katz, Natural Gas Engineering: Production & Storage, McGraw-Hill Companies, 1990
- Mohan Kelkar, Natural Gas Production Engineering, PennWell Books Technology & Engineering, 2008

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%
CHE272  Water Treatment

3 Cr. hrs. = [2 Lect. + 2 Tut + 0 Lab]  Prerequisite: CHE 212

Introduction for potable water supply treatment process - Physical processes: screening, mixing, sedimentation, membrane separation - Chemical process: coagulation, chemical precipitation, disinfection, ion exchange - Desalination processes: membrane separation, evaporation, reverse osmosis, ion exchange - Development of process design parameters.

Textbook:

References:

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%

CHE273  Air Pollution Control

3 Cr. hrs. = [2 Lect. + 2 Tut + 0 Lab]  Prerequisite: CHE 213

Selected chemical and physical properties of potential atmospheric pollutants - Basic properties and terminology - Industrial air pollution sources and prevention - Air pollution in the chemical process industries - Air pollution in the petroleum
industry - Air pollution from iron and steel manufacturing - Air pollution from lead and zinc smelting - Air pollution from nickel ore processing and refining - Air pollution from aluminum manufacturing - Air pollution from copper smelting - Air pollution dispersion - Dispersion theory basics - Estimating the air quality impact of stationary sources - Principles of pollution prevention - Prevention and Control Hardware - Methods of Particulate Collection, Methods for Cleaning Gaseous.

Textbook:

References:
- C. David Cooper, F. C. Alley, Air Pollution Control: A Design Approach, Waveland Pr Inc; 4 edition, 2010

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%
coding and air switching, x-ray attenuation coding and mechanical switching, Sorting by density –
Final disposal: Incineration, Composite, sanitary land fill, Pyrolysis, Pulping reclamation, Anaerobic digestion, Underground disposal, Deep shallow water disposal - Environmental stress, pollution issues for all of these options.

Hazardous wastes: Hazardous waste characterization and the regulatory process
Waste tracking systems, and - Waste minimization and resource recovery - minimization process selection –
CHE281 Material Science & New Materials

3 Cr. hrs. = [2 Lect. + 2 Tut + 0 Lab]  
Prerequisite: CHE 112


Textbook:

References:

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%,
**CHE311 Catalysis & Surface Chemistry**

2 Cr. hrs. = [2 Lect. + 0 Tut + 0 Lab]  
Prerequisite: CHE 232

The Structure of Surfaces, Thermodynamics of Surfaces, Dynamics at Surfaces, Electrical Properties of Surfaces, The Surface Chemical Bond, Catalysis by Surfaces, Mechanical Properties of Surfaces. Review of catalysis: Concepts like multiplet theory, ensembles, geometric factor; local field effects; coupled interactions; structure sensitivity and structure insensitivity; demanding reactions site structure; molecule; remote control and auto, remote; bi, and multi, functionality; forward and back spillover; bifurcation theory; bi, and multi layers; bond order conservation; electrochemical promotion; kinetic coupling; linear free energy relationships; metal, support interactions; pore efficiency and effectiveness; self organization, sorbate, sorbate interactions; structure breaking and directing; structure, reactivity relationships; poisoning, promotion and deactivation; selectivity, catalytic process engineering: examples and case histories; environmental and green chemical concepts.

**Textbook:**
- W. Adamson, Physical Chemistry of Surfaces, Wiley Intersciences, 5th Ed., 1995
- Bond, G C, Heterogeneous Catalysis: Principles & Application, Oxford University Pres, 1987,
References:
- Gabor A. Somorjai, Yimin Li, Introduction to Surface Chemistry and Catalysis, Wiley; 2 edition, 2010

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%,

**CHE321 Mass Transfer**

<table>
<thead>
<tr>
<th>3 Cr. hrs. = [2 Lect. + 2 Tut + 0 Lab]</th>
<th>Prerequisite: CHE 231</th>
</tr>
</thead>
</table>


Textbook:

References:
CHE331 Chemical Reactors Design

Prerequisite: CHE 232

3 Cr. hrs. = [2 Lect. + 2 Tut + 0 Lab]


Textbook:

References:

Assessment:
- Final Exam: 60%, Quizzes: 20%, Term Work: 20%,
CHE332  Modeling & Simulation in Chemical Engineering

3 Cr. hrs. = [2 Lect. + 2 Tut + 0 Lab]  Prerequisite: CHE 232

importance of modeling and simulation in chemical engineering systems and computer aided calculations, High level programming and software packages, Categories of Modeling approaches, Continuity equation, Heat transfer model, Mass transfer model, Chemical and physical equilibrium model, Rate equitation model, Developing mathematical relations for modeling chemical engineering systems, Modes of simulation, Applications using mathematical modeling and simulation to solve chemical engineering problems aided with computer.

