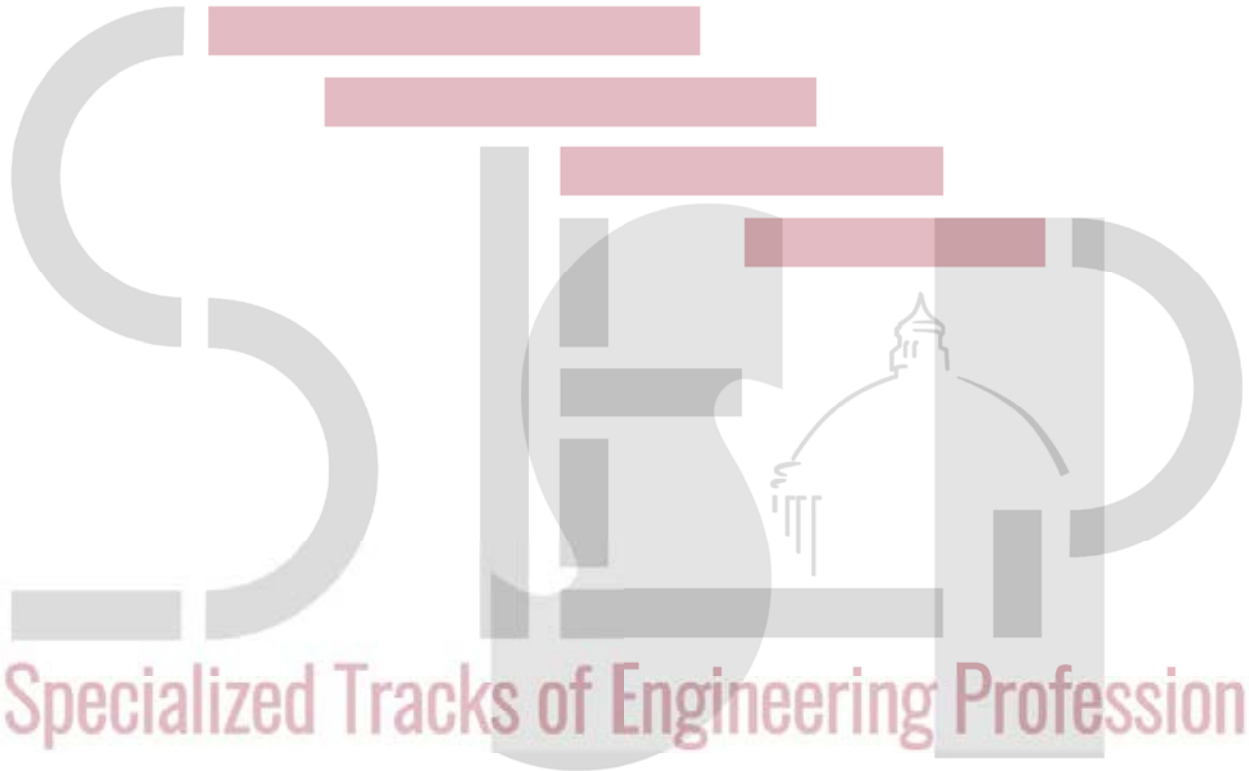

PART [C]: SPECIALIZED PROGRAMS

(1) CONSTRUCTION ENGINEERING AND MANAGEMENT Program (CEM)

برنامج هندسة وإدارة التشييد

(1) Construction Engineering and Management Program (CEM)

برنامج هندسة وإدارة التشييد

VISION رؤية البرنامج

CEM program aims to prepare a distinguished graduate capable of competing in the national, regional and international market along with maintaining a high level of academic, professional and ethical standard as well as analytical and innovative capabilities and unique practical skills in the field of construction.

MISSION رسالة البرنامج

The mission of the Construction Engineering and Management Program is to address and enhance the institutional backing through the graduates of the program who will essentially provide a good support for the government, and the construction companies, in achieving the established policies and plans with respect to public and private sectors. For the later sector, they help in running private sectors investments because of their solid backgrounds in project and construction managements. Whereas, for the public sector, the graduates would fill the gap that exists in public agencies including Ministry of Housing, Utilities and Urban Communities, Housing and Building Research Center (HBRC), the Holding Company for Housing etc. Furthermore, the program mission is to meet the highly demanded graduates who possess special skills and capabilities in the field.

GRADUATE ATTRIBUTES مواصفات الخريج

The CEM program has adopted the National Academic Reference Standards (NARS) for Engineering issued by the National Authority for Quality Assurance and Accreditation for Education (NAQAAE) as the program objects to ensure the satisfaction of the national quality assurance standards. The NARS 2018 for Engineering are broad statements that define the main characteristics and performance expected from all engineering students upon their graduation so that the graduate attributes of the SEM program can be achieved as follows:

BASIC CIVIL Engineering graduate must be able to:

1. Develop solutions for complicated engineering problems by applying engineering fundamentals, basics of science and mathematics and by conducting experiments and analyzing data using statistical analysis and engineering judgement.
2. Use engineering processes to develop cost-effective solutions, considering global, cultural, social, environmental, ethical, factors within the principles of sustainable design and development. Also, applying cutting-edge technology and standards, quality norms, safety regulations, environmental concerns, and risk management principles.
3. Practice research strategies and investigation procedures in Engineering projects by conducting good planning and supervision.
4. Practice performing individually or in a team Using modern techniques of communication with a variety of audiences.
5. Utilize pioneering thinking and develop the leadership skills to adequately react to complex situations, apply modern knowledge of practice, lifelong learning strategies.
6. Select modern construction methods for structures using numerical techniques or measurements. Examine the construction method by applying civil engineering techniques such as: Structural Analysis and Mechanics, Properties and Strength of Materials, Surveying, Soil Mechanics, and Fluid Mechanics. Optimize the design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures; Familiarize with Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Irrigation, Water Resources and Harbors.
7. Design the construction processes and evaluate the construction defects, instability, and quality issues; and maintain safety measures in construction and materials. Understand biddings, contracts, project insurance and guarantees and assess environmental impacts of civil engineering projects.

