

الخطة الدراسية لبرنامج "الدرجة الجامعية المتوسطة" في تخصص الهندسة المدنية والبيئة العمرانية (برنامج دولي)

تم اعتماد هذه الخطة الدراسية بموجب قرار مجلس عمداء جامعة البلقاء التطبيقية رقم
750 / 2017 / 2018 تاريخ 2018/4/24م (الجلسة السادسة والعشرون) وتطبق اعتباراً من
مطلع العام الجامعي (2018/2017)

تتكون الخطة الدراسية لنيل الدرجة الجامعية المتوسطة في برنامج تكنولوجيا الهندسة المعمارية
والمدنية والبيئة/ تخصص الهندسة المدنية والبيئة العمرانية من (72) ساعة معتمدة، موزعة على
النحو الآتي:

الرقم	المتطلب	ساعة معتمدة
1.	المهارات العامة	12
2.	مهارات التشغيل	6
3.	العلوم المساندة	9
4.	المهارات المتخصصة	45
المجموع		72

وصف مخرجات التخصص:

يهدف هذا التخصص الى تخريج تقنيين للعمل في مجال: حاسب كميات انشائية، مراقب بناء وعمال في المواقع الانشائية، مساعد مصمم انشائي في البناء التقليدي والبناءالمستدام، رسام مخططات تنفيذية دقيقة باستخدام عدد من البرمجيات الحديثة مثل (Revit, BIM)، مساعد مصمم انشائي في عمليات رصف الطرق وتجهيز البنية التحتية.

المجالات المعرفية للمهارات المتخصصة:

#	الفرع	الساعات المعتمدة		المواد التي تغطي الفرع
		نظري	عملي	
1.	مبادئ الهندسة المدنية وتطبيقاتها	11	4	مفاهيم اساسية في تكنولوجيا البناء المواد الانشائية مختبر المواد الانشائية الرياضيات الهندسية التطبيقية مبادئ التصميم الانشائي التصميم الانشائي المتقدم
2.	ادارة المشاريع الانشائية وحساب الكميات	5	8	الرسم الانشائي الطرق البديلة للانشاءات مبادئ ادارة المشاريع الانشائية ادارة المشاريع الانشائية المتقدمة تطبيقات الحاسوب في الانشاءات
3.	هندسة الطرق والتربة	9	5	جيولوجيا وميكانيكا التربة مختبر جيولوجيا وميكانيك التربة المساحة وعمليات التوقيع مختبر المساحة وعمليات التوقيع هندسة الطرق والاسفلت مختبر هندسة الطرق والاسفلت هيدرولوجي
4.	التدريب الميداني		3	
	مجموع الساعات المعتمدة	25	20	45 (س.م)

الخطة الدراسية لتخصص "الهندسة المدنية والبيئة العمرانية"

أولاً: المهارات العامة، (12) ساعات معتمدة موزعة على النحو الآتي:

رقم المادة	اسم المادة	س.م	نظري	عملي	المتطلب السابق
020000111	المواطنة الإيجابية ومهارات الحياة	3	3	0	
020000121	الثقافة الإسلامية	3	3	0	
020000131	التربية الوطنية	2	2	0	
020000181	العلوم العسكرية	1	1	0	
020000101	مهارات لغوية /إنجليزي	3	3	0	
المجموع (س.م)					0

ثانياً: مهارات التشغيل ، (6) ساعات معتمدة موزعة على النحو الآتي:

رقم المادة	اسم المادة	س.م	نظري	عملي	المتطلب السابق
020000122	مهارات التواصل باللغة الإنجليزية	2	2	0	
020000231	ريادة الأعمال	2	2	0	
020000141	الصحة والسلامة والبيئة المهنية	2	2	0	
المجموع (س.م)					0

ثالثاً: المهارات المساندة، (9) ساعات معتمدة موزعة على النحو الآتي:

رقم المادة	اسم المادة	س.م	نظري	عملي	المتطلب السابق
020000151	مفاهيم رياضية	3	3	0	
020000161	مفاهيم فيزيائية	3	3	0	
020000162	مختبر مفاهيم فيزيائية	1	0	3	020000161*
020000171	الرسم الهندسي بالحاسوب	2	0	6	
المجموع (س.م)					3

الخطة الدراسية لتخصص "الهندسة المدنية والبيئة العمرانية"

رابعاً: المهارات المتخصصة، (45) ساعة معتمدة، موزعة على النحو الآتي:

رقم المادة	اسم المادة	س.م	نظري	عملي	المتطلب السابق
020108111	مفاهيم أساسية في تكنولوجيا البناء	3	2	3	
020108121	مبادئ ادارة المشاريع الانشائية	2	1	3	
020108131	المواد الانشائية	2	1	3	
020108132	مختبر المواد الانشائية	1	0	3	020108131
020108141	الرسم الانشائي	2	0	6	020000171
020108211	الطرق البديلة للإنشاءآت	2	1	3	020108111
020108122	إدارة المشاريع الإنشائية المتقدمة	2	1	3	020108121
020308221	الرياضيات الهندسية التطبيقية	3	3	0	020000151
020108142	مبادئ التصميم الانشائي	3	2	3	020308221
020108151	جيولوجيا وميكانيكا التربة	3	3	0	020108111
020108152	مختبر جيولوجيا وميكانيكا التربة	1	0	3	020108151
020108241	التصميم الانشائي المتقدم	3	3	0	020108142
020108161	المساحة وتوقيع المخططات	3	2	3	020108111
020108162	مختبر المساحة وتوقيع المخططات	1	0	3	020108161
020108251	هندسة الطرق والأسفلت	2	2	0	020108161
020108252	مختبر هندسة الطرق والاسفلت	1	0	3	020108251
020108171	هيدرولوجي	3	2	3	020000161
020108281	تطبيقات الحاسوب في الانشاءات	2	0	6	020108141
020108221	مشروع التخرج	3	2	3	020108122
020108291	التدريب الميداني	3	-	*	
المجموع (س.م)					
		45	25	20	

* - تدريب عملي متواصل لمدة (8) أسابيع.

الخطة الاسترشادية لتخصص "الهندسة المدنية والبيئة العمرانية"

=====

الفصل الدراسي الثاني			الفصل الدراسي الأول		
س.م.	رقم المادة	اسم المادة	س.م.	رقم المادة	اسم المادة
2	020000171	الرسم الهندسي بالحاسوب	3	020000151	مفاهيم رياضية
2	020108131	المواد الانشائية	3	020000161	مفاهيم فيزيائية
1	020108132	مختبر المواد الانشائية	1	020000162	مختبر مفاهيم فيزيائية
3	020000101	مهارات لغوية/ انجليزي	3	020000111	المواطنة الايجابية ومهارات الحياة
2	020108121	مبادئ ادارة المشاريع الانشائية	2	020000141	الصحة والسلامة والبيئة المهنية
2	020000131	التربية الوطنية	3	020000121	الثقافة الاسلامية
3	02018161	المساحة وعمليات التوقيع	3	020000151	مفاهيم اساسية في تكنولوجيا البناء
2	020108211	الطرق البديلة للانشاءات			
1	020108252	مختبر المساحة وعمليات التوقيع			
18		المجموع	18		المجموع

الفصل الدراسي الرابع			الفصل الدراسي الثالث		
س.م.	رقم المادة	اسم المادة	س.م.	رقم المادة	اسم المادة
2	020000122	مهارات التواصل باللغة الانجليزية	2	020108141	الرسم الانشائي
3	020108291	التدريب الميداني	2	020108251	هندسة الطرق والاسفلت
3	020108241	التصميم الانشائي المتقدم	3	020108142	مبادئ التصميم الانشائي
3	020108171	هيدرولوجي	3	020108151	جيولوجيا وميكانيكا التربة
2	020000231	ريادة الاعمال	3	020308221	الرياضيات الهندسية التطبيقية
1	020108252	مختبر هندسة الطرق والاسفلت	1	020108152	مختبر جيولوجيا وميكانيكا التربة
1	020000181	العلوم العسكرية	2	020108122	ادارة المشاريع الانشائية المتقدمة
3	020108221	مشروع التخرج	2	020108281	تطبيقات الحاسوب في الانشاءات
18		المجموع	18		المجموع

الوصف المختصر للمواد التعليمية في " الهندسة المدنية والبيئة العمرانية "

أولاً: الثقافة العامة

<p>المواطنة الإيجابية ومهارات الحياة 020000111 (3: 0-3)</p> <p>يوضح المساق مفهوم المواطنة ومهارات الحياة وأهميتها في اكتساب مهارات قيمه، والعمل على استخدام هذه المهارات في سعيهم للحصول على تعليم أفضل ونتائج ايجابية في العمل، حيث ان المساق يراعي بناء المعرفة في الموضوعات التي يتضمنها البرنامج كما ويبني المهارة عند الشباب لاستخدامها في تطبيق المعرفة كما ويبني الثقة في قدرات الشباب على استخدام هذه المعرفة والمهارة بالاضافة الى توفير الدعم الشخصي والبيئي لتغيير السلوك من خلال تعزيز قيم المواطنة الايجابية والثقافة المجتمعية البناء والعمل المجتمعي التطوعي.</p>
<p>الثقافة الإسلامية 020000121 (3: 0-3)</p> <p>1. تعريف الثقافة الإسلامية وبيان معانيها وموضوعاتها والنظم المتعلقة بها - وظائفها وأهدافها. 2. مصادر ومقومات الثقافة الإسلامية والأركان والأسس التي تقوم عليها. 3. خصائص الثقافة الإسلامية. 4. الإسلام والعلم، والعلاقة بين العلم والإيمان 5. التحديات التي تواجه الثقافة الإسلامية. 6. رد الشبهات التي تثار حول الإسلام. 7. الأخلاق الإسلامية والآداب الشرعية في إطار الثقافة الإسلامية. 8. النظم الإسلامية.</p>
<p>التربية الوطنية 020000131 (2: 0-2)</p> <p>يعد مساق التربية الوطنية من المتطلبات الإلزامية لجميع طلبة كليات المجتمع الأردنية وامتدادا لعضوية فلسفة التربية الوطنية والتعليم باعتبارها بعدا من أبعاد الإستراتيجية الوطنية للتعليم العالي، وينطلق مساق "التربية الوطنية" من مجموعة الثوابت الأردنية وعلى رأسها العقيدة الإسلامية السمحة، ومبادئ الثورة العربية الكبرى، والدستور الأردني والتجربة الوطنية.</p>
<p>علوم عسكرية 020000181 (1: 0-1)</p> <p>المحور الأول: نشأة وتطور القوات المسلحة/ الجيش العربي، أسلحة المناورة، أسلحة الإسناد، أسلحة الخدمات المحور الثاني: الثورة العربية الكبرى، الحروب العربية الإسرائيلية (حروب 1948، 1967، معركة الكرامة 1968، حرب تشرين 1973)، دور القوات المسلحة الأردنية- الجيش العربي في التنمية الوطنية الشاملة المحور الثالث: الأمن العام، المخابرات العامة، قوات الدرك، الدفاع المدني</p>
<p>مهارات لغوية انجليزي: 020000101 (3-0:3)</p>