Textbook:

References:

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%.

CHE333  Chemical Plant Design & Management

CHE334 Chemical Process Control

2 Cr. hrs. = [1 Lect. + 2 Tut + 0 Lab]  Prerequisite: CHE 332


Textbook:
References:

- George Stephanopoulos, Chemical Process Control: An Introduction to Theory and Practice, PTR Prentice Hall, 1984

Assessment:

Final Exam: 60%, Quizzes: 20%, Term Work: 20%

CHE351 Applied Biotechnology

2 Cr. hrs. = [2 Lect. + 0 Tut + 0 Lab]  Prerequisite: CHE 232

Bioprocess Engineering: Downstream processing for bioproducts, Removal of microbial cells and other solid matter, Disintegration of cells, Extraction methods, Concentration methods, Purification and resolution of mixtures, Drying, Thermodynamics of growth, Microbial process kinetics, Transport phenomena and bioreactor design, Transport phenomena and bioreactor design, Systems and operating constrains, Physical pathways in bioreactors, Interparticulate transfer rates; correlation for KL, Interparticulate bio-reaction rates, Physical properties of bioreactor media: Bioreactor performance, Power requirements, Scale - up, Microbial biomass as a protein source, Organic acids and amino acids, Microbial gums, The production and purification of fine enzymes

Textbook:

References:
- Nagat Abd Alla Mostafa, Basic and applied biotechnology, Faculty of Engineering, Minia University, 2008

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%

**CHE361 Petrochemical Industries**

3 Cr. hrs. = [2 Lect. + 2 Tut + 0 Lab] Prerequisite: CHE 241

Definitions of Petrochemicals, Raw materials, Classifications of petrochemicals according to sources, Unit processes in organic chemical synthesis based on acetylene, propylene, butadiene and petroleum aromatics, Thermal Cracking, Conversion Processes for Selected Petrochemicals, Petrochemical Complex, Processing of Plastic, Rubber, and Fiber, Layout of Petrochemical Plants, Processing Units, Offsite Facilities

References:
- Alain Chauvel, Gilles Lefebvre, Petrochemical Processes, Editions OPHRYS, ISBN 2710810662, 9782710810667
- Lahiri, Petrochemical Industries Technology and Processes, CBS Publisher & Distributors P Ltd, 2010

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%
**CHE362  Natural Gas Purifications**

3 Cr. hrs. = [2 Lect. + 2 Tut + 0 Lab]  
Prerequisite: CHE 261

Hydrogen sulphide and carbon dioxide removal, Alkaline salt solution for acid gas removal, Water as an absorbent for gas impurities, Sulpher dioxide removal, Sulpher recovery processing, Control of nitrogen oxides (NOx), Gas dehydration and purification, Thermal and catalytic conversion of gas impurities.

**Textbook:**

**References:**

**Assessment:**
Final Exam: 60%, Quizzes: 20%, Term Work: 20%

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**CHE371  Renewable Energy Resources Engineering**

3 Cr. hrs. = [2 Lect. + 2 Tut + 0 Lab]  
Prerequisite: CHE 221

Energy and sustainable development, Scientific principles of renewable energy, Technical implications, Social implications, Solar radiation, Diverse solar thermal applications: Air heaters, Crop driers, Water desalination, Solar ponds, Solar concentrators, Solar thermal electric power systems, Photovoltaic generation,
Hydro, power, Power from the wind, Biomass and biofuels: Biomass production for energy farming, Direct combustion for heat, Pyrolysis, Alcoholic fermentation, Anaerobic digestion tor biogas, Wastes and residues, Vegetable oils and biodiesel, Wave power, Tidal power, Geothermal energy, Energy systems storage and transmission, Institutional and economic factors.

Textbook:

References:

Assessment-
Final Exam: 60%, Quizzes: 20%, Term Work: 20%

CHE372 Wastewater Treatment

3 Cr. hrs. = [2 Lect. + 2 Tut + 0 Lab] Prerequisite: CHE 213


مجَيريُ مضز العزبًُ
وسارَ التعلًه العالى
المعَد العالى للَيدصُ والتهيىلىجًا ببرج العزب
قزار وسارٍ رقه

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و

Arab Republic of Egypt
Ministry of Higher Education
Higher Institute of Engineering & Technology,
Borg Al-Arab - Alexandria