In Addition to the above attributes for Civil Engineers; The CEM Program aims to provide the Construction field with graduates who can fill the existing gab of knowledge in common Civil Engineer graduate which is necessary to run construction projects effectively and economically. The CEM graduates should be able to effectively deal with:

- Site Management.
- Contract Administration.
- Legal issues related for project construction
- Technical Problems
- Recent Advances in the field

PROGRAM BENCHMARK مرجعية البرنامج

NARS 2018	LEVEL A	LEVEL B	LEVEL C	LEVEL D
	Totally Adopted P. A11	Partially Adopted See Below	See Below	NA

NARS Level B Specialty Competencies:

1. Select appropriate and sustainable technologies for construction of buildings, infrastructures and water structures; using either numerical techniques or physical measurements and/or testing by applying a full range of civil engineering concepts and techniques of: Structural Analysis and Mechanics, Properties and Strength of Materials, Surveying, Soil Mechanics and Fluid Mechanics.
2. Achieve an optimum design of Reinforced Concrete and Steel Structures, Foundations and Earth Retaining Structures; and at least three of the following civil engineering topics: Transportation and Traffic, Roadways and Airports, Railways, Sanitary Works, Irrigation, Water Resources and Harbors; or any other emerging field relevant to the discipline.
3. Plan and manage construction processes; address construction defects, instability and quality issues; and maintain safety measures in construction and materials.
4. Deal with biddings, contracts and financial issues including project insurance and guarantees; and assess environmental impacts of civil engineering projects.

Level C Sub-Specialty Competencies:

1. Demonstrate basic organizational and construction management skills. Use appropriate specialized computer software, computational tools and packages. Prepare technical drafts and finished drawings both manually and using CAD
2. Prepare quantity surveying reports, cost estimates, and construction schedules.
3. Administer contracts, and control time, cost and quality of projects. Prepare, evaluate and defense construction claims.

SPECIALIZED COURSES CONTENTS توصيف المقررات

Code	Name	Credit Hours	Category	Pre-requisite
CEMS280	Engineering Seminar	1	DR	30 CR.HRS. + AA APROVAL
CEMS281	Industrial Training-1	1	FR	60 CR.HRS. + AA APROVAL
CEMS381	Industrial Training-2	2	DR	CEMS281+ AA APROVAL
CEMS481	Graduation Project-1	1	FR	CEMS381+ AA APROVAL
CEMS482	Graduation Project-2	3	DR	CEMS481
Total		**2+6**		

COURSES CONTENTS توصيف المقررات

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
Faculty Requirements										
CEMS280	Engineering Seminar	1	1	0						1
	Pre-requisites: 30 CHs. + AA Approval									
	Talks and presentations are invited from industrial establishments relevant to the program. The guest speaker should discuss the organization, management, and recent technologies implemented in his/her industrial establishment. Students exercise writing brief technical reports on the guest presentation and deliver their own presentation about the topic. The course is graded as Pass/Fail grade-system.									
CEMS281	Industrial Training-1	1	0	0						0
	Pre-requisites: 60 CR.HRS. + AA APPROVAL									
	Training on industrial establishments relevant to the program. Training lasts for total of 90 hours, during a minimum period of three weeks. This Training consists of a student self-learning-based course of computer software Programs; specifically: RIVET & PRIMAVERA. These counts for two weeks training. The student is also asked for a formal report showing some elementary site activities collected by him from real construction site (s) and will be counted for one-week training. The efficiency/sufficiency of the self-learning of the two software programs will be evaluated practically through a computer session carried out in									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
	the computer Lab. The student will be evaluated (site report and computer session) by a panel of three members with one member being an external examiner appointed from industry or other colleges of engineering. The course is graded as Pass/Fail grade-system.									
CEMS381	Industrial Training-2	2	0	0						0
	Pre-requisites: CEMS281 + AA APPROVAL									
	Training on industrial establishments relevant to the program. Training lasts for total of 180 hours, during a minimum period of six weeks (about 70 hours in site and the rest in a technical office). The program training advisor schedules at least two follow-up visits to the training venue and formally report on performance of trainee(s). A Mentor in the industrial establishment provides a formal report on the student's performance during training. The student submits a formal report and presentation to be evaluated by a panel of three members with one member being an external examiner appointed from industry or other colleges of engineering. The course is graded as Pass/Fail grade-system.									
CEMS481	Graduation Project-1	1	0	2	0					2
	Pre-requisites: CEMS381 + AA Approval									
	Students – in groups (or individually in some programs) - undertake a final project as part of the program. In GP1, students provide a clear identification of a real-life problem that represents an actual need for the industry or the community and reflects the mission and strategic objective of CUFE. Students are expected to survey the related literature, collect, and interpret market data, and proposed an approach for the solution, using the engineering knowledge and skills acquired. The course is graded as Pass/Fail based upon a report/oral presentation stating the expected cost and required material, tools, and facilities as well as a timed list of deliverables.									
CEMS482	Graduation Project-2	3	1	4						5
	Pre-requisites: CEMS481									
	Graduation Project-2 is the second phase of the graduation project. The aim is to develop innovative solutions to problems encountered during the implementation process thus fulfilling the deliverables stated in Graduation Project-1. A dissertation on the project is submitted taking into consideration technical, economic, social, and environmental requirements while analysing the major results and presenting direct conclusions.									