ثانياً: مهارات التشغيل والاستخدام

مهارات التواصل باللغة الإنجليزية 020000122 (2: 0-2)

This is a communication skills course which aims at improving learners' oral and written communication skills by providing learners with the language needed to naturally and confidently communicate in an English speaking workplace environment and real life situations.

ريادة الأعمال 020000231 (2: 0-2)

يوضح المساق مفهوم ريادة الأعمال، تأثيرها في الإقتصاد الوطني ودورها في القضاء على البطالة، وكيفية استحداث أفكار ريادية ومبتكرة لتوائم احتياجات المجتمع و مواجهة المخاطر والتحديات التي تعترضها، وتقييم فرص نجاحها من خلال دراسة الجدوى، وكيفية حساب كلفتها وتمويلها وإدارة شؤونها المالية، وكيفية عمل تسويق لها، والطبيعة القانونية لها وخطة العمل اللازمة للبدء بها مع التركيز على التجربة الأردنية في هذا المجال.

الصحة والسلامة والبيئة المهنية 020000141 (2: 0-2)

اهداف الصحة والسلامة في بيئة العمل وطرق حماية المتواجدين والمتأثرين. دراسة أهم الاخطار وأكثرها إنتشارا في مختلف مجالات العمل ، تمييز المخاطر الكيماوية والبيولوجية والسقوط من المرتفعات والمخاطر الفيزيائية في بيئة العمل و الحريق والكهرباء والمخاطر الناتجة من الملائمة، تمييز مصادر المخاطر وتأثيرتها على الصحة وسلامة العمل وطرق ضبط المخاطر لتخفيف احتمالية حدوثها والتخفيف من نتائجها في حالة حدوثها. مناقشة التسلسل الهرمي للسيطرة على المخاطر وطرق إختيار معدات الحماية الشخصية وتطبيق الاسعافات الاولية في حالات الاصابات البشرية. التعرف على المتطلبات القانونية الاردنية الرئيسية لحماية العاملين.

ثالثاً: العلوم المساندة

<p>مفاهيم رياضية 020000151 (3: 0-3)</p> <p>يعتبر هذا المساق تمهيدا لعلم التفاضل والتكامل حيث يبدأ بمجموعات الاعداد والمجموعات والعمليات عليها ومعادلة الخط المستقيم وحل انواع من المعادلات والمتباينات، ومن ثم الاقترانات (كثيرات الحدود والجذرية والنسبية والمثلثية والاسية واللوغريتمية) اضافة للطرق للمتطابقات المثلثية الاساسية وحل معادلات مثلثية وبعد ذلك التعرف على المفهوم الهندسي للمشتقة وقواعد وقوانين الاشتاق لبعض الاقترانات وكذلك مفهوم النهايات واخيرا قواعد وقوانين تكامل الاقترانات الاساسية والمحددة في الاهداف الخاصة.</p>
<p>مفاهيم فيزيائية 020000161 (3: 0-3)</p> <p>شرح وتوضيح لمفاهيم و تطبيقات الفيزياء الميكانيكية (الحركة و القوة و الطاقه الميكانيكية) توضيح المفاهيم الأساسية في الضوء و خصائصه. تعريف الطالب باساسيات الفيزياء الحراريه و مفاهيمها. مفاهيم في الكهرباء السكونيه و المكهرباء المتحركة . (القوة الكهربائيه، المجال الكهربائي، الجهد الكهربائي ،. التيار و المقاومه الكهربائيه) التعريف بمفاهيم الفيزياء المغناطيسيه الأساسية و تطبيقاتها . (الحث المغناطيسي، النفاذيه المغناطيسيه.المواد المغناطيسيه)</p>
<p>مختبر مفاهيم فيزيائية 020000162 (1: 0-3)</p> <p>يشمل المختبر التجارب الفيزيائية الاساسية في مجال الميكانيكا و الكهرباء و المغناطيسيه لتعزيز المفهوم الفيزيائي النظري</p>
<p>الرسم الهندسي بالحاسوب 020000171 (2: 0-6)</p> <p>Introduction to AutoCAD, application of AutoCAD, commands, geometric entities. Geometric construction. Dimensioning, free –hand sketching, object representation, orthographic drawing and projections.</p>

رابعاً: المهارات المتخصصة

Fundamentals in Construction Technology (020108111)(3:2-3)

The terminology used in construction technology, techniques used to construct a range of substructures and superstructures, civil engineering infrastructure technology: de-watering techniques, Cut offs, site remediation. The supply and distribution of building services.

Construction Practice and Management (020108121)(2:1-3)

The History of construction industry and structure, types of construction companies in the market and their relationships within the tendering process, the key stages in a construction project, health & safety involvement and evolution in construction industry.

Construction Materials (020108131)(2:1-3)

Health and safety regulations and legislations associated with the storage, handling and use of materials on a construction site, the environmental and sustainability factors impacting on and influencing the material choices for a construction project, construction materials performance properties, experimental data, and humane comfort requirements within use.

Construction Materials Lab.(020108132)(1:0-3)

Testing Properties of aggregate; Sieve analysis, specific gravity and water absorption, bulk density and voids ratio of aggregates, elongation and flakiness index of coarse aggregates. Testing properties of cement; fineness of cement, initial and final sitting time, tensile and compressive strength of cement. Testing properties of concrete; Slump test, compacting factor test, Schmidt hammer, compression strength of concrete. Testing properties of steel; tensile, impact strength, and torsion.

Construction Drawing (020108141)(2:0-6)

Types of construction information and their uses in the process, production, reading and editing of construction information, industry standard tools and systems, collaboration in the

information process, construction drawing, detailing, and Computer aided design (CAD), Building Information Modeling (BIM), Schedules, specifications, bills of quantities and information distribution and collaboration.

Alternative Methods of Construction (020108211)(2:1-3)

Environmental protection in Construction, Social and economic factors in design, Sustainability protocols and regulations in permits. Alternative methods of construction; Timber Frame, Prefabrication, Insulated Concrete Forms (ICFs) and more. Government policy implications and health & safety constraints associated with alternative construction methods.

Advanced Construction Practice and Management (020108122)(2:1-3)

Project identification, research methods, feasibility studies, Project Brief, Recourses planning, cost planning, Gantt chart, PERT, critical path method (CPM), project tracking, Project analysis, Report format.

Principles of Structural Design (020108142)(3:2-3)

Fundamental principles of structural design, codes of practice and standards ,forces within fixed structures, bending moments and shear forces for simply supported steel and concrete beams, deflection for simply supported steel beams, the axial load carrying capacity of steel and reinforced concrete columns, design methods for steel, reinforced concrete beams and columns.

Applied Engineering Mathematics (020308221)(3:3-0)

Number theory, complex numbers, matrix theory, linear equations, numerical integration, numerical differentiation, and graphical representations of curves for estimation Within an engineering context, Solving engineering problems using first and second order differential equations.

Geotechnics and Soil Mechanics (020108151)(3:3-0)

Rock types, their formation and uses within civil engineering, classification of soils to current codes of practice, soil properties determined by geotechnical procedures, geotechnical weaknesses and problems in construction.

Geotechnics and Soil mechanics Lab (020108152)(1:0-3)

Testing all the properties of soil; Moisture content, Specific gravity of soil, Atterberg limit, Sieve analysis, Hydrometer, Soil compaction, Proctor test, Sand cone method, Compaction test balloon method, California bearing Ratio CBR, Unconfined compression test, Direct shear test ,Constant head permeability test, Falling head permeability test

Advanced Structural Design (020108241)(3:3-0)

complex structural conditions, dynamic conditions, deflection due to wind loadings on fixed structures, and strategies to resist wind loading, bending, shear and deflection for complex support conditions, Design complex columns and piled foundations based on calculation, design of tensile structures.

Surveying, Measuring and Setting Out (020108161)(3:2-3)

Station network for horizontal and vertical control, topographic survey, industry standard techniques in the production, transferring and staking out of co-ordinates of multiple construction elements, Preparation of reports on the causes of errors and techniques to improve accuracy, including the use of digital data.

Surveying, Measuring and Setting Out lab (020108162)(1:0-3)

Use of Theodolite, Total station, and leveling instruments in the field to generate the sitting out reports.

Graduation Project (020108221)(3:2-3)

Individual and group skills in construction projects, allocating roles within a collaborative construction team, Planning a construction project, resource management, staffing and project scheduling, Preparation of tender documentation, evaluation of end result and construction team's work.