لائحة الداخلية لمرحلة البكالوريوس
كيم ۲۷۱ هندسة ومصاد الطاقة المتجددة

الطاقة والتنمية المستدامة، المبادئ والأسس العملية للطاقة المتجددة، العوامل التقنية والاجتماعية للطاقة المتجددة، الإشعاع الشمسي، التطبيقات المتعددة للإشعاع الشمسي، صناعة الهواتف، مجتمعات المحاصيل الزراعية، تحلية المياه، البرك الشمسية، أنظمة توليد الطاقة الكهربائية من الحرارة الشمسية: الكهرواتومية، الطاقة الكبيرة من الطاقة المائية، مولدات الطاقة من الرياح، الكتلة الحيوية والوقود الحيوي: إنتاج الكتلة الحيوية كمزج لإنتاج الطاقة، الحرق المباشر لإنتاج الطاقة الحرارية، التقطير آلات، التخمر الكحولى، الخلايا الكيروضوئية، الطاقة الكبيرة: الطاقة الكريبتوكوبلازما، مجمعات الإشعاع الشمسى، أنظمة توليد الطاقة الكبيرة من الحرارة، الطاقة الناتجة من حرارة الأرض الجوفية، أنظمة تخزين ونقل الطاقة، العوامل الاقتصادية والمؤسساتية.
filtration, Rotating biological contactors, Anaerobic decomposition, Adsorption: theory of adsorption, properties of activated carbon, the Powdered Activated Carbon Treatment (PACT) process, Ion exchange, Chemical oxidation- Sludge handling and disposal, Miscellaneous treatment processes: Land treatment, Deep-well disposal, Membrane processes, Phosphorous removal, Filtration.

Textbook:

References:
- W. Wesley Eckenfelder, Jr., Industrial Water Pollution Control, McGraw-Hill Companies Inc., 3rd Ed, 2000

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%

CHE411 Nuclear & Radiation Engineering

2 Cr. hrs. = [2 Lect. + 0 Tut + 0 Lab]  Prerequisite: CHE 351

Radioactivity - Patterns of nuclear stability - Nuclear transmutation - Nuclear reactions - Ionized and nonionized radiations - Alpha, beta & gamma radioactive materials radiations - Rates of radioactive decay - Detection of radioactivity - Energy changes in Nuclear reactions - Nuclear materials ~ Nuclear power fission -
Nuclear power fusion - Radiation in the environment and living systems -
Extraction of uranium from its ores - Purification of uranium - Nuclear fuel
fabrication - Nuclear reactors - Radioactive waste disposal.

Textbook:
- Eugene R. Weiner, Applications of Environmental Chemistry a Practical Guide
  for Environmental Professionals. Lewis Publishers, CRC, 2000

References:
  (Pearson International, 2010

Assessment:
- Final Exam: 60%, Quizzes: 20%, Term Work: 20%

CHE412  Computer Applications in Chemical Engineering

3 Cr. hrs. = [2 Lect. + 1 Tut + 2 Lab]

This course applies numerical methods to solve a broad range of chemical engineering problems. Numerical techniques for solving problems expressed in terms of matrix, ordinary and partial differential equations will be developed. Use of computer software to solve typical problems in fluid mechanics, heat and mass transfer, mass and energy balances, unit operations, reactor engineering, and process and equipment design and control.
Application of Computational Fluid Dynamics to simulate flow systems and advanced heat transfer problems. Use of software packages such as Excel, Mathcad, Mathlab, polymath, mathematica for chemical engineering system design. Apply software packages to simulate unit operations and processes.

**Laboratory:**
1. Practice the use of Computational Fluid Dynamics to simulate flow systems and heat transfer problems.
2. Practice using software packages as Excel, Mathcad, Mathlab, polymath, mathematica to be familiar with Interface features, Graphical features, Computational features and advanced features of the software.
3. Practice the use of software packages to design chemical engineering units and systems.

**Textbook:**

**References:**

**Assessment:**
- Final Exam: 50%, Quizzes: 20%, Term Work: 30%,
CHE431  Industrial Safety & Risk Analysis

3 Cr. hrs. = [2 Lect. + 2 Tut + 0 Lab]  Prerequisite: CHE 331

Chemical Plants Economics

Prerequisite: CHE 331

Cost and asset accounting - Cost estimation - Interest and investment costs - Taxes and insurance - Depreciation - Profitability - Alternative investments and Replacements - Optimum design and design strategy - equipment sizing and cost estimation.

Textbook:

Assessment:
- Final Exam: 60%, Quizzes: 20%, Term Work: 20%

Chemical Plants Economics

Prerequisite: CHE 331

Cost and asset accounting - Cost estimation - Interest and investment costs - Taxes and insurance - Depreciation - Profitability - Alternative investments and Replacements - Optimum design and design strategy - equipment sizing and cost estimation.