PROGRAM REQUIREMENTS متطلبات البرنامج

Category		No. of courses	Course Credit Hour	Total Credit Hours
Discipline Requirements (DR)	core/ compulsory	19	3	57
		7	2	14
		2	1	2
	Elective	1	3	3
Total DR courses		29		76
Program Requirement (PR)	core/ compulsory	1	2	2
		5	3	15
	Elective	0	2	0
		6	3	18
Total PR courses		12		35
Total Elective courses (DR & PR)		7	3	21

- **Discipline Requirements (DR) core/compulsory courses list**

Code	Name	Credit Hours	Pre-requiste
GENS341	Operation Research	3	70 Credits
ARCS110	Basic Architectural Design & Building Construction	2	INTS001
ARCS216	Introduction to CAD System for Civil Engineering	2	INTS001 + INTS005
IHDS204	Civil Engineering Drawing	3	INTS001
IHDS201	Fluid Mechanics	3	PHYS001
IHDS302	Open Channel Hydraulics	2	IHDS201
INTS203	Mechanical and Electrical Systems`	2	50 credits
PBWS303	Water and Wastewater Engineering	2	IHDS201
PBWS202	Surveying for Engineers	3	MTHS003
PBWS301	Highway Engineering	2	75 credits
PBWS302	Soil Mechanics	3	STRS202 + STRS204
PBWS402	Foundations	3	PBWS302
STRS101	Structural Analysis-1	3	EMCS001

Code	Name	Credit Hours	Pre-requiste
STRS202	Structural Analysis-2	3	STRS101
STRS203	Engineering Materials	3	PHYS001 + EMCS001
STRS204	Mechanics of Materials	3	STRS203
STRS301	Reinforced Concrete Design I	3	STRS202 + STRS204
STRS324	Construction Project Management	3	70 Cr Hrs
STRS302	Steel Structures Design I	3	STRS202 + STRS204
STRS303	Reinforced Concrete Design II	3	STRS301
STRS304	Steel Structure Design II	3	STRS302
MTHS102	Linear Algebra and Multivariable Integrals	3	MTHS003
MTHS104	Differential Equations	3	MTHS003
MTHS300	Statistical Analysis for Civil Engineers	1	70 Credits
EMCS201	Engineering Mechanics-3-Rigid Body Dynamics	3	EMCS002
Total	Including CEMS280, 380, 382	**73**	

- **Discipline Requirements (DR) elective courses list**

Code	Name	Credit Hours	Pre-requiste
ELECTIVE (E-3) 1 course (3 Credits)			
IHDS301	Introduction to Water Resources Engineering	3	75 Credits
PBWS343	Transportation and Logistic Management	3	none
STRS407	Masonry Structures	3	STRS301
Total		**3**	

Program Requirements (PR) core/compulsory courses list

Code	Name	Credit Hours	Pre-requiste
STRS205	Human Resources Management	2	34 Cr. Hr.
STRS321	Economic Strategies in Construction Industry	3	70 Cr. Hr.
STRS322	Construction Planning and scheduling	3	STRS324
STRS425	Construction Methods & Equipment	3	STRS324
STRS426	Estimating and Quantity Surveying	3	STRS324
STRS327	Law and Construction Industry	3	GENS237
Total		17	

- **Program Requirements (PR) elective courses list**

Code	Name	Credit Hours	Pre-requiste
ELECTIVE (E-2) 1 course (3 Credits)			
GENS442	Decision Support System	3	GENS341
STRS423	Financial Management	3	STRS321
STRS428	Intro. To Construction Contract and Contract Admin.	3	STRS327
STRS441	Concrete Structures Design III	3	STRS303
STRS445	Steel Structures Design III	3	STRS304
ELECTIVE (E-4) 1 course (3 Credits)			
STRS429	Heavy Construction Methods	3	STRS425
STRS404	Construction Material and Quality Control	3	STRS202 + STRS203
STRS447	Strategic Planning	3	STRS321 + STRS322
STRS464	Sustainability and Public Policy in the Construction Industry	3	STRS324
ELECTIVE (E-5) 2 courses (6 Credits)			
PBWS446	Deep Excavation and Side Support	3	PBWS302
STRS452	Information Technology in Construction	3	STRS324
STRS454	Special Problems in Construction	3	130 cr + STRS324
STRS463	Building Information Modeling	3	ARCS216 + STRS324
STRS465	Inspection and Maintenance of Structures	3	STRS303
STRS 470	Dispute Resolution in Construction Industry	3	STRS327

ELECTIVE (E-6) 2 courses (6 Credits)			
STRS421	Risk Management in Construction Industry	3	STRS428
STRS427	Cost Engineering	3	STRS426
STRS448	Quality and Safety Management	3	STRS324
STRS449	Organization Management	3	STRS324
STRS453	Project Specifications and Bids	3	STRS428
STRS456	Claims In Construction Industry	3	STRS428+STRS322
Total		18	

Proposed Study Plan - 8 semesters - Including Freshman Level

S	Code	Name	Credit Hours	Contact Hours							
				Lec	Tut (2)	App Tut	Lab	Stud	Off Tut	OffHr	Total
SEMESTER 1	PHYS001	Mechanical Properties of Matter and Thermodynamics	3	2		2	1				5
	MTHS002	Calculus 1	3	2	2						4
	EMCS001	Engineering Mechanics – Dynamics	3	1	2		1				4
	CHES001	Chemistry for Engineers	2	1	2						3
	INTS001	Engineering Graphics	3	2				3			5
	INTS005	Information Technology	2	1			3				4
	GENS004	Proficiency and Capacity Building	1	1							1
	GENS001	Critical and Creative Thinking	2	2							2
		Sub-Total	**19**	**13**	**6**	**2**	**4**	**3**	**0**	**0**	**28**

S	Code	Name	Credit Hours	Contact Hours							
				Lec	Tut (2)	App. Tut	Lab	Stud	Off Tut	Off. Hrs	Total
SEMESTER 2	MTHS003	Calculus 2	3	2	2						4
	EMCS002	Engineering Mechanics - Statics	2	1	2						3
	PHYS002	Electricity and Magnetism	3	2		2	1				5
	GENS005	Elective E-A (Writing and Presentation Skills)	2	2							2
	GENS002	Societal Issues	2	2							2
	MDPS001	Fundamental of Manufacturing Engineering	2	1		1	2				4
	STRS101	Structural Anaysis – 1	3	2	2						4
	ARCS110	Basic Arch Design and Building Construction	2	1		3					4
		Sub-Total	**19**	**13**	**6**	**6**	**3**	**0**	**0**	**0**	**28**