Highway Engineering and Asphalt (020108251)(2:2-0)

Planning, design, construction and maintenance of road infrastructure; including the supporting structures such as tunnels, bridges and full pavement construction, new route process for a highway, including pavement types, improvements to the existing road infrastructure.

Highway Engineering and Asphalt lab (020108252)(1:0-3)

Types of Asphalt used in roads, the tests applied to it, the results and the application, some of the Asphalt related tests such as; Asphalt penetration point, specific weight test, softening point (ball and ring) tests, viscosity test, flashpoint test,.....), the results and their application in the construction field.

Hydraulics (020108171)(3:2-3)

Fluid properties and behavior, forces related to fluids at rest and in motion, distribution of fluids within correctly sized pipes and channels, hydrostatic pressure exerted on substructures.

Field Training (020108291)(3:0-*)

Equivalent to 8 weeks of field training targeted to emphasize the ability of students to apply the theories in the real world of the profession

Computer Applications in Construction (020108281)(2:0-6)

The application of Excel sheets and generating of valid quantity surveying BOQ (with complete quantity surveying application for construction projects), The application of P3 program (Primavera), with valid results in planning of projects, the application of Prokon program and generating valid results for structural design aspects.

برنامج الدرجة الجامعية المتوسطة

Specialization	Civil Engineering and Built Environment
Course Title	Advanced Project Management Principles in Construction
Course Number	020108122
Credit Hours	2
Theoretical Hours	1
Practical Hours	3

Brief Course Description:

Project identification, research methods, feasibility studies, Project Brief, Recourses planning, cost planning, Gantt chart, PERT, critical path method (CPM), project tracking, Project analysis, Report format.

Course Objectives:

This course aims at:

1. Formulate a project that will provide a solution to an identified problem.
 2. Manage a project within agreed timescales and specification; documenting the process throughout
 3. Evaluate potential project management solutions.
 4. Produce a project and deliver a presentation of the final project outcomes.
- 1.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Formulate a project that will provide a solution to an identified problem.	<ul style="list-style-type: none"> ▪ Project identification ▪ Research methods ▪ Feasibility Studies ▪ Brief and specification 	
2.	Manage a project within agreed timescales and specification; documenting the process throughout	<ul style="list-style-type: none"> ▪ Resources and resource planning ▪ Costs and cost planning ▪ Work plan: Gantt charts, Project Evaluation and Review Technique (PERT) charts, Critical Path Method (CPM). ▪ Project tracking: Progress tracking, Milestones. 	
3.	Evaluate potential project management solutions.	<ul style="list-style-type: none"> ▪ PERT analysis ▪ CPM analysis 	
4.	Produce a	<ul style="list-style-type: none"> ▪ Report formats 	

	project and deliver a presentation of the final project outcomes.	▪ Presentation techniques	
--	---	---------------------------	--

Text Books & References:

Textbook:

BUSSEY, P. (2015) CDM 2015: A Practical Guide for Architects and Designers. London: RIBA.

References:

- BALDWIN, A. (2014) Handbook for Construction Planning and Scheduling. London: Wiley-Blackwell.
- CIOB (2010) Guide to Good Practice in the Management of Time in Complex Projects. London: Chartered Institute of Building.
- GOETSCH, D. L. (2011) Construction Safety & Health. London: Pearson.
- KELLY, J. and MALE, S. (1992) Value Management in Design and Construction: The Economic Management of Project. London: Taylor & Francis.
- POTTS, K. and ANKRAH, N. (2014) Construction Cost Management: Learning from Case Studies. London: Routledge.
- LAWSON, B. (2005) How Designers Think: The Design Process Demystified. London: Routledge.
- WYATT, D. (2007) Construction Specifications: Principles and Applications. New York: Delmar.

برنامج الدرجة الجامعية المتوسطة

Specialization	Civil Engineering and Built Environment
Course Title	Fundamentals in Construction Technology
Course Number	020108111
Credit Hours	(3)
Theoretical Hours	(2)
Practical Hours	(3)

Brief Course Description:

The terminology used in construction technology, techniques used to construct a range of substructures and superstructures, civil engineering infrastructure technology: de-watering techniques, Cut offs, site remediation. The supply and distribution of building services.

Course Objectives:

This course aims at:

1. Explain the terminology used in construction technology.
2. Describe the different techniques used to construct a range of substructures and superstructures, including their function and design selection criteria.
3. Identify the different types of civil engineering/infrastructure technology used in support of buildings.
4. Illustrate the supply and distribution of a range of building services and how they are accommodated within the building.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Explain the terminology used in construction technology.	<ul style="list-style-type: none"> ▪ Types of construction activity: Low, medium and high rise buildings, domestic buildings, for example house, flats and other multi-occupancy buildings, commercial buildings, for example offices and shops, industrial buildings, for example, light industrial and warehouses. ▪ Construction technology terminology: Loadbearing and non-loadbearing, structural stability, movement and thermal expansion, durability, weather and moisture resistance, aesthetics, fire resistance, sound insulation, resistance to heat loss and thermal transmission, dimensional co-ordination and standardization, sustainability and scarcity of availability, on-site and off-site construction, legal requirements, buildability, health and safety. ▪ Construction information: Drawings, specification, schedules, CAD, Building Information Modelling (BIM). ▪ Sustainability: Supply chain, Lifecycle, 'Cradle-to-grave', 'Cradle-to-cradle', Circular economies. 	

<p>2.</p>	<p>Describe the different techniques used to construct a range of substructures and superstructures, including their function and design selection criteria.</p>	<ul style="list-style-type: none"> ▪ Pre-design studies: Desk-top, Site Reconnaissance, Direct Soil Investigation techniques. ▪ Substructure functions and design considerations: Different methods for gathering disturbed and undisturbed samples, influence of soil type on foundation design, including water and chemical content, potential loads, position of trees and the impact on foundations, economic considerations, legal considerations (health and safety work in excavations), building regulations, plant requirements. ▪ Types of foundations: Shallow and deep foundations, strip and deep strip foundations, pad foundations, raft foundations, piled foundations (replacement and displacement piles). ▪ Types of superstructure: Traditional construction, framed construction: steel, composite concrete and steel, timber. Walls; roofs; structural frames; claddings; finishes; services. ▪ Walls: External walls (traditional cavity, timber frame, lightweight steel). Cladding (panel systems, infill systems, composite panel 	
-----------	--	---	--

		<p>systems, internal partition walls).</p> <ul style="list-style-type: none"> ▪ Roofs: Pitched and flat roof systems, roof coverings. ▪ Floors: Ground floors, intermediate floors, floor finishes. ▪ Staircases: Timber, concrete, metal staircases, means of escape. ▪ Finishes: Ceiling, wall and floor finishes. 	
3.	Identify the different types of civil engineering infrastructure technology used in support of buildings.	<ul style="list-style-type: none"> ▪ Site remediation and de-watering: Contamination management (cut-off techniques, encapsulation). And Soil remediation (stone piling, vibro-compaction. De-watering: permanent sheet piling, secant piling, grout injection freezing, and temporary techniques, such as pumping, wells, and electro-osmosis). ▪ Substructure works: Basement construction (steel sheet piling, concrete diaphragm walls, coffer dams, caissons, and culverts). ▪ Superstructure works: Reinforced concrete work (formwork, reinforcement, fabrication, and concrete, steel). 	
4.	Illustrate the supply and distribution of a range of	<ul style="list-style-type: none"> ▪ Primary service supply: Cold water, gas, electricity. ▪ Services distribution: Hot and cold water, Single phase and 3-phase electricity, air 	

	building services and how they are accommodated within the building.	conditioning ductwork. ▪ Services accommodation: Raised access flooring, suspended ceilings, partitioning, rising ducts.	
--	--	---	--

Text Books & References:

Textbook:

- BRYAN, T. (2010) Construction Technology: Analysis and Choice, Oxford: Blackwell.

References:

- CHARTLETT, A. and Maybery–Thomas, C. (2013) Fundamental Building Technology. 3rd Ed. Abingdon: Routledge.
- CHUDLEY, R. et al. (2012) Advanced Construction Technology. 5th Ed. Harlow: Pearson Education Limited.
- CHUDLEY, R. and Grenno, R. (2016) Building Construction Handbook. Abingdon: Routledge.
- FLEMING, E. (2005) Construction Technology: An Illustrated Introduction. Oxford: Blackwell.

برنامج الدرجة الجامعية المتوسطة

Specialization	Civil Engineering and Built Environment
Course Title	Construction Materials
Course Number	020108131
Credit Hours	(2)
Theoretical Hours	(1)
Practical Hours	(3)

Brief Course Description:

Health and safety regulations and legislations associated with the storage, handling and use of materials on a construction site, the environmental and sustainability factors impacting on and influencing the material choices for a construction project, construction materials performance properties, experimental data, and humane comfort requirements within use.