Textbook:

Assessment:
- Final Exam: 60%, Quizzes: 20%, Term Work: 20%
**CHE451  Mechanical Unit Operations**

3 Cr. hrs. = [2 Lect. + 2 Tut + 0 Lab]  
Prerequisite: None


**Textbook:**

**References:**

**Assessment:**
- Final Exam: 60%, Quizzes: 20%, Term Work: 20%
CHE452  Multistage Separation Operation

3 Cr. hrs. = [2 Lect. + 2 Tut + 0 Lab]  Prerequisite: CHE 321

Interphase mass transfer and types of mass transfer operations, Single and Multiple Stage Equilibrium Contact Stages, Absorption, Distillation, Adsorption. Membrane separation: Liquid permeation membrane processes or dialysis, Gas permeation membrane processes, Reverse osmosis and its application to desalination. Crystallization, Drying of process materials, Leaching.

Textbook:

References:

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%

CHE461 Petroleum Refining Engineering

3 Cr. hrs. = [2 Lect. + 2 Tut + 0 Lab]  Prerequisite: CHE 241

Introduction including: Theories of petroleum origin - Methods of prospecting, drilling and production of crude oil - Crude classification and evaluation - Crude distillation - Catalytic reforming and isomerization - Thermal cracking and coking processes - Hydro-conversion processes - Fluidised catalytic cracking - Product
blending - Clean fuels - Residue upgrading - Safety aspects in petroleum refineries - Acid gas processing and mercaptans removal - Refinery economics - Environmental aspects in refining - Overall refinery case study


References:

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%

**CHE491 Project**

6 Cr. hrs. = [4 Lect. + 0 Tut + 6 Lab]

Students are assigned to perform an integrated study for a project describing a unit process for production a chemical compound or a group of chemical compounds from its raw materials till the final product. The study has to demonstrate that student able to apply the main concepts and theories studied before in different courses such as: Thermodynamics, - Reaction kinetics, Mass, heat and momentum transfer, Computer technology. Students prepare a report demonstrating their
skills on research and analysis and obtaining data and information from literature and scientific periodicals, preparing and writing technical reports. The study include the following: Flow Diagrams: Qualitative flow diagram indicating the flow of materials, unit operations involved, equipment necessary, and special information on operating temperatures and pressures. A quantitative flow diagram shows the quantities of materials required for the process operation. - Material and Energy balances (integrated and detailed) - Calculating volumes and dimensions of reactors and vessels and their dimensions and their material of construction - Pumps, flow meters, control, and safety equipment required - Systems recommended for waste disposal and handling - Economic analysis.

**Assessment:**

*Year Work: 50%, Final Graduation Report/Thesis and Oral: 50%*
Humanities & Social Sciences

HUM011 Arabic Language

2 Cr. hrs. = [2 Lect. + 0 Tut + 0 Lab]

References:

Assessment:
Final Exam: 60% , Quizzes: 20% , Term Work: 20% ,

HUM012 English Language 1

2 Cr. hrs. = [1 Lect. + 2 Tut + 0 Lab]

How to talk about the people in your life - how to talk about greeting customs - how to explain who people are - how to correct a misunderstanding - writing a self - introduction - how to talk about your background - how to talk about tourism - how to describe objects - how to tell an anecdote - writing an intercultural experience - how to talk about your schooldays - how to talk about your achievements - how to offer hospitality - how to talk about your education and career - writing a CV - how to say how you feel about things - how to talk about music - how to compare and discuss preference - comparing with as - how to explain what a film is about - writing a description of a film or book - how to talk about countries and governments - how to talk about rules and laws - how to talk about stories in the news - how to talk about past events - writing narrating a
story - how to express strong feelings - how to tell and show interest in an anecdote - how to talk about people in your neighborhood (pronouns in reported speech) - how to report what people said - writing exchanging news in a personal letter - how to say how people look - how to talk about fashion - how to talk about plans and intentions - how to express guesses - writing a letter of application - how to talk on the phone - how to talk about ability - how to report an interview - how to report a conversation - writing a report - how to make small talk - how to talk about your future - how to give advice - how to talk about unreal situations - writing an opinion - how to exchange opinion - how to talk about your shopping habits - how to talk about recent activities - how to ask about products in a shop - writing a letter of complaint - how to give and ask about directions - how to talk about holiday accommodation - how to give health advice - how to give extra information - writing a website recommendation - how to explain your point of view - how to talk about hopes and wishes - how to describe the plot of a story - how to talk about important decisions - writing a story with a moral.

Textbook:

Assessment:
Final Exam: 60% , Quizzes: 20% , Term Work: 20% .