S	Code	Name	Credit Hours	Contact Hours							
				Lec	Tut (2)	App Tut	Lab	Stud	Off Tut	Off Hr	Total
SEMESTER 3	MTHS102	Linear Algebra and Multivariable Integrals	3	2	2						4
	EMCS201	Engineering Mechanics-3- Rigid Body Dynamics	3	2	2						4
	ARCS216	Inrto. To CAD System for Civil Engineering	2	1		1	2				4
	STRS202	Structural Analysis – 2	3	2	2						4
	STRS203	Engineering Material	3	2		1	2				5
	IHDS204	Civil Engineering Drawings	3	2	2						4
	STRS205	Human Resourses Management	2	1	2						3
		Sub-Total	**19**	**12**	**8**	**2**	**4**	**0**	**0**	**0**	**28**

S	Code	Name	Credit Hours	Contact Hours							
				Lec	Tut (2)	App. Tut	Lab	Stud	Off Tut	Off. Hrs	Total
SEMESTER 4	MTHS104	Differential Equations	3	2	2						4
	IHDS201	Fluid Mechanics	3	2	2						4
	MTHS005	Introduction to Probability and Statistics	3	2	2						4
	INTS203	Mech. And Elec. Systems	2	1	2						3
	STRS204	Mechanics of Material	3	2	2						4
	PBWS202	Surveying for Engineering	3	2		1	2				5
	E-A (GENS110)	Elective E-A (Fundamental of Management, Risk and Environment)	2	2							2
		Sub-Total	**19**	**13**	**10**	**1**	**2**	**0**	**0**	**0**	**26**

CEMS281	Industrial Training -1 (Summer Training after Semester 4)	1									

S	Code	Name	Credit Hours	Contact Hours							
				Lec	Tut (2)	App Tut	Lab	Stud	Off Tut	Off Hr	Total
SEMESTER 5	GENS341	Operation Research	3	2	2						4
	STRS324	Construction Project Management	3	2	2						4
	STRS301	Reinforced Concrete Design - 1	3	2	2						4
	E-1 (GENS20X)	Elective E-1	2	2							2
	IHDS302	Open Channel Hydraulics	2	1		2	1				4
	STRS321	Ecconomic Strategies in Construction Ind.	3	2	2						4
	PBWS303	Water and Wastewater Engineering	2	1	2						3
	MTHS300	Statistical Analysis for Civil Engineers	1	0	2						2
		Sub-Total	**19**	**12**	**12**	**2**	**1**	**0**	**0**	**0**	**27**

S	Code	Name	Credit Hours	Contact Hours							
				Lec	Tut (2)	App. Tut	Lab	Stud	Off Tut	Off. Hrs	Total
SEMESTER 6	GENS120	Fund. of Ecconomics and Accounting	2	2							2
	PBWS302	Soil Mechanics	3	2	2						4
	STRS302	Steel Structure Design - 1	3	2	2						4
	STRS303	Reinforced Concrete Design - 2	3	2	2						4
	STRS327	Law and Construction Industry	3	2	2						4
	STRS322	Construction Planning and Scheduling	3	2	2						4
	PBWS301	Highway Engineering	2	1	2						3
		Sub-Total	**19**	**13**	**12**	**0**	**0**	**0**	**0**	**0**	**25**

CEMS381	Industrial Training -2 (Summer Training after Semester 6)	2									

S	Code	Name	Credit Hours	Contact Hours							
				Lec	Tut (2)	App Tut	Lab	Stud	Off Tut	OffHr	Total
SEMESTER 7	PBWS402	Foundations	3	2	2						4
	STRS425	Construction Methods and Equipments	3	2	2						4
	STRS426	Estimating & Quantity Surveying	3	2	2						4
	STRS304	Steel Structure Design - 2	3	2	2						4
	E-2	ELECTIVE E-2	3	2	2						4
	E-5	ELECTIVE E-5	3	2	2						4
	CEMS481	Graduation Project – 1	1		2						2
		Sub-Total	**19**	**12**	**14**	**2**	**0**	**0**	**0**	**0**	**26**

S	Code	Name	Credit Hours	Contact Hours							
				Lec	Tut (2)	App. Tut	Lab	Stud	Off Tut	Off. Hrs	Total
SEMESTER 8	E-3	ELECTIVE E-3	3	2	2						4
	E-4	ELECTIVE E-4	3	2	2						4
	E-5	ELECTIVE E-5	3	2	2						4
	E-6	ELECTIVE E-6	3	2	2						4
	E-6	ELECTIVE E-6	3	2	2						4
	CEMS280	Engineering Seminar	1	1							1
	CEMS482	Graduation Project – 2	3	1	4						5
		Sub-Total	**19**	**12**	**14**	**0**	**0**	**0**	**0**	**0**	**26**

Tracks of Sub-Specialization in CEM Program

The Construction Engineering and Management program provides 3 tracks of specialization: Contracts, Cost, and Management. This is achieved through the Elective courses in the 7th and 8th semesters. The following tables shows these 3 tracks with the compulsory (Comp) and elective (E) courses for each track.

CONTRACTS TRACK

	Code	Course Title	Group & Credits
1	GENS237	Ethics & Legislation in Construction Industry	E1- 2
2	STRS322	Construction Planning & Scheduling	Comp -3
3	STRS327	Law & Construction Industry	Comp -3
4	STRS428	Introduction to construction Contracts & Contract Administration	E2- 3
5	STRS470	Dispute Resolution in Construction Industry	E5- 3
6	STRS456	Claims In Construction Industry	E6- 3

COST TRACK

	Code	Course Title	Group & Credits
1	STRS321	Economic Strategies in Const. Industry	Comp -3
2	STRS322	Construction Planning & Scheduling	Comp -3
3	STRS426	Estimating and Quantity Surveying	Comp -3
4	STRS452	Information Technology in Construction.	E5 – 3
5	STRS427	Cost Engineering	E6– 3
6	STRS423	Financial Management	E2– 3