Course Objectives:

This course aims at:

1. Review health and safety regulations and legislations associated with the storage, handling and use of materials on a construction site.
2. Discuss the environmental and sustainability factors which can impact on and influence the material choices for a construction project.
3. Present material choices for a given building using performance properties, experimental data, sustainability and environmental consideration.
4. Evaluate the performance of a given building in respect of its human comfort requirements.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Review health and safety regulations and legislations associated with the storage, handling and use of materials on a construction site.	<ul style="list-style-type: none"> ▪ Regulations and guidance: Health & safety management regulations, design management regulations, provision and use of equipment regulations, control and management of hazardous materials through storage, movement and use. ▪ Materials handling and installation: Risk assessments and method statements (qualitative and quantitative). ▪ Materials storage: moving materials safely; working in confined spaces; working at height. ▪ Occupational health risks associated with materials: asbestos-related and respiratory disease; dermatitis and skin problems; musculoskeletal disorders; hand arm vibration. ▪ Personal Protective Equipment (PPE). 	
2.	Discuss the environmental and sustainability factors which can impact on	<ul style="list-style-type: none"> ▪ Environmental considerations: Lifecycle assessment. Environmental profile methodology. Environmental product declaration and certification. Embodied energy. Waste management (the economics and technologies of 	

	<p>and influence the material choices for a construction project.</p>	<p>construction waste disposal).</p> <ul style="list-style-type: none"> ▪ Sustainability: Resource availability and depletion: renewable and non-renewable materials. Reuse and recycling of construction and demolition waste. Waste and Resources Action Program (WRAP). ▪ Environmental assessment methods: Building Research Establishment Environmental Assessment Method (BREEAM). Leadership in Energy and Environmental Design (LEED). Green Star. Estidama, or other forms of environmental assessment. Construction Industry Research Information Association. 	
<p>3.</p>	<p>Present material choices for a given building using performance properties, experimental data, sustainability</p>	<ul style="list-style-type: none"> ▪ Material testing: Testing methods, interpreting test data. Codes and standards ▪ Structural behaviors: Performance properties (strength, elasticity, toughness, hardness, creep, fatigue, porosity, brittleness, density, thermal conductivity and durability). ▪ Inherent material properties: Relationship between material properties, behavior 	

	and environmental consideration.	and use.	
4.	Evaluate the performance of a given building in respect of its human comfort requirements.	<ul style="list-style-type: none">▪ Human comfort provision: Indoor environmental quality (thermal, illumination, sound, ventilation).▪ Thermal losses and gains.▪ Passive and active design: design solutions, environmental benefit vs. implementation cost.▪ Calculations of u-values, lux levels, acoustic and ventilation.	

Textbooks & References:

Textbook:

- CLAISSE, P, A. (2015) Civil Engineering Materials. Kidlington: Butterworth– Heinemann.

References:

- CASINI, M. (2016) Smart buildings: Advanced materials and Nanotechnology to improve energy. Duxford: Woodhead Publishing.
- THOMAS, R. (ed.) (2006) Environmental design: An introduction for architects and engineers. Third Edition edn. London: Taylor & Francis.
- DEAN, Y. (1996) Materials Technology. (Mitchells Building Series). Abingdon: Routledge.
- DORAN, D. and Cather, B. (2013) Construction Materials Reference Book. Abingdon, Routledge.
- EVERETT, A. (1994) Materials. (Mitchells Building Series). 5th Ed. Abingdon: Routledge.
- KATIB, J.M. (2009) Sustainability of Construction Materials. Abingdon: Woodhead Publishing Ltd.
- LYONS, A. (2014) Materials for Architects and Builders. 5th Ed. Abingdon: ROUTLEDGE.
- PACHECO–Torga, F. and JALALI, S. (2011) Eco–Efficient Construction and Building Materials. London: Springer.
- PACHECO–TORGA, F. et al. (2013) Eco–efficient Construction and Building Materials, Life Cycle Assessment (LCA), Eco–Labelling and Case Studies. London: Springer.

برنامج الدرجة الجامعية المتوسطة

Specialization	Civil Engineering and Built Environment
Course Title	Construction Practice and Management
Course Number	020108121
Credit Hours	(2)
Theoretical Hours	(1)
Practical Hours	(3)

Brief Course Description:

The History of construction industry and structure, types of construction companies in the market and their relationships within the tendering process, the key stages in a construction project, health & safety involvement and evolution in construction industry.

Course Objectives:

This course aims to:

1. Describe the construction industry with reference to company structures and other activities.
2. Explain different types of construction companies in the market and their relationships within the tendering process.
3. Discuss the key stages in a construction project, and how Building Information Modeling informs the different stages.
4. Analyze how the construction industry has developed suitable collaboration strategies in support of greater recognition of health & safety.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Describe the construction industry with reference to company structures and other activities.	<ul style="list-style-type: none"> ▪ Understanding of the construction industry: Historical development of the construction industry. Professional and other institutes; including societies. Links between professional, technical and skills professionals. Contractor and head office structure. Site structure and organization. Types of contractual work tendered by companies. 	
2.	Explain different types of construction companies in the market and their relationships within the tendering process.	<ul style="list-style-type: none"> ▪ Company types: Professional relationships between companies. Contract tendering. Tender process. 	
3.	Discuss the key stages in a construction	<ul style="list-style-type: none"> ▪ Master programs and contract planning techniques. ▪ The role of Building Information Modeling 	

	project, and how Building Information Modeling informs the different stages.	(BIM) on the construction. <ul style="list-style-type: none">▪ Modern procurement methods within construction.▪ Sustainability.	
4.	Analyze how the construction industry has developed suitable collaboration strategies in support of greater recognition of health & safety.	<ul style="list-style-type: none">▪ Key stakeholders in the construction process.▪ BIM and collaboration.▪ Health & safety within the construction industry: Pre-construction regulations and legislation. Site safety.	

Textbooks & References:

Textbooks:

- GRIFFITH, A. and WATSON, P. (2003) Construction management: Principles and practice. Hampshire: Palgrave Macmillan.

References:

- HARRIS, F. and McCaffer, R. (2013) Modern construction management. Chichester: Wiley Blackwell.
- KYMMELL, W. (2007) Building information modeling: Planning and managing construction projects. New York: McGraw Hill Professional.
- OTTOSSON, H. (2012) Practical project management for building and construction. Boca Raton: CRC Press.

برنامج الدرجة الجامعية المتوسطة

Specialization	Civil Engineering and Built Environment
Course Title	Construction Drawing
Course Number	020108141
Credit Hours	(2)
Theoretical Hours	(0)
Practical Hours	(6)

Brief Course Description:

Types of construction information and their uses in the process, production, reading and editing of construction information, industry standard tools and systems, collaboration in the information process, construction drawing, detailing, and Computer aided design (CAD), Building Information Modeling (BIM), Schedules, specifications, bills of quantities and information distribution and collaboration.

Course Objectives:

This course aims at:

1. Evaluate different types of construction information in the context of diverse project types.
2. Develop construction drawings, details, schedules and specifications in support of a given construction project.
3. Interpret different types of construction information in order to explain a construction project.
4. Assess ways in which construction professionals collaborate in the production of construction information.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1	Evaluate different types of construction information in the context of diverse project types.	<ul style="list-style-type: none"> ▪ Construction drawings. ▪ Site plans: Floor plans, roof plans, ceiling plans. ▪ General arrangement. ▪ Elevations. ▪ Drawings: Assembly drawings. Component drawings/details. ▪ Schedules: Door schedules. Window schedules. Hardware schedules. ▪ Specifications: Performance specification. Outline specification. Full specification. Specification templates/standards. 	
2	Develop construction drawings, details, schedules and specifications in support of a given construction project.	<ul style="list-style-type: none"> ▪ Computer Aided Design (CAD). ▪ Templates. ▪ Title blocks. ▪ Annotation. ▪ Building Information Modelling (BIM). ▪ Specification software. ▪ Bills of quantities. ▪ Schedules of works. 	
3	Interpret different types	<ul style="list-style-type: none"> ▪ Reading construction drawings. ▪ Information co-ordination. 	

	of construction information in order to explain a construction project.	<ul style="list-style-type: none">▪ Clash detection.▪ 'Red-lining'.	
4	Assess ways in which construction professionals collaborate in the production of construction information.	<ul style="list-style-type: none">▪ Project roles.▪ Information production.▪ Hierarchy of roles and information.▪ Project collaboration.▪ Document sharing/distribution.▪ Online/cloud-based collaboration.▪ Building Information Modelling (BIM).	

Textbooks & References:

Textbooks:

- HUTH, M.W. (2009) Understanding Construction Drawings. Delmar Cengage.

References:

- CHING, F.D.K. (2014) Building Construction Illustrated. John Wiley & Sons.
- CHUDLEY, R. (2016) Building Construction Handbook. Routledge.
- Construction Specifications Institute (2011) The CSI Construction Specifications Practice Guide. John Wiley & Sons.
- KALIN, M. and WEYGANT, R.S. (2010) Construction Specification Writing: Principles and Procedures. John Wiley & Sons.
- KUBBA, S. (2008) Blueprint Reading: Construction Drawing for the Building Trade. McGraw-Hill.

برنامج الدرجة الجامعية المتوسطة

Specialization	Civil Engineering and Built Environment
Course Title	Principles of Structural Design
Course Number	020108142
Credit Hours	(3)
Theoretical Hours	(2)
Practical Hours	(3)

Brief Course Description:

Fundamental principles of structural design, codes of practice and standards ,forces within fixed structures, bending moments and shear forces for simply supported steel and concrete beams, deflection for simply supported steel beams, the axial load carrying capacity of steel and reinforced concrete columns, design methods for steel, reinforced concrete beams and columns.

Course Objectives:

This course aims at:

1. Calculating bending moments and shear forces for simply supported steel and concrete beams.
2. Determining deflection for simply supported steel beams.
3. Calculating the axial load carrying capacity of steel and reinforced concrete columns.
4. Exploring design methods for steel, reinforced concrete beams and columns.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Calculate bending moments and shear forces for simply supported steel and concrete beams.	<ul style="list-style-type: none"> ▪ Loading: Dead loads. Live loads. Wind loads. Point loads. Uniformly distributed loads. ▪ Elasticity and plasticity of common construction materials: Factors of safety. Building regulations. Health and safety regulations. ▪ Bending moments: Bending moment diagrams. ▪ Shear forces: Shear force diagrams. 	
2.	Determine deflection for simply supported steel beams.	<ul style="list-style-type: none"> ▪ Deflection in supported beams with point loads. ▪ Deflection in supported beams with uniformly distributed loading. 	
3.	Calculate the axial load carrying capacity of steel and reinforced concrete	<ul style="list-style-type: none"> ▪ Axial loading: Steel columns. Reinforced concrete columns. Foundations. Slenderness ratio. Effective length. Material properties. Corrosion resistance. Weathering. 	

	columns.		
4.	Explore design methods for steel, reinforced concrete beams and columns.	<ul style="list-style-type: none">▪ Limit state design.▪ Steel: Beam design and selection. Column design and selection.▪ Reinforced concrete: Beam design and selection. Column design and selection.▪ Building Information Modelling for structures.	