HUM013  English Language 2

2 Cr. hrs. = [1 Lect. + 2 Tut + 0 Lab]  Prerequisite: HUM 012

Question tags (check information) - futures overview - verb phrase about work (talk about future plans & make predictions) - narrative tenses - time expressions - (write a short story) if structures p) - (write a dairy entry) - used to/get used to/would - appearance (describe appearance) - present perfect simple & continuous -adjectives with ed & ing endings - (write an informal email) - countable & uncountable nouns - food & cooking - (describe how to prepare & cook a dish) - it's time/I'd rather/ I'd better - describing personality(describe different types of people) - sequencing devices e.g. after + ing - vocabulary: law & insurance (tell a funny story) - reflexive pronouns - (ask about & give your own beliefs & opinions), present/future modals of possibility - noises) make speculations(- in case - write a formal letter of application > adjectives & adverbs
- verb phrases with take - (give a presentation about a place - present/future modals of possibility - noises - (make speculations - in case - (write a formal letter of application - adjectives& adverbs - verb phrases with take - (give a presentation about a place) - emphasis - phrasal verbs with out - (compare & contrast photographs) - although /but/however/nevertheless - feelings - (talk about books - making comparisons - verb phrases about moving/ travelling - (make comparisons about places & people - have/get something else - animal expression - (talk about services - hard and hardly - (write a report of survey findings - Relative clauses - (write an article) - if Structure (2) - speaking - (talk about your regrets & resolutions).

**Textbook:**

**Assessment:**
- Final Exam: 60% , Quizzes: 20% , Term Work: 20%

### HUM081 Computer Skills

0 Cr. hrs. = [1 Lect. + 0 Tut + 4 Lab]

The goal of this course is to teach and assess basic computer concepts and skills so that students can use computer technology in everyday life to develop new social and economic opportunities for themselves, their families, and their communities. This curriculum will help students to develop a fundamental understanding of computers; from using the Internet, to sending e-mail, to creating a resume. This curriculum helps in developing the essential skills the student needs to begin computing with confidence.

The course consists of five modules: (1) Computer Basics (Introduction to Computers - Common Computer Terminology - Computer Performance and Features - Computer Operating Systems - Career Opportunities); (2) The Internet and the World Wide Web (The Internet - The World Wide Web - Using e-mail - Other Methods of Communicating on the Internet); (3) Productivity Programs (Introduction to Productivity Programs - Common Features and Commands - Introduction to Word Processing - Introduction to Spreadsheet Programs - Introduction to Presentation Programs - Introduction Database Programs); (4) Computer Security and Privacy (Introduction to Computer Security and Privacy -

Laboratory:
- Practice using ICDL components.

Assessment:
Examination/Oral: 100%

HUM111  Technical Report Writing

2 Cr. hrs. = [1 Lect. + 2 Tut + 0 Lab]  
Prerequisite: HUM 013

Essential elements of a technical report: Abstract, Summary, Contents, Objectives, Details of the report including figures, images, video,... etc, Conclusions, Recommendations, References using a standard format and the different electronic sources.

Report Composition: Logical presentation of the report and coordination between its components. Importance of using correct grammar and punctuation. Enhancing communication effectiveness by the use of different media.

Report Implementation: Use of the appropriate software packages including any graphics or multimedia packages.

References:

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%

HUM121 Introduction to Accounting

2 Cr. hrs. = [2 Lect. + 0 Tut + 0 Lab]  Prerequisite: None

The scientific frame of accounting: accounting concept & objectives, acceptable principles of accounting, accounting branches, types of institutions - financial statement: balance sheet, income statement, ownership proprietary statement, cash flows statement - double entry & analysis of financial transactions: accounting continuous balance of the financial position formula, debit & credit items financial position formula - the accounting cycle: business documents, the journals the ledgers' commercial documents according to the Egyptian laws. Journalizing & recording the commercial transactions of the firm, transactions of
the owner of the firm, commercial papers & documents different types of revenues & expenditure. Trail Balance: Trail balance concept & objectives, its balance & imbalance corrections in the imbalance cases. A brief presentations of accounting in she types of companies as partnerships, limited partnerships & corporation.

References:
• Mohamed Sabri El Attar, Mansoura Hamed & Ahmed ElSabagh, Principles of financial Accounting, Cairo University.

Assessment:
Final Exam: 60% , Quizzes: 20% , Term Work: 20% ,

HUM181 Communication & Presentation Skills

2 Cr. hrs. = [1 Lect. + 2 Tut + 0 Lab]  Prerequisite: None

Course Aims: to providing the student with the latest knowledge about the concepts, characteristics, and types of managerial and interpersonal communications, as well as the concepts and requirement of good listening and presentation, and Developing the student's abilities and skills of effective communication, and good listening, as well as how to use the interpersonal and managerial communication methods and the presentation techniques in performance and dealing with others inside and outside the organization.

Course Contents: Concept and nature of communication, Communication model, Formal and informal communications, Interpersonal and managerial communications, Body language, Written communications (Reports and memos),
Ten Commandments of effective communication, Good listing, Elements of effective presentation model, Preparation of good presentation, Carrying out presentations, Discussion and dealing with objections, Evaluating presentation performance.