PLANNING & SCHEDULING TRACK

	Code	Course Title	Group & Credits
1	STRS324	Const. Project. Management	Comp -3
2	STRS322	Const. Planning & Scheduling	Comp -3
3	STRS425	Const. Methods & Equip.	Comp -3
4	STRS447	Strategic Planning	E5 – 3
5	STRS449	Organization Management.	E6 – 3
6	STRS448	Quality & Safety Management.	E6 – 3

COURSES CONTENTS توصيف المقررات

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
Discipline Compulsory Courses										
GENS341	Operation Research	3	2	2						4
	Pre-requisites: 70 Credits									
	This course examines the evolving structure of cities andIntroduction - Linear programming, Network analysis, Decision analysis, Random processes, Queuing models, Inventory analysis, Simulation, Dynamic programming, Nonlinear programming, Game Theory, Waiting line theory.									
Textbook	Hillier, F.S., and Lieberman, G. J., 2014. Introduction to Operation Research. 10th ed., New York: McGraw-Hill, Inc.									
ARCS110	Basic Architectural Design and Building Construction	2	1	0	3					4
	Pre-requisites: GENS003 + INTS001									
	Introduction to design, Design as a goal Directed Activity, The Management of Architectural Information, Architectural Design and Decision Making, Basic Elements of Architectural Design, The Architectural Design Matrix, Form and Form Generation, Space and Compositions, The Building Matrix. Building Loads, Clarifications of Construction Systems, Substructures, Insulation, Staircase Terminologies									
References	• Ernst Neufert, Peter Neufert, Architects' Data, Fourth Edition, U.S.A, 2012. • Francis O.K. Ching, Building Construction Illustrated, Wiley, Fifth edition, 2014. • Francis D.K. Ching, Architecture: Form, Space and Order, John Wiley and Sons, New York, Fourth Edition, 2014.									
ARCS216	Introduction to CAD Systems for Civil Engineering	2	1	0	1	2				4
	Pre-requisites: INTS005 + INTS001									
	The aim of this course is to explore current CAD technologies and develop skills in the use of specialist CAD software to produce 2D and 3D design specifications, to transform CAD drawings into photo realistic virtual products and to gain an awareness of CAD data and how such information can be transformed to engineering drawings. At the end of the course, the students will understand a variety of terms and terminology as applied to CAD technology; demonstrate the use of an industry standard operating system to create standard CAD packages for 2D and 3D design drawings.									
References	Yasser Shoukry, Jaiprakash Pandey: Practical Autodesk AutoCAD 2021 and AutoCAD LT 2021, PUPLISHING 2020 Nighat Yasmin, Introduction to AutoCAD 2023 for Civil Engineering Applications: Learning to use AutoCAD for Civil Engineering Projects. Publisher: SDC Publications (Schroff Development Corpora, ISBN-13: 9781630575212, 2022									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
IHDS204	Civil Engineering Drawing	3	2	2						4
	Pre-requisites: INTS001									
	Introduction to civil engineering projects, General Concepts, Legend and symbols, Scales and drawing size, General layout and plans, Longitudinal and cross sections, Detailing, Earthworks and retaining walls, Applications on irrigation and land reclamation projects, Half-earth-removed views, Pitching and protection. Drawing of steel sections and connections, reinforced concrete sections. Projection of beams and columns.									
References	Class notes prepared by the staff of Irrigation and Hydraulics department.									
IHDS201	Fluid Mechanics	3	2	2						4
	Pre-requisites: PHYS001									
	Introduction, Dimensions and units, Fluid properties (density, specific weight, specific gravity, specific heat, vapor pressure, compressibility, viscosity, surface tension), Fluid Statics (absolute and gage pressure, pressure at a point, pressure transmit ion , pressure measurements, pressure prism, hydrostatic force on a plane surface, hydrostatic force on a curved surface, buoyancy, flotation, and stability), Rigid body motion of a fluid, Fluid Kinematics (continuity equation, steady and unsteady flow, laminar and turbulent flows, path line and stream line, ideal and real, rotational and ir-rotational flow, Fluid Dynamics (Bernoulli's Equation, total and hydraulic gradient lines, application of Bernoulli Equation, Pitot Tube, stagnation point, Venturi Meter, orifice, nozzles, flow over notches and weirs), Momentum analysis of flow Systems (conservation of momentum, control volume, forces on control volume, forces acting on plates, turbines concept, forces acting on bends & reducers , calculations of minor losses), Flow through pipe lines (Reynold's Number, Darcy-Weisbach Equation, friction head losses, Moody Charts, design of pipe flow system, branching pipe, pipes in series and in parallel, head loss problems, discharge problems, sizing problem, reservoir system)									
Textbook	Applied Fluid Mechanics 7th edition, by Robert L. Mott published by Pearson Education (2014) Foundementals of Fluid Mechanics book 7th edition by Munson Published by Wiley (2012).									
IHDS302	Open Channel Hydraulics	2	1		2	1				4
	Pre-requisites: IHDS201									
	Introduction, Types of cross sections, Stage and depth measurements, Types of flow, Velocity distribution, Velocity measurements, Kinetic energy and momentum, correction factors, Curvilinear pressure distribution, Steady uniform flow, Resistance to flow, Design of cross sections, Design of circular cross sections, Specific energy and critical flow, Applications on specific energy, Specific force, Steady rapidly varied flow, Hydraulic Jump, Weirs, Discharge measurements, Steady gradually varied flow, Water surface profiles, Computation of water surface profiles length, Flow control, Laboratory experiments.									
Textbook	Chaudhry, M. H. (2022). Open-channel flow. 3rd edition, New York: Springer									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
INTS203	Mechanical and Electrical Systems	2	1	2						3
	Pre-requisites: 50 credits									
	Introduction to electrical circuits; Electrical installation in residential and industrial buildings (illumination networks in rural areas, data lines, telephone lines & antenna, control of air conditioning, lift); Requirements of audio systems; Alarm devices (fire - security - gas); HVAC components and systems; Plumbing elements and features; Essential mechanical systems used in residential & institutional projects									