Textbooks & References:

Textbooks:

- DURKA, F. et al (2002) Structural Mechanics: Loads, Analysis, Design and Materials. 6th Ed. Prentice Hall.

References:

- ANTHONY, A. et al (2007) Reynolds's Reinforced Concrete Designer's Handbook. 11th Ed. Taylor & Francis.
- FIONA, C. (2008) Structural Engineer's Pocket Book. 2nd Ed. Butterworth-Heinemann.
- HULSE, R. and CAIN, J. (2000) Structural Mechanics. 2nd Rev Ed. Palgrave Macmillan.
- MCKENZIE, W. (2003) Design of Structural Elements. Palgrave Macmillan.
- MOSLEY, H. (2007) Reinforced Concrete Design. 6th Rev Ed. Palgrave.
- OZELTON, E. (2006) Timber Designers' Manual. Wiley-Blackwell.
- SEWARD, D. (2003) Understanding Structures: Analysis, Materials, Design. 3rd Rev Ed. Palgrave Macmillan.
- SMITH, P. (2001) An Introduction to Structural Mechanics. Palgrave Macmillan.
- Steel Construction Institute (2005) Steel Design Manual. 6th Ed. Wiley-Blackwell.

برنامج الدرجة الجامعية المتوسطة

Specialization	Civil Engineering and Built Environment
Course Title	Graduation Project
Course Number	020108221
Credit Hours	(3)
Theoretical Hours	(2)
Practical Hours	(3)

Brief Course Description:

Individual and group skills in construction projects, allocating roles within a collaborative construction team, Planning a construction project, resource management, staffing and project scheduling, Preparation of tender documentation, evaluation of end result and construction team's work.

Course Objectives:

This course aims at:

1. Assess individual and group skills in order to allocate roles within a collaborative team.
2. Plan a construction project, based on a set theme, in collaboration with others to ensure good practice in resource management, staffing and project scheduling.
3. Prepare tender documentation; undertaking work appropriate to a defined role within a team.
4. Evaluate own work, and the work of others, in a collaborative team.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Assess individual and group skills in order to allocate roles within a collaborative team.	<ul style="list-style-type: none"> ▪ Roles and responsibilities: Skills auditing. Belbin Team Inventory. Myers Briggs Personality Type Indicator. ▪ Human resources management: Core job dimensions (skill variety, task identity, task significance, autonomy, feedback). ▪ Job design (job rotation, job enlargement, etc.). 	
2.	Plan a construction project, in collaboration with others to ensure good practice in resource management , staffing and project scheduling.	<ul style="list-style-type: none"> ▪ Project planning: Setting goals. Defining 'deliverables'. Task definition. Identifying risks/risk management. Communications planning. ▪ Resource management: Human resources. Physical resources. Supply chain. Waste management. ▪ Project scheduling: Scheduling tools. Milestones. Blocks. 	

<p>3.</p>	<p>Prepare tender documentation; undertaking work appropriate to a defined role within a team.</p>	<ul style="list-style-type: none">▪ Tender documentation: Construction drawings. Specifications. Schedules of work. Cost plan. Health and safety legislation. Building Information Modeling.	
<p>4.</p>	<p>Evaluate own work, and the work of others, in a collaborative team.</p>	<ul style="list-style-type: none">▪ Reflective practice: Schön's 'The Reflective Practitioner'. Gibbs' 'Reflective Cycle'. Reflection vs. Description.▪ Reflection in practice: Project lifecycle. Post implementation review.	

Text Books & References:

Text Book:

- BOUCLAGHEM, D. (2011) Collaborative Working in Construction. Abingdon: SPON Press.

References:

- BALDWIN, A. (2014) Handbook for Construction Planning and Scheduling, Wiley-Blackwell: London.
- BELBIN, M. (2010) Team Roles at Work. Taylor & Francis.
- BENNETT, J. and PEACE, S. (2006) Partnering in Construction: A Code of Practice for Strategic Collaborative Working. Burlington: Butterworth-Heinemann.
- CIOB (2010) Guide to Good Practice in the Management of Time in Complex Projects. London: Chartered Institute of Building.
- DAINTY, A. and LOOSEMORE, M. (ed.) (2012) Human Resource Management in Construction: Critical Perspectives. Abingdon: Routledge.
- KELLY, J. and MALE, S. (1992) Value Management in Design and Construction: The Economic Management of Project. London: Taylor & Francis.
- MYERS, S. and CHILDS, R. (2016) Understanding Team Roles. Nielson Book Services Limited.
- POTTS, K. and ANKRAH, N. (2014) Construction Cost Management: Learning from Case Studies. London: Routledge.
- WYATT, D. (2007) Construction Specifications: Principles and Applications. New York: Delmar.

برنامج الدرجة الجامعية المتوسطة

Specialization	Civil Engineering and Built Environment
Course Title	Applied Engineering Mathematics
Course Number	020308221
Credit Hours	(3)
Theoretical Hours	(3)
Practical Hours	(0)

Brief Course Description:

Number theory, complex numbers, matrix theory, linear equations, numerical integration, numerical differentiation, and graphical representations of curves for estimation Within an engineering context, Solving engineering problems using first and second order differential equations.

Course Objectives:

This course aims at:

1. Apply instances of number theory in practical construction situations.
2. Solve systems of linear equations relevant to construction applications using matrix methods.
3. Approximate solutions of contextualized examples with graphical and numerical methods.
4. Review models of construction systems using ordinary differential equations.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Apply instances of number theory in practical construction situations.	<ul style="list-style-type: none"> Number theory: Bases of a number (Denary, Binary, Octal, Duodecimal, Hexadecimal) and converting between bases. Types of numbers (Natural, Integer, Rational, Real, Complex). The modulus, argument and conjugate of complex numbers. Polar and exponential form of complex numbers. The use of de Moivre's Theorem in engineering. Complex number applications e.g. electric circuit analysis, information and energy control systems. 	
2.	Solve systems of linear equations relevant to construction applications using matrix methods.	<ul style="list-style-type: none"> Matrix methods: Introduction to matrices and matrix notation. The process for addition, subtraction and multiplication of matrices. Introducing the determinant of a matrix and calculating the determinant for a 2x2 matrix. Using the inverse of a square matrix to solve linear equations. Gaussian elimination to solve systems of linear equations (up to 3x3). 	
3.	Approximate solutions of contextualized	<ul style="list-style-type: none"> Graphical and numerical methods: Standard curves of common functions, including quadratic, cubic, logarithm and exponential 	

	examples with graphical and numerical methods.	curves. Systematic curve sketching knowing the equation of the curve. Using sketches to approximate solutions of equations. Numerical analysis using the bisection method and the Newton–Raphson method. Numerical integration using mid–ordinate rule, the trapezium rule and Simpson’s rule.	
4.	Review models of construction systems using ordinary differential equations.	<ul style="list-style-type: none"> ▪ Differential equations: Formation and solutions of first–order differential equations. ▪ Applications of first–order differential equations e.g. RC and RL electric circuits, Newton’s laws of cooling, charge and discharge of electrical capacitors, and complex stresses and strains. ▪ Formation and solutions of second–order differential equations. ▪ Applications of second–order differential equations e.g. mass–spring–damper systems, information and energy control systems, heat transfer, automatic control systems and beam theory and RLC circuits. ▪ Introduction to Laplace transforms for solving linear ordinary differential equations. ▪ Applications involving Laplace transforms, such as electric circuit theory, load frequency control, harmonic vibrations 	

Text Books & References

Textbook:

BIRD, J. (2014) Higher Engineering Mathematics. 7th Ed. London: Routledge

References:

- SINGH, K. (2011) Engineering Mathematics Through Applications. Basingstoke: Palgrave Macmillan.
- STROUD, K.A. and BOOTH, D.J. (2013) Engineering Mathematics. 7th Ed. Basingstoke: Palgrave Macmillan.

برنامج الدرجة الجامعية المتوسطة

Specialization	Civil Engineering and Built Environment
Course Title	Geotechnics and Soil Mechanics
Course Number	020108151
Credit Hours	(3)
Theoretical Hours	(3)
Practical Hours	(0)

Brief Course Description:

Rock types, their formation and uses within civil engineering, classification of soils to current codes of practice, soil properties determined by geotechnical procedures, geotechnical weaknesses and problems in construction.

Course Objectives:

This course aims at:

1. Review rock types, their formation and uses within civil engineering.
2. Explore and classify soils to current codes of practice.
3. Analyze soil properties determined by geotechnical procedures.
4. Produce a proposal to address identified geotechnical weaknesses and problems.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Review rock types, their formation and uses within civil .engineering	<ul style="list-style-type: none"> ▪ Rock type formation and classification. ▪ Rock type susceptibility to weathering and weathering processes. ▪ Discontinuous nature of rock mass, folding and faulting. ▪ The use of rock within civil engineering. ▪ The use of un-cemented sediments within civil engineering. 	
2.	Explore and classify soils to current codes of practice.	<ul style="list-style-type: none"> ▪ Ground and site investigation. ▪ Soil sampling. ▪ Soil types. ▪ Soil descriptions. ▪ Soil classifications. ▪ Soil particle size. ▪ Soil specific gravity. ▪ Soil plasticity index. 	
3.	Analyze soil properties determined by geotechnical procedures.	<ul style="list-style-type: none"> ▪ Shear strength. ▪ Compressibility. ▪ Moisture content. ▪ Soil density. ▪ Specific gravity. ▪ Liquid and plasticity indices. ▪ California bearing ratio. 	