牢 contrasting the student to the new language of the public and private organizations in the environment and handling of the other presentations, making an assessment of the public relations, the model of public relations, official and unofficial relations, personal and administrative relations, language of the written (reports and memos), the Ten Commandments of effective communication, good listing, elements of the public presentation model, preparation of good presentation, carrying out presentations, discussion and dealing with objections, evaluating presentation performance.

Textbook:

Assessment:
Final Exam: 60% , Quizzes: 20% , Term Work: 20%.

HUM182 Analysis & Research Skills

2 Cr. hrs. = [1 Lect. + 2 Tut + 0 Lab]  
Prerequisite: None

Analysis Skills: Framework for analyzing engineering problems taking into account technical, economic, environmental, and ethical issues. Phases of problem solving (Understanding the problem and formulating it, Solution plan, Implementation plan, Evaluation, and Revision). Role of creativity in the analysis. SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis for different alternatives. Detailed Cost - Benefit analysis and Risk analysis. Role of cooperation and team - work in analyzing large engineering problems. Importance of finding the relevant data, information, and knowledge.
Search Skills: Basic Web search methods and how to formulate search engine queries using logical connectives (e.g. AND, OR, NOT). Phrase, title, domain, URL, and link search. Evaluating search results, choosing the appropriate search engine. Importance of evaluating the credibility of the different Web sites.

References:

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%.

HUM221 Business Administration

2 Cr. hrs. = [2 Lect. + 0 Tut + 0 Lab] \hspace{1cm} Prerequisite: None

Nature, scope, importance & characteristics of business administration, development of the managerial thought, business external & internal environments, types of institutions, the managerial process.

Functions of management: planning: planning concept & importance, types of plans, characteristics & contents of the plan, planning stages, budgeting for planning. Organization: organization concept & importance, characteristics of good & effective organization, types of organization structures, centralization & decentralization, span of supervision, delegation of authority, integration among
the different units in the organization. Direction & supervision: Motivation, communications leadership & its different types.

Control: concept & importance of control, control steps, objectives, actual performance, the deviation, reasons of the deviation, the corrective actions, types of control, internal & external control. Decision - Making: Types of administrative decisions, decision - making process & steps, importance of information of decision making.

Major functions in different companies: production, marketing, finance, human resources.

Textbook:
- Mohamed Abdallah Abd El Rehim, Fundamental of Management & Organization, Cairo University.

References:
- El Oesouky Hamed Abou Zeid, the Scientific Fundamentals of Management. Cairo University.

Assessment:
- Final Exam: 60%, Quizzes: 20%, Term Work: 20%
HUM351  Professional Ethics

1 Cr. hrs. = [1 Lect. + 0 Tut + 0 Lab]  
Prerequisite: None

Global Vision about Engineering Science & job of Engineer Engineering Science is the indicator for any civilization since long time ago. - Being an Engineer is one of the finest and the highest job (Engineering job based on creativity, innovation and development from his own imagination - Serving the whole humanity and seeking for the quality in human life).

Engineers responsibility in the national and the international scale: Vital role for the engineer according to the international engineering contracts (FIDIC) - Responsibility of the engineer according to the Egyptian Laws.

Job ethics and etiquette: Global vision on the Engineers Syndicate law no. 66 for 1974 - Confirming.

References:
- قانون نقابة المهندسين المصرية ولاحته التنفيذية

Assessment:
- Final Exam: 60%, Quizzes: 20%, Term Work: 20%
**HUM352 Human Rights**

1 Cr. hrs. = [1 Lect. + 0 Tut + 0 Lab]  

Prerequisite: None

<table>
<thead>
<tr>
<th>Topic</th>
<th>Textbook</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>عصام محمد إبراهيم زناتي، قانون حقوق الإنسان، دار النيضة العربية، 2012</td>
</tr>
<tr>
<td></td>
<td>عبد الوهاب الفار، قانون حقوق الإنسان في الفكر الوضعي والشريعة الإسلامية، دار النهضة العربية، 1987</td>
</tr>
</tbody>
</table>

References:
- المجلة المصرية لقانون الدول والمنظمات الدولية لحقوق الإنسان، إصدارات المجتمع العربي لحقوق الإنسان

Assessment:
- Final Exam: 60%  
- Quizzes: 20%  
- Term Work: 20%.

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**HUM381 Principles of Negotiation**

2 Cr. hrs. = [2 Lect. + 0 Tut + 0 Lab]  

Prerequisite: None

Course Aims: Providing the student with the latest knowledge about the concepts, dynamic nature, principles, attributes, strategies, and tactics of effective negotiations, and Developing the student's abilities and skills for good preparation and practices of negotiation in the contemporary organizations.