References	Nilsson, James William, and Susan A. Riedel. Electric circuits. Pearson, 2020.									
PBWS303	Water and Wastewater Engineering	2	1	2						3
	Pre-requisites: IHDS201									
	Introduction – Definitions – Fields of Environmental Engineering – Environmental system – Waste cycles – Main Environmental problems – Global problems – Water pollution – Water supply Engineering – Water purification works – Water distribution system and Storage tanks – Sanitary Drainage – Sewerage System – Wastewater Treatment Works.									
Textbook	John C. Crittenden, R. Rhodes Trussell, David W. Hand, Kerry J. Howe and George Tchobanoglous (2012), MWH's Water Treatment: Principles and Design, 3rd Edition. Metcalf & Eddy Inc., George Tchobanoglous, Franklin L. Burton, Ryujiro Tsuchihashi, and H. David Stensel. 2013. Wastewater Engineering: Treatment and Resource Recovery. 5th ed. New York, NY: McGraw-Hill.									
PBWS202	Surveying for Engineers	3	2		1	2				5
	Pre-requisites: MTHS003									
	Engineering principles and applications of surveying sciences (with emphasis on plane surveying) are presented in relation to engineering. Popular techniques and engineering use of distance, angles and height difference measurements are studied and practiced. Applications in detail mapping, earthwork computations, and setting out engineering structures are covered in this course. Integrated digital surveying and mapping using total station are introduced									
Textbook	Charels D. Ghilani and Paul R. Wolf 2017 "Elementary surveying; an introduction to geomatics" (15th edition) Pearson Prentice Hall New Jersey.,									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
PBWS301	Highway Engineering	2	1	2						3
	Pre-requisites: 75 credits									
	Introduction to transport planning and traffic engineering – route study and reconnaissance – functional classification of road network – criteria of geometric design – design of road horizontal & vertical alignments – cross section elements – type of road pavement – vehicle – load and stresses – construction equipments – method statement & quality control – pavement management and rehabilitation – traffic control during road construction and maintenance. Use of computer simulation for selection of equipment.									
Textbook	• Traffic and Highway Engineering" by N. J. Garber and L. A. Hoel, Fifth Edition, 2014 • Islam, M. Rashad, and Rafiqul A. Tarefder. 2020. Pavement Design: Materials, Analysis, and Highways. 1st ed. New York: McGraw Hill.									
PBWS302	Soil Mechanics	3	2	2	0					4
	Pre-requisites: STRS202 + STRS204									
	Basic properties of soil, Soil classification, Compaction, Permeability, Soil stresses, Consolidation, Shear strength, and Lateral earth pressure.									
Textbook	Das, B. M., & Sivakugan, N. (2015). Introduction to geotechnical engineering. Cengage Learning									
PBWS402	Foundations	3	2	2						4
	Pre-requisites: PBWS302									
	Basics of soil investigations, Soil bearing capacity, Designs of shallow foundations: wall footings, isolated footings, combined footings and strip footings, Design of retaining walls, Design of deep foundations: pile construction methods, estimation of pile bearing capacity, pile load tests, design of group piles. Considerations for selection of types of foundations									
References	Das, B.M. (2020). "Principles of Fouccation Engineering", 10th Edition, Cengage Learning, Hampshire, UK Egyptian Code of Practice for Soil Mechanics and Design and Construction of Foundations (2001), ASTM International (Formerly known as: American Society for Testing and Materials).									
STRS101	Structural Analysis-1	3	2	2						4
	Pre-requisites: EMCS001									
	Types of structures and idealized models. Loads; supports and reactions. Internal forces in plane and space structures. Analysis of statically determinate structures such as beams, frames, and trusses. Influence lines of beams and frames									
References	Structural Analysis, Author: R.C. Hibbler (10th edition) (2018), Pea rson Education Inc.									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
STRS202	Structural Analysis-2	3	2	2						4
	Pre-requisites: STRS101									
	Governing differential equation for beam deflections. Deformations by virtual work. Statically indeterminate structures. Flexibility analysis methods such as consistent deformations and three-moments equation. Moving loads on beams.									
References	Structural Analysis, Author: R.C. Hibbler (10th edition) (2018), Pearson Education Inc.									
STRS203	Engineering Materials	3	2		1	2				4
	Pre-requisites: PHYS001 + EMCS001									
	Classification of types of materials; Concrete and asphalt concrete; constituent materials and their properties, mix design, manufacture, properties, and standard and quality control testing; Steel, Building stones; Bricks; Timber; Heat insulating and acoustic materials. Laboratory: Testing for QC									
References	1" (Properties of concrete", Neville, A.M., Pearson Education Limited, Edinburgh Gate. Harlow, England, 2011 (Reference book). 2" (Engineering Materials a: An Introduction to Properties Applications and Design",Ashby, M.F. and Jones D.H.R., Butterworth-Heinemann, Massachutess, USA, 2012 . 3) Egyptian Code of Practice ECP#203/2020.									
STRS204	Mechanics of Materials	3	2	2						4
	Pre-requisites: STRS203									
	Properties of plane areas. Stresses and strains for axial loading. Normal stresses due to normal force and bi-axial moments. Shear stresses due to shear force. Shear stresses due to torsion. Principal stresses and maximum shear stress for 2D element. Buckling of columns.									
References	'Mechanics of Materials', Beer, Johnston & DeWolff, Structural Mechanics', Metwally Abdel Aziz									
STRS301	Reinforced Concrete Design I	3	2	2						4
	Pre-requisites: STRS202 + STRS204									
	Methods of design; Codes; Structural systems and load distribution; Design using limit states method; Section subjected to bending moments; Section subjected to shear and torsion; Reinforcement details for beams; Design and reinforcement details for solid slabs ; Design and reinforcement details of concrete short columns; Limit state of deflection, Working stress design method.									