4.	Produce a proposal to address identified geotechnical weaknesses and problems.	<ul style="list-style-type: none">▪ Shear strength and embankment design.▪ Compressibility and foundation design.▪ Liquid and plasticity indices and foundation design.▪ California bearing ratio and highway design.	
----	--	--	--

Text Books & References:

Textbook:

- MCLEAN, A. and GRIBBLE, C. (1985) Geology for Civil Engineers. Routledge.

References:

- CHUDLEY, R. and GREENO, R. (2012) Advanced Construction Technology. 5th Ed. Pearson.
- CHUDLEY, R. and GREENO, R. (2014) Building Construction Handbook. 10th Ed. Butterworth–Heinemann.
- MANLEY, S., CHARTERS, M., FRANCIS, C., TOPLISS, S. and DOYLE, M. (2008) Construction and the Built Environment. Pearson.
- OSBOURN, D. and GREENO, R. (2007) Introduction to Building. 4th Ed. Pearson

برنامج الدرجة الجامعية المتوسطة

Specialization	Civil Engineering and Built Environment
Course Title	Advanced Structural Design
Course Number	020108241
Credit Hours	(3)
Theoretical Hours	(3)
Practical Hours	(0)

Brief Course Description:

complex structural conditions, dynamic conditions, deflection due to wind loadings on fixed structures, and strategies to resist wind loading, bending, shear and deflection for complex support conditions, Design complex columns and piled foundations based on calculation, design of tensile structures.

Course Objectives:

This course aims at:

1. Explore deflection due to wind loadings, on fixed structures, and strategies to resist wind loading.
2. Determine bending, shear and deflection for complex support conditions.
3. Design complex columns and piled foundations based on calculation.
4. Explore the design of tensile structures.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Explore deflection due to wind loadings, on fixed structures, and strategies to resist wind loading.	<ul style="list-style-type: none"> ▪ Wind loading: Calculating wind loading. Wind loading on tall buildings. Shear forces. Lateral load. Uplift load. Torsional load. ▪ Managing wind loading: Building form. Stiffening. 	
2.	Determine bending, shear and deflection for complex support conditions.	<ul style="list-style-type: none"> ▪ Bending: Supported timber beams. Steel cantilever beams. Reinforced concrete cantilevers. Steel three-pin frames. ▪ Shear: Supported timber beams. Steel three-pin frames. ▪ Deflection: Supported timber beams with point loads and uniformly distributed loading. Steel cantilever beams with point loads and uniformly distributed loading. Reinforced concrete cantilever beams with point loads and uniformly distributed loading. ▪ Structural connections: Beam-to-beam 	

		connections. Beam-to-column connections. Types of connection. Bolt fixings. Welded connections. Fin plates. Splices. Bracing connections.	
3.	Design complex columns and piled foundations based on calculation.	<ul style="list-style-type: none"> ▪ Axial loading: Carrying capacity of timber columns. Carrying capacity of reinforced concrete piled foundations. Carrying capacity of steel piled foundations. ▪ Eccentric loading: Buckling. Stress. ▪ Piled foundations: End bearing piles. Friction piles. Sheet piles. Micro piling. Helical piles. ▪ Structural design information: CAD drawings. Building Information Modelling. Calculations. 	
4.	Explore the design of tensile structures.	<ul style="list-style-type: none"> ▪ Linear structures: Suspension bridges. Cable-stayed beams/trusses. ▪ Three-dimensional structures: Tensegrity structures. Tensairity structures. ▪ Surface-stressed structures: Pre-stressed membranes. Grid shell. Fabric structure. 	

Text Books & References:

Textbook:

- MOSLEY, H. (2007) Reinforced Concrete Design. 6th Rev Ed. Palgrave.

References:

- ANTHONY, A. et al (2007) Reynolds's Reinforced Concrete Designer's Handbook. 11th Ed. Taylor & Francis.
- DURKA, F. et al (2002) Structural Mechanics: Loads, Analysis, Design and Materials. 6th Ed. Prentice Hall.
- FIONA, C. (2008) Structural Engineer's Pocket Book. 2nd Ed. Butterworth-Heinemann.
- HULSE, R. and CAIN, J. (2000) Structural Mechanics. 2nd Rev Ed. Palgrave Macmillan.
- OZELTON, E. (2006) Timber Designers' Manual. Wiley-Blackwell.
- SEWARD, D. (2003) Understanding Structures: Analysis, Materials, Design. 3rd Rev Ed. Palgrave Macmillan.
- SMITH, P. (2001) An Introduction to Structural Mechanics. Palgrave Macmillan.
- STEEL CONSTRUCTION INSTITUTE (2005) Steel Design Manual. 6th Ed. Wiley-Blackwell.
- MCKENZIE, W. (2003) Design of Structural Elements. Palgrave Macmillan

برنامج الدرجة الجامعية المتوسطة

Specialization	Civil Engineering and Built Environment
Course Title	Surveying, Measuring and Setting Out
Course Number	020108161
Credit Hours	(3)
Theoretical Hours	(2)
Practical Hours	(3)

Brief Course Description:

Station network for horizontal and vertical control, topographic survey, industry standard techniques in the production, transferring and staking out of co-ordinates of multiple construction elements, Preparation of reports on the causes of errors and techniques to improve accuracy, including the use of digital data.

Course Objectives:

This course aims at:

1. Undertake a survey to establish a station network for horizontal and vertical control.
2. Explain the process of undertaking a topographic survey.
3. Apply industry standard techniques in the production, transferring and staking out of co-ordinates of multiple construction elements.
4. Prepare a report on the causes of errors and techniques to improve accuracy, including the use of digital data.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Undertake a survey to establish a station network for horizontal and vertical control.	<ul style="list-style-type: none"> ▪ Description of types of control points. ▪ Primary controls, first and second order. ▪ Secondary control. ▪ Different methods of marking control points. ▪ The use of local, national and grid control available. ▪ Conducting a closed traverse. ▪ Carrying out a full closed traverse survey for horizontal and vertical controls. ▪ Methods for checking accuracy of the traverse. ▪ Matching the control station accuracy to national standards or recommendations. ▪ Calculations to obtain corrected co-ordinates. 	
2.	Explain the process of undertaking a topographic survey.	<ul style="list-style-type: none"> ▪ Purpose of a topographic survey. ▪ Links to initial control. ▪ Techniques to communicate a completed survey. ▪ Cut and fill information obtained from a survey. ▪ Methods of completing a topographic 	

		<p>survey.</p> <ul style="list-style-type: none"> ▪ Equipment to be used to capture topographic details. ▪ Use of free station and GPS to complete the survey. ▪ Coding systems for features to be surveyed. ▪ Data transfer techniques. 	
3.	Apply industry standard techniques in the production, transferring and staking out of co-ordinates of multiple construction elements.	<ul style="list-style-type: none"> ▪ Examples of construction elements. ▪ Building outlines, centre lines of structural elements, boundary locations from national co-ordinates, road centre lines, drainage and hard landscape features. ▪ Setting out techniques. ▪ Holistic view of setting from the whole to the part. ▪ Use of free station, reference lines, stake out, tie distances within a total station program. ▪ Techniques to obtain setting out data, including data transfer. ▪ Process of setting out structures and offsetting lines of structural elements. ▪ Horizontal and vertical control of construction, both initially and as the 	

		work commences.	
4.	Prepare a report on the causes of errors and techniques to improve accuracy, including the use of digital data.	<ul style="list-style-type: none">▪ Errors in surveying and setting out: Instrumentation error (prism constants, reflector heights, atmospheric influences, calibration certification, free station errors, discrete setting out.). Human errors (alignment of leveling staffs and hand- or tripod-mounted prisms, physical setting out constraints.)▪ Improvement of accuracy: Use of technology to provide checking methods. Testing procedures for instrumentation to be used in setting out and surveying. Comparing accuracy of set out element to nationally recognized standards.	

Text Books & References:

Text Book:

- IRVINE, W. and MACLENNAN, F. (2005) Surveying for Construction. 5th Ed. London: McGraw–Hill.

References:

- SCHOFIELD, W. and BREACH, M. (2007) Engineering Surveying. 6th Ed. Oxford: Elsevier.
- SADGROVE, B.M. (2007) Setting Out Procedures for the Modern Built Environment. London: Ciria.
- UREN, J. and PRICE, W. (2010) Surveying for Engineers. 5th Ed. Basingstoke: Palgrave Macmillan.

برنامج الدرجة الجامعية المتوسطة

Specialization	Civil Engineering and Built Environment
Course Title	Highway Engineering and Asphalt
Course Number	020108251
Credit Hours	(2)
Theoretical Hours	(2)
Practical Hours	(0)

Brief Course Description:

Planning, design, construction and maintenance of road infrastructure; including the supporting structures such as tunnels, bridges and full pavement construction, new route process for a highway, including pavement types, improvements to the existing road infrastructure.