Course Contents: Negotiation: concept, attributes, and principles, Dynamic nature of negotiation, Interdependence. Ethics of negotiation, Psychological and social

Textbook:

Assessment:
Final Exam: 60% , Quizzes: 20% , Term Work: 20% ,

HUMx62 Music Appreciation

Prerequisite: None

2 Cr. hrs. = [2 Lect. + 0 Tut + 0 Lab]

الاستماع لمجموعات الآلات الموسيقية الوركستالنية وهي مجموعة آلات النفخ الخشبية، مجموعة آلات النفخ النحاسي، الآلات الإيقاعية، التعرف عليها من خلال الصور المرفقة مع المزمزة الخاصة بالمقرر دراسي. الدراسة النظرية بطرقية مختصرة تشمل الجوانب المعرفية الأساسية والمطلوب دراستها للحصول الموسيقية المختلفة (عصر البازو، العصر الكلاسيكي، العصر الرومانتيكي، نبذة عن موسيقى الغاز ونشأتها، نبذة عن الموسيقى العربية وآلاتها المستخدمة)
اللاحتلة الداخلية لمرحلة البكالوريوس

نموذج: دراسة المقرر

الأهداف العامة للمقرر: بعد دراسة هذا المقرر يكون الطالب قادرًا على: التعرف والاستماع على الآلات الموسيقية المستخدمة في الأوركسترا، دراسة أنواع الموسيقى الهامة عن موسيقى الجاز، دراسة الموسيقى العربية والأوروبية، الإيمان الكامل بأنواع الموسيقى المختلفة.

المهارات الذاتية: بعد دراسة هذا المقرر يكون الطالب قادرًا على: إدراك ومعرفة أنواع الآلات الموسيقية المختلفة، تمييز نوع الموسيقى المختلفة (عالمية، عربية)، معرفة تكوين الأوركسترا الغربي والغربي والغربي وفرق الجاز.

المهارات العامة: بعد دراسة هذا المقرر يكون الطالب قادرًا على: التواصل الفعال، من خلال المناقشة والحوار، توظيف المادة العلمية في خدمة الثقافة الموسيقية، الإيمان بنظريات علمية في غير مجال التخصص، الأساليب المستخدمة للتقديم: مناقشات وشرح خلايا المحاضرة، اختبارات شفوية وتحريرية، اتخاذ نهاية الفصل الدراسي.

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%.

HUMX71  Introduction to The History of Civilizations

2 Cr. hrs. = [2 Lect. + 0 Tut + 0 Lab]  Prerequisite: None

مفهوم الحضارة (الثقافة والحضارة، التاريخ والحضارة)، أصول الحضارة الإنسانية في العصور القديمة (البديعات الحضارية الأولى، الثقافة والحضارة في الشرق القديم، وفي الغرب القديم " اليونان والرومان"، الحضارة والثقافة في العصور الوسطى (المسيحية، الإقطاع، العرب، العصور الإسلامية)، الحضارة في العصور الحديثة (النهضة، الإصلاح المدني، تقدم العلوم، الفلسفة والآداب والفنون).

References:
- حسين مؤنس، الحضارة، عالم المعرفة، الكويت 1978
- حسن شجاعة مصطفى، الموجز في تاريخ الحضارة والثقافة، دار النهضة المصرية 1959
- رالف لونتين، شجرة الحضارة، ترجمة أحمد فخري (3 أجزاء) المركز القومي للترجمة 2010

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%
HUMx72  Trends in Contemporary Arts

2 Cr. hrs. = [2 Lect. + 0 Tut + 0 Lab]  Prerequisite: None

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%

HUMx73  Recent Egypt’s History

2 Cr. hrs. = [2 Lect. + 0 Tut + 0 Lab]  Prerequisite: None

Assessment:
Final Exam: 60%, Quizzes: 20%, Term Work: 20%
References:

- أحمد زكريا الشماغ، تطور مصر الحداثة، الهيئة العامة لقصور الثقافة، القاهرة 2011
- أحمد عبدالرحمن مصطفى، تاريخ مصر السياسي من الاحتلال إلى المعاهدة، دار المعارف، 1967
- يونان نجيب رزق، تقديم وراجع، المرجع في تاريخ مصر الحديث والمعاصر، المجلس الأعلى للثقافة 2009

Assessment:

Final Exam: 60%, Quizzes: 20%, Term Work: 20%

HUMx74  Heritage of Egyptian Literature

2 Cr. hrs. = [2 Lect. + 0 Tut + 0 Lab]  Prerequisite: None

الأثر الآدبي المصري

الКурс يهدف للمقرر إلى تعريف الطالب بالتميز الإقليمي لمصر في العصور القديمة والوسطى الحديثة وأثر عقيدة المكان على الفكر والموضوع المصري وتجلياته في التراث الآدبي شعر وustry من خلال الدروس التاريخية والمدنية للذات المصرية في مراحل مختلفة.