References	Design of Reinforced Concrete Structures (Mashhour and El-Mihilmy) Volumes 1., الكود المصري لتصميم وتنفيذ المنشآت الخرسانية كود رقم 203- 2020 الكود المصري لحساب الأحمال والقوى في الأعمال الإنشائية وأعمال المباني - كود رقم 201 – 2012 ,									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
STRS321	Economy Strategies in Construction Industry	3	2	2						4
	Pre-requisites: 70 cr.									
	Money/time analysis, Alternative comparison, rate of return, cost/benefit ratio, depreciation and taxes, replacement analysis, public utilities analysis, estimating for economic analysis, capital planning and budgeting, introduction to risk and uncertainty, sensitivity analysis, bond and shares, mortgage.									
STRS324	Construction Project Management	3	2	2						4
	Pre-requisites: 70 Cr Hrs									
	Project management definition, project delivery methods, contracting strategies, basic management functions, construction scheduling, bar charts, AOA and AON networks, critical path method, construction resources, material management, labor productivity, construction equipment, design and analysis of construction operations, construction cost, cost estimating, direct and indirect costs, cash flow calculations, introduction to management information systems									
References	Halpin, D. W. (2010). Construction management. John Wiley & Sons. Project Management Institute. (2021). A guide to the Project Management Body of Knowledge (PMBOK guide) (7th ed.). Project Management Institute.									
STRS302	Steel Structures Design I	3	2	2						4
	Pre-requisites: STRS202 + STRS204									
	Introduction to structural steel design – Design criteria (materials, loads, and systems) – General layout – Design of tension members – Design of compression members – Design of beams – Design of beam-columns.									
References	"Behavior, Analysis, and Design of Structural Steel Elements", Elsayed Bahaa Machaly, 2020 "Egyptian Code of Practice for Steel Construction and Bridges, ECP 205", latest edition 2018									
STRS303	Reinforced Concrete Design II	3	2	2						4
	Pre-requisites: STRS301									
	Design and reinforcement details: ribbed slabs, paneled beams slab, flat slabs (beamless slabs), stairs; Design of sections under eccentric forces; Design and reinforcement details of concrete long columns									
References	Design of Reinforced Concrete Structures (Mashhour and El-Mihilmy) Volumes 2., الكود المصري لتصميم وتنفيذ المنشآت الخرسانية كود رقم 203- 2020, الكود المصري لحساب الأحمال والقوى في الأعمال الإنشائية وأعمال المباني - كود رقم 201 – 2012									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
STRS304	Steel Structures Design II	3	2	2						4
	Pre-requisites: STRS302									
	Welded connections – Bolted connections (bearing and friction bolts) – Steel details for frames – Steel details for trusses – steel details for wind bracing.									
References	"Behavior, Analysis, and Design of Structural SteelWork Connections", Elsayed Bahaa Machaly -Latest Edition, 2020 "Egyptian Code of Practice for Steel Construction and Bridges, ECP 205", latest edition,2018									
MTHS102	Linear Algebra and Multivariable Integrals	3	2	2						4
	Pre-requisites: MTHS003									
	Solving Linear Systems, Vector Spaces and Subspaces, Inner Product Spaces and Orthonormal Bases, The Eigenvalue Problem; Diagonalization of Matrices, Computing Functions of Matrices. Functions of Several Variables, The Gradient of a Scalar Function and its Applications, Vector Fields, Curl and Divergence, Double and Triple Integrals with Applications, Line and Surface Integrals with Applications									
Textbook	1" .Calculus Early Transcendentals", by James Stewart, 8th edition, 2015, Cengage Learning. 2. "Elementary Linear Algebra with Applications" by B. Kolman and D. Hill, 2013, Pearson international edition.									
MTHS104	Differential Equations	3	2	2						4
	Pre-requisites: MTHS003									
	First-order differential equations, separable, exact, linear, homogeneous and Bernoulli equations; modeling with first order differential equations; higher-order differential equations; method of undetermined coefficients; variation of parameters; modeling with higher order differential equations; series solutions; Laplace transform; properties and applications, shifting theorems, convolution theorem; solutions of differential equations using Laplace transform; Fourier series; Fourier transform.									
Textbook	1. "A First Course in Differential Equations with Modeling Applications" 11th Edition 2017, by Dennis G. Zill 2. "Fundamentals of Differential Equations", 9th Edition, 2017, by R. Nagle, Edward Saff , Arthur Snider. 3. "Advanced Engineering Mathematics", John Wiley & Sons, Inc., 10th Edition, 2011, by Erwin Kreyszig.									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
MTHS300	Statistical Analysis for Civil Engineers	1	0	2						2
	Pre-requisites: 70 Credits									
	Review of main probability and statistical concepts. Observed data and graphical representation. Samples and Statistics. Parameter estimation; Quality Criteria for Estimates. Hypothesis Testing. Chi-Squared Goodness-of-Fit Test, Kolmogorov–Smirnov Test. Simple linear regression. Multiple linear regression. Introduction to design of experiments, statistical distribution app ication in engineering.									
Textbook	Soong, T. T. (2005). Fundamentals of probability and statistics for Engineers. John Wiley and Sons									
EMCS201	Engineering Mechanics-3-Rigid Body Dynamics	3	2	2						4
	Pre-requisites: EMCS002									
	Planar kinematics of rigid bodies- center of mass- moment of inertia - planar kinetics of rigid body: linear and angular equations – application of the equations of motion of rigid body, translation, rotation about a fixed axis and general plane motion - Principle of Work and Kinetic Energy- Conservation of Mechanical Energy- Principle of Impulse and Momentum – Introduction to Vibrations									
Textbook	1- Engineering Mechanics: Dynamics and Statics, SI Edition, 14th edition. Published by Pearson (February 20th, 2020) - Copyright © 2020, Russell C. Hibbeler. 2- Vector Mechanics for Engineers: Dynamics, 12th Edition, By Ferdinand Beer and E. Johnston and Phillip Cornwell and Brian Self, McGraw-Hill © 2019, Published: January 29, 2018									
MDPS001	Fundamentals of Manufacturing Engineering	2	1		1	2				4
	Pre-requisites: None									