Course Objectives:

This course aims at:

1. Evaluate how a new highway route is identified, planned and designed.
2. Assess the methods of earthwork operations, bridges and tunneling which are used in connection with the provision of highways.
3. Justify the selection of pavement construction type for a given highway provision
4. Present a report that specifies improvement that can be made to a given highway infrastructure project, including maintenance techniques and planning.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Evaluate how a new highway route is identified, planned and designed.	<ul style="list-style-type: none"> ▪ Highway identification and planning: The techniques used for the assessment of potential traffic volumes. Understanding of the different variables which affect potential traffic volumes. And acquisition procedures for preferred routes, including alignment design. Public consultation arrangements, including Environmental Impact Assessment. Funding arrangements, including any proposed tolls, contributions or other revenue sources. ▪ Highway design: Horizontal and vertical alignment design of roads. Environmental Impact Assessment requirements within the design. Proposed assessment of interchanges with existing infrastructure, including bridges, tunnels and junctions. Provision and integration of any electronic toll collection infrastructure. Drainage systems, including sustainable urban drainage systems. Knowledge of designing highways for different users. 	
2.	Assess the	<ul style="list-style-type: none"> ▪ Earthwork–operations–methods: 	

	<p>methods of earthwork operations, bridges and tunneling which are used in connection with the provision of highways.</p>	<p>Accommodation of cut and fill balancing into earthwork operation. Use of ground stabilization techniques, including lime injection and use of specialized plant for the construction of highways in areas of weak soils. Forming of embankments, including retaining walls and assessment of the soil's angle of repose to stabilize the surrounding rock or soil. Engineering control of earthwork operations. Formation testing.</p> <ul style="list-style-type: none"> ▪ Bridges: Formation of abutments. Active and passive span arrangement. Bridge deck and bearing details to be used. Architectural requirements of the structures. Typical types of highway bridges used. ▪ Tunnel provision: Formation of tunnel, including considerations of cut and cover, pipe jacking, and boring, including use of tunnel boring machines. Soils conditions and proposed destination for surplus material. Maintenance arrangements. Materials used for tunnel linings. 	
<p>3.</p>	<p>Justify the selection of pavement</p>	<ul style="list-style-type: none"> ▪ Flexible pavement construction: Use of dense bitumen macadam, high-density macadam, pervious macadam, mastic 	

	<p>construction type for a given highway provision</p>	<p>asphalt and hot rolled asphalt. Properties of aggregates and uses. Common construction methods. Environmental performance, skid resistance and deterioration. Sub-base materials used and construction technique.</p> <ul style="list-style-type: none"> ▪ Rigid pavement construction: Concrete mix details, reinforcement and joint details. Use of pavement trains. Environmental performance, skid resistance and deterioration. Sub-base materials used and construction technique. 	
4.	<p>Present a report that specifies improvement that can be made to a given highway infrastructure project, including maintenance techniques and planning.</p>	<ul style="list-style-type: none"> ▪ Improvement to existing highway infrastructure: Use and effectiveness of 'smart' motorways. Utilization of redundant infrastructure. Provision of technology to improve public transport systems. Appraising the use and implementation of traffic management systems to prevent congestion. ▪ Maintenance planning and techniques: Knowledge of common degradation processes for highway structures. Appraising techniques for essential or routine repair to concrete supporting infrastructure. Techniques for renewing 	

		worn out pavement surfaces. Techniques for surveying road conditions for the production of repair schedules or asset management.	
--	--	--	--

Text Books & References:

Text Book:

- O'FLAHERTY, C. (2002) Highways: The location, design, construction & maintenance of pavements. 4th Ed. Oxford: Butterworth–Heinemann.

References:

- ROGERS, M. (2008) Highway Engineering. 2nd Ed. Oxford: Blackwell publishing.
- WATSON, J. (1994) Highway Construction & Maintenance. 2nd Ed. Harlow: Longman

برنامج الدرجة الجامعية المتوسطة

Specialization	Civil Engineering and Built Environment
Course Title	Hydraulics
Course Number	020108171
Credit Hours	(3)
Theoretical Hours	(2)
Practical Hours	(3)

Brief Course Description:

Fluid properties and behavior, forces related to fluids at rest and in motion, distribution of fluids within correctly sized pipes and channels, hydrostatic pressure exerted on substructures.

Course Objectives:

This course aims at:

1. Apply concepts of physics to develop solutions for hydrostatic and hydrodynamic problems.
2. Calculate forces related to fluids at rest and in motion.
3. Develop practical solutions for the distribution of fluids within correctly sized pipes and channels.
4. Calculate the hydrostatic pressure exerted on substructures for a given context.

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Apply concepts of physics to develop solutions for hydrostatic and hydrodynamic problems.	<ul style="list-style-type: none"> ▪ Fluid properties: Density. Viscosity. ▪ Fluid behavior: Viscous flow. Laminar flow. Turbulence. Boundary layer. 	
2.	Calculate forces related to fluids at rest and in motion.	<ul style="list-style-type: none"> ▪ Flow calculation: Bernoulli's equation. Hydraulic radius. Velocity distribution. Reynolds number. ▪ Energy: The energy principle. The energy equation. Hydraulic grade. Energy grade. Energy loss/gain. Friction losses. 	
3.	Develop practical solutions for the distribution of fluids within correctly sized pipes and channels	<ul style="list-style-type: none"> ▪ Flow in pipes: Darcy–Weisback equation. Chezy's equation (Kutter's equation). Discharge. Head loss. Pipeline discharge. Orifice equation. ▪ Open channel flow: Steady/uniform flow. Manning's equation. Specific energy/critical depth. Subcritical/supercritical flow. Non– 	

		uniform flow.	
4.	Calculate the hydrostatic pressure exerted on substructures for a given context.	▪ Hydrostatic pressure: Forces on plane. Forces on submerged surfaces. Pascal's law.	

Text Books & References:

Text Book:

- DOUGLAS, J.F. (2011) Fluid mechanics. Prentice Hall.

References:

- HALL, F. and GREENO, R. (2015) Building services handbook. Routledge.
- MASSEY, B.S., BERNARD S. and WARD-SMITH, A. J. (2012) Mechanics of fluids. Spon Press.
- STROUD, K.A. and BOOTH, D.J. (2013) Engineering mathematics. Palgrave Macmillan.
- WYNN, P. (2014) Hydraulics for civil engineers. ICE Publishing.

برنامج الدرجة الجامعية المتوسطة

Specialization	Civil Engineering and Built Environment
Course Title	Alternative Methods of construction
Course Number	020108211
Credit Hours	(2)
Theoretical Hours	(1)
Practical Hours	(3)

Brief Course Description:

Environmental protection in Construction, Social and economic factors in design, Sustainability protocols and regulations in permits. Alternative methods of construction; Timber Frame, Prefabrication, Insulated Concrete Forms (ICFs) and more. Government policy implications and health & safety constraints associated with alternative construction methods.

Course Objectives:

This course aims at:

1. Examine how the construction industry impacts on the environment, and how changes in the industry can create broader social and economic benefits.
2. Explore alternative construction methods which are fit for purpose in a given context.
3. Discuss government policy implications and health & safety constraints associated with alternative construction methods.
4. Present a design proposal, utilizing a selected alternative construction method

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Examine how the construction industry impacts on the environment, and how changes in the industry can create broader social and economic benefits	<ul style="list-style-type: none"> ▪ Environmental protection: Features of the environment; global warming; carbon emissions; government and national targets; construction statistics. ▪ Social and economic factors: Government influences; construction statistics; housing statistics; affordable homes; urbanization; Greenfield and brownfield sites. ▪ Sustainability protocols: Passive Haus/Passive House BREEAM. LEED Code for Sustainable Homes 	
2.	Explore alternative construction methods which are fit for purpose in a given context	<p>Timber Frame.</p> <p>Prefabrication.</p> <p>Insulated Concrete Forms (ICFs).</p> <p>Structural Insulated Panels (SIPs).</p> <p>Off-site-manufacture.</p> <p>Modularization/Componentization.</p> <p>Robotics.</p> <p>Autonomous building</p>	

<p>3.</p>	<p>Discuss government policy implications and health & safety constraints associated with alternative construction methods</p>	<p>Government policy:</p> <p>Local/regional/national Planning and Building regulations.</p> <p>Local/regional/national Health & safety legislation.</p> <p>Effect and progress:</p> <p>General proposals for improvements on regulations, the impact on the eco system and the future aspect.</p>	
<p>4.</p>	<p>Present a design proposal, utilizing a selected alternative construction method.</p>	<p>Computer-aided software:</p> <p>AutoCAD; Revit; Sketch-up; Photoshop; BIM.</p> <p>Computer-aided drawings and details:</p> <p>Floor plans; elevations; sections; details; sketches; perspectives; rendered; photo-realization.</p> <p>Presentation and skills:</p> <p>Consideration of audience; venue; environment; documentation; resources; time management. Clarity; concision; voice</p>	

Text Books & References:

Text Book:

- Construction Technology: Designing Sustainable Homes. Dublin: Gill & MacMillan Ltd. JONES, B. (2015)

References:

- COTTERELL, J. and DADEBY, A. (2012) The Passivhaus Handbook: A practical guide to constructing and retrofitting buildings for ultra-low energy performance.
- Devon: Green Books. ELIZABETH, L. and ADAMS, C. (2005)
- Alternative Construction: Contemporary natural building methods. New Jersey: John Wiley & Sons Ltd. GARBER, R. (2014)
- BIM Design: Realizing the creative potential of Building Information Modelling. Chichester: John Wiley & Sons Ltd. HICKEY, T. (2014)
- Building with Straw Bales: A Practical Manual for Self-Builders and Architects. Cambridge: Green Books. LAWSON, M. OGDEN, R. and GOODIER, C (2014)
- Modularisation in the construction of buildings. Florida: Taylor & Francis Group.

Links

برنامج الدرجة الجامعية المتوسطة

Specialization	Civil Engineering and Built Environment
Course Title	Construction material lab
Course Number	020108132
Credit Hours	(1)
Theoretical Hours	(0)
Practical Hours	(3)

Brief Course Description:

Testing Properties of aggregate; Sieve analysis, specific gravity and water absorption, bulk density and voids ratio of aggregates, elongation and flakiness index of coarse aggregates. Testing properties of cement; fineness of cement, initial and final setting time, tensile and compressive strength of cement. Testing properties of concrete; Slump test, compacting factor test, Schmidt hammer, compression strength of concrete. Testing properties of steel; tensile, impact strength, and torsion.