التمتت المقرر: مصر وتراثها القومي من نظرة حضارية وإبداعية،懂得 التراث الآدبي المصري والرجولي في العصور الوسطى وتأثيرها بينه وبين المصري والخطاب الوسطي في أوروبا، التراث الجغرافي المصري وأدب الرحلة في كتابات مصرية، التأليف الموسيقى في مصر والصياغة الأدبية في فن الموسوعات، ظواهر الأدبية العشيرة على الأدب المصري، مناهج دراسة التراث الآدبي المصري، معارف الفنون في الشعر المصري، مدارس الكتابة القصبة (الطبيعة المصرية)، أدب الحرب الموضوعات الجديدة والبيئة المصرية، مدارس الكتابة القصبة على المستوى الرسمي وغيرها، تتبع التطبيق على النص والتحليل من خلال أبرز شعراء وكبار الكتاب المصريين من أمثال ابن يثيم المصري وابن بناء الملك وصولا إلى أوراق الدكتور محمد كامل حسين والأستاذ أمين الخولي والدكتور جمال حمداوي في تناول التراث الآدبي المصري بالتحليل والدراسة المنهجية حول عبقية المكان.
## References:

- عوض مرسي الغباري، كتاب دراسات فى الأدب المصرى، الدار الدولية لللاستثمارات الثقافية، القاهرة، الطبعة الأولى 2007

### Assessment:

Final Exam: 60%, Quizzes: 20%, Term Work: 20%

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### HUMx75  Arab& Islamic Civilization

2 Cr. hrs. = [2 Lect. + 0 Tut + 0 Lab]  
Prerequisite: None

<table>
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<tr>
<th>الحضارة الإسلامية</th>
<th>X75</th>
</tr>
</thead>
<tbody>
<tr>
<td>أسس الحضارة الإسلامية (القرآن والسنة، الأمة العربية، اللغة، الإطار الجغرافي، الشعوب المفتوحة، التأثيرات الأجنبية)، النظام السياسي (الخلافة، الوزارة، الكتابة، الحجابة)، النظام الإداري (الإدارات المحلية، دواوين الجند والخرج والرسائل والبريد… الخ)، النظام المالي (موارد بيت المال، النفقات، السكينة، النظام العسكري) (الجيش: تكوينه وأسلحته وأسلوبه، الأسطول)، التعليم والثقافة (العلوم الشرعية علم الكلام والفقه…، العلوم العقلية)، الفنون والآثار والعمارة، القضاء والنقض، المجتمع الإسلامي (عاصمة وأجناسه، الطوائف الدينية والمهذبة، البنية الطبقية: الحكام والفقهاء والعلماء والتجار وأصحاب الحرير والصناعات… إلخ).</td>
<td></td>
</tr>
</tbody>
</table>

### References:

- أحمد عبد الرازق، الحضارة الإسلامية في العصور الوسطى، 2004
- فتحية النبراوي، تاريخ النظم والعهود الإسلامية، 1985
- عبد المنعم ماجد، تاريخ الحضارة الإسلامية في العصور الوسطى، 1978

### Assessment:

Final Exam: 60%, Quizzes: 20%, Term Work: 20%,
**HUMx76 Literary Appreciation**

2 Cr. hrs. = [2 Lect. + 0 Tut + 0 Lab]  

Prerequisite: None

- **References:**
  - عبد الله التطاوي، تقاطعات الحركة الشعرية بين الموروث والفردي، الدار المصرية اللبنانية 2007

- **Assessment:**
  - Final Exam: 60%  
  - Quizzes: 20%  
  - Term Work: 20%
### General

**FT291 Field Training 1**

<table>
<thead>
<tr>
<th>1 Cr. hrs. = [0 Lect. + 0 Tut + 6 Lab]</th>
<th>Prerequisite: None</th>
</tr>
</thead>
</table>

Students should spend * weeks in field training, after completing the Second level, in any Engineering Institution or Engineering Firms. Students should demonstrate the professional and practical skills they acquired during discussion with their assigned tutors.

**Assessment:**

Term Work: 50%. Experimental/Oral: 50%

### FT391 Field Training 2

<table>
<thead>
<tr>
<th>1 Cr. hrs. = [0 Lect. + 0 Tut + 6 Lab]</th>
<th>Prerequisite: None</th>
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</table>

Students should spend £ weeks in field training, after completing the Third level, in any Engineering Institution or Engineering Firms. They should prepare a technical report implying a full description of the processes they joined for training. Students should demonstrate the professional and practical skills they acquired during discussion of report with their assigned tutors.

**Assessment:**

Term Work: 50%. Experimental/Oral: 50%