Course Objectives:

This course aims at:

- 1- Testing all the properties of aggregate
- 2- Testing all the properties of cement
- 3- Testing all the properties of concrete
- 4- Testing the tensile strength of steel

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Testing all the properties of aggregate	<ul style="list-style-type: none">▪ Sieve analysis of coarse and fine aggregate▪ Determination of specific gravity and water absorption of coarse and fine aggregates▪ Determination of bulk density and voids ratio of aggregates▪ Determine of elongation and flakiness index of coarse aggregates▪ Resistance to abrasion and impact of small size coarse aggregates using the los Angeles Machine▪ Determination of aggregates impact value▪ Determination of clay, silt and fine dust in fine or coarse aggregates	
2.	Testing all the properties of cement	<ul style="list-style-type: none">▪ Determination of fineness of cement▪ Determination of specific weight of cement▪ Determination of initial and final setting time of cement▪ Determination of tensile strength of cement mortar	

		<ul style="list-style-type: none">▪ Determination of compressive strength of cement	
3.	Testing all the properties of concrete	<ul style="list-style-type: none">▪ Slump test▪ Compacting factor test▪ Flow test▪ Schmidt hammer▪ Compression strength of concrete	
4.	Testing the tensile strength of steel	<ul style="list-style-type: none">▪ The tensile strength of steel▪ Impact test▪ Torsion test	

Text Books & References:

Text Book:

CLAISSE, P, A. (2015) Civil Engineering Materials. Kidlington: Butterworth– Heinemann

References:

- DEAN, Y. (1996) Materials Technology. (Mitchells Building Series). Abingdon: Routledge.
- DORAN, D. and Cather, B. (2013) Construction Materials Reference Book. Abingdon, Routledge.
- EVERETT, A. (1994) Materials. (Mitchells Building Series). 5th Ed. Abingdon: Routledge.
- KATIB, J.M. (2009) Sustainability of Construction Materials. Abingdon: Woodhead Publishing Ltd.
- LYONS, A. (2014) Materials for Architects and Builders. 5th Ed. Abingdon: ROUTLEDGE.
- PACHECO–Torga, F. and JALALI, S. (2011) Eco–Efficient Construction and Building Materials. London: Springer.
- PACHECO–TORGA, F. et al. (2013) Eco–efficient Construction and Building Materials, Life Cycle Assessment (LCA), Eco–Labelling and Case Studies. London: Springer

برنامج الدرجة الجامعية المتوسطة

Specialization	Civil Engineering and Built Environment
Course Title	Geotechnics and Soil mechanics Lab
Course Number	020108152
Credit Hours	(1)
Theoretical Hours	(0)
Practical Hours	(3)

Brief Course Description:

Testing all the properties of soil; Moisture content, Specific gravity of soil, Atterberg limit, Sieve analysis, Hydrometer, Soil compaction, Proctor test, Sand cone method, Compaction test balloon method, California bearing Ratio CBR, Unconfined compression test, Direct shear test ,Constant head permeability test, Falling head permeability test

Course Objectives:

This course aims at:

- 1- Testing all the properties of soil
- 2- Defining all results and applications of such tests

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Testing all the properties of soil (practice, results, reports, and identification relation with results)	<ul style="list-style-type: none">▪ Moisture content▪ Specific gravity of soil▪ Atterberg limit▪ Liquid limit▪ Plastic limit▪ Shrinkage limit▪ Sieve analysis▪ Hydrometer▪ Soil compaction▪ Proctor test▪ Sand cone method▪ Compaction test balloon method▪ California bearing Ratio CBR▪ Unconfined compression test▪ Direct shear test▪ Constant head permeability test▪ Falling head permeability test	

Text Books & References:

Text Book:

- MCLEAN, A. and GRIBBLE, C. (1985) Geology for Civil Engineers. Routledge.

References:

The easyHandbook in soil mechanics and experiments (2012)

برنامج الدرجة الجامعية المتوسطة

Specialization	Civil Engineering and Built Environment
Course Title	Highway and Asphalt Lab
Course Number	020108252
Credit Hours	(1)
Theoretical Hours	(0)
Practical Hours	(3)

Brief Course Description:

Types of Asphalt used in roads, the tests applied to it, the results and the application, some of the Asphalt related tests such as; Asphalt penetration point, specific weight test, softening point (ball and ring) tests, viscosity test, flashpoint test,.....), the results and their application in the construction field.

Course Objectives:

This course aims at:

- 1- Testing all the properties of Asphalt
- 2- Defining all results and applications of such tests

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Testing all the properties of asphalt	<ul style="list-style-type: none">▪ Penetration test▪ Say-bolt viscosity▪ Float test for bituminous materials▪ Flash and fire point by Cleveland cup▪ Specific gravity of semi-solid bituminous materials▪ Ductility of bituminous materials▪ Distillation of cut-back Asphalt▪ Quantitative extraction of bitumen from bituminous paving mixtures▪ Maximum theoretical density▪ Marshall Test	

Text Books & References:

Text Book:

- O'FLAHERTY, C. (2002) Highways: The location, design, construction & maintenance of pavements. 4th Ed. Oxford: Butterworth-Heinemann.

References:

- ROGERS, M. (2008) Highway Engineering. 2nd Ed. Oxford: Blackwell publishing.
- CHUDLEY, R. and GREENO, R. (2014) Building Construction Handbook. 10th Ed. Butterworth-Heinemann.
- MANLEY, S., CHARTERS, M., FRANCIS, C., TOPLISS, S. and DOYLE, M. (2008) Construction and the Built Environment. Pearson.

Al-Balqa' Applied University



تأسست عام 1997

جامعة البلقاء التطبيقية

برنامج الدرجة الجامعية المتوسطة

Specialization	Civil Engineering and Built Environment
Course Title	Surveying, measuring and setting out lab
Course Number	020108162
Credit Hours	(1)
Theoretical Hours	(0)
Practical Hours	(3)

Brief Course Description:

Use of Theodolite, Total station, and leveling instruments in the field to generate the sitting out reports.

Course Objectives:

This course aims at:

- 1- Using the theodolite instrument
- 2- Using the total station
- 3- Using the leveling

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Using the theodolite instrument	<ul style="list-style-type: none"> ▪ Close Traverse Method to find the horizontal and vertical control points. ▪ Calculate to correct coordinate, Traverse surveying in the field yields observed angles or directions and length of the traverse sides (horizontal and vertical control). Thus, these parameters are used in traverse computations which are performed in a plane coordinate system. The usual steps followed in making elementary traverse computations are; <ol style="list-style-type: none"> 1- Adjusting angles or directions to fixed geometric conditions 2- Determining azimuths of the traverse 	

		<p>lines.</p> <p>3- Calculating departures and latitudes and adjusting them for miss-closure</p> <p>4- Computing coordinates of the traverse stations.</p>	
2.	Using the total station	<ul style="list-style-type: none">▪ Setting out building: Determine corner coordinate of the building by Google earth or any sources and by total station and prism setting out corner coordinate.▪ Road central line▪ Drainage system: Determine height of the earth and by the plan setting our height of the drainage points and Determine the slope of the drainage.	
3.	Using the leveling	<ul style="list-style-type: none">▪ Elevation using high instrument	

		<ul style="list-style-type: none">▪ Elevation using rise and fill▪ Calculate the cut and fill: <p>Determine the ground working and divide the ground squarely(grid) ,determine the height of the corner of the ground by leveling by way height of the instrument or rise and fill , by plan we know formation level of the ground and we define quantity of the cut and fill</p>	
--	--	--	--

Text Books & References:

Text Book:

- SCHOFIELD, W. and BREACH, M. (2007) Engineering Surveying. 6th Ed. Oxford: Elsevier.

References:

- SADGROVE, B.M. (2007) Setting Out Procedures for the Modern Built Environment. London: Ciria.
- UREN, J. and PRICE, W. (2010) Surveying for Engineers. 5th Ed. Basingstoke: Palgrave Macmillan.
- CHUDLEY, R. and GREENO, R. (2014) Building Construction Handbook. 10th Ed. Butterworth–Heinemann.
- MANLEY, S., CHARTERS, M., FRANCIS, C., TOPLISS, S. and DOYLE, M. (2008) Construction and the Built Environment. Pearson.

برنامج الدرجة الجامعية المتوسطة

Specialization	Civil Engineering and Built Environment
Course Title	Computer Applications in Construction
Course Number	020108281
Credit Hours	(2)
Theoretical Hours	(0)
Practical Hours	(6)

Brief Course Description:

The application of Excel sheets and generating of valid quantity surveying BOQ (with complete quantity surveying application for construction projects), The application of P3 program (Primavera), with valid results in planning of projects, the application of Prokon program and generating valid results for structural design aspects.

Course Objectives:

This course aims at:

- 1- Teaching the students to use Excel sheets in BOQ and quantity surveying
- 2- Teaching the students to use Primavera (P3)
- 3- Teaching the students to use Prokon

Detailed Course Description:

Unit Number	Unit Name	Unit Content	Time Needed
1.	Excel	<ul style="list-style-type: none">- Quantity Surveying for construction projects (cut and fill, concrete, steel, blocks, tiles, plaster, paint, and other construction material)- The introduction and the interface, tools used, features, and main pages- Main functions and uses, with examples of uses and results from construction projects- Practical application and results, the identification of such results and the meaning of the results, with the correct interpretation on them.	
2.	Primavera	<ul style="list-style-type: none">- The introduction and the interface,	

		<p>the tools, and main pages.</p> <ul style="list-style-type: none">- Main application, features and functions; money squeeze, delays, personals allocation, etc....- Practical application and results, with correct application of such results in the construction field.	
3.	Prokon	<ul style="list-style-type: none">- The introduction and the interface, the tools and main pages- Main application, features and functions, with clear evidence of beams, columns, slabs and footings pages with the correct values applied.- Practical application and results with the interpretation of such results in the construction field.	

Text Books & References:

Text Books:

- Project Planning and Control using Primavera P6 by Paul E. Harris
- BIM and Quantity Surveying 1st Edition by Steve Pittard (Editor), Peter Sell (Editor)

References:

- Teaching manual for primavera scheduling software
- Structural Analysis by R.C Hibbeler (8th Edition)
- New Aspects of Quantity Surveying Practice (3rd edition)