Discipline Elective Courses

Elective Group E-3

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
IHDS301	Introduction to Water Resources Engineering	3	2	2						4
	Pre-requisites: 75 Credits									
	Hydrologic cycle, precipitation, infiltration, evaporation and evapo-transpiration, rainfall; Runoff relationships (rational method, unit hydrograph, statistical and probability approaches), stream flow hydrographs, types of aquifers, ground-water flow equations, well hydraulics, monitoring of groundwater levels, hydraulic characteristics of aquifers, groundwater management and safe yields.									
Textbook	Water-Resources Engineering, 3rd/E David A. Chin Publisher: Pearson, 2012									
PBWN343	Transportation and Logistic Management	3	2	2						4
	Pre-requisites: none									
	Transport systems and basic definitions- Introduction to transport planning and management - Transport operations and scheduling - Logistics supply chain management - Vehicle routing and scheduling - Cost elements - Private participation in transport logistics - International technical cooperation in transport logistics - computer applications									
STRS407	Masonry Structures	3	2	2						4
	Pre-requisites: STRS301									
	Masonry Materials, Development of Building Structures, Elements, Systems. Types of Masonry Construction (Un-reinforced, Reinforced, Prestressed), Structural Design, Structural Requirements, Mortar – Grout – Reinforcement – Masonry Assemblages – Strength; Flexural, Axial compression, Combined axial comp. and Flexure, and Shear. Beams and Lintels. Axial and out of Plane loads, Columns and Pilasters, Shear Walls, Construction Considerations and Details									
Textbook	ECP 204-2005, Egyptian code for the design of masonry structures (2005), Building construction, course notes by Prof. Dr. Hossam Hodhod									

Program Compulsory Courses										
Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
STRS205	Human Resources Management	2	1	2						3
	Pre-requisites: 34 cr. Hr									
	HR planning: Job analysis, demand for HR, Supply of HR – Staffing: Recruitment, Selection – Training and development – Performance Appraisal – Compensation: Type of equity, Designing the pay structure, employee benefits – Labour/management relations – Motivation – Leadership – Communication									
Textbook	HUMAN RESOURCE MANAGEMENT, PHI Learning, 2014, BISWAJEET PATTANAYAK									
STRS322	Construction Planning and Scheduling	3	2	2						4
	Pre-requisites: STRS324									
	Construction planning, importance of scheduling, scheduling techniques, program evaluation and review technique (PERT), line of balance, schedule updating, project crashing, time cost trade-off, resource scheduling, resource allocation and leveling techniques, project planning and control using commercial software.									
Textbook	"Project Scheduling and Management for Construction" by David R. Pierce, 4th ed., John Wiley & Sons, Inc., Hoboken, New Jersey, 2013.									
STRS425	Construction Methods & Equipment	3	2	2						4
	Pre-requisites: STRS324									
	Introduction to building construction methods, site layout planning, concrete construction, steel construction, temporary support of excavations, masonry construction, building finishing. Introduction to construction equipment, earthmoving equipment, equipment performance, compacting equipment, lifting equipment									
Textbook	Construction planning, Equipment, and Methods (McGraw-Hill), R. L. Peurifoy, W. B. Ledbetter, C. J. Schexnayder, Clif J. Schexnayder									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
STRS426	Estimating and Quantity Surveying	3	2	2						4
	Pre-requisites: STRS324									
	Bidding process and requirements, bid cocuments, construction quantities, take-off principles, methods of measurement, pricing for resources, unit pricing, overheads, writing the bill, measuring & valuation of works during project execution, updating and reporting, construction project exercises.									
Textbook	"Estimating Construction Costs", Robert Peurifoy and Oberlender, G. D., McGraw-Hill Higher Education									
STRS327	القانون وصناعة التشييد Law and Construction Industry المقرر يدرس باللغة العربية	3	2	2						4
	Pre-requisites: GENS237									
	تعديل العقد، التعويض الاتفاقى فى العقد المدنى والعقد الإدارى. جزاء عدم تنفيذ العقد. فسخ العقد: الأنواع والأثر. الإرادة المنفردة. العمل غير المشروع: أركانه وأنواعه. العقود الهندسية. عقود التشييد. عقد المقاولة. إلتزامات المقاول ورب العمل. التسليم الابتدائى والتسليم النهائى. تغير ثمن العقد: المدنى والإدارى. إنتهاء عقد المقاولة: حالاته. تعويض المقاول. المقاولة من الباطن. مستندات العقد. أولوية المستندات. طرق التعاقد فى عقود البنية التحتية. قواعد التعاقد مع الجهات العامة. عقد المشورة الهندسية وحالات تغير السعر فيها. مسئولية المشيدين: المقاول والمهندسين: عن الإشراف وعن التصميم. مقدمة فى قانون الإثبات. مقدمة فى عقد العمل. Amendment to the contract. Liquidated Damages in Civil and Administrative Contracts. Penalty of revoking contract. Dissolution of Contract; types, effect. Unilateral Undertakings. Tort; Basis and types. Types of Engineering Contracts. Construction Contracts. Contracting Contract. Obligations of the Contractor and the Owner. Practical Acceptance and Final Acceptance. Change in Contract Price; Civil Contracts and Administrative Contracts. Disclosure of Contracting Contract, Compensation of the Contractor. Subcontracting. Documents of the Contract; The priorities. Types of Contracting in Infrastructures Projects, Rules of Contracting with Public Authorities. Consulting Contract. Cases of Changing price of consulting Contract. Liability of the Builders; the engineer and contractor in design, supervision and construction. Introduction to the law of Proof, Introduction to Law of Work									
Textbook	كتاب: "المختصر فى مسئولية المهندس والمقاول فى عقود التشييد"- 2024									

Program Elective Courses

Elective Group E-2

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
GENS442	Decision Support Systems	3	2	2						4
	Pre-requisites: GENS341									
	Management Support Systems. Decision Making Process: Systems, Models, Sensitivity Analysis, "What-If?" Analysis, Goal Seeking, DSS Characteristics, DSS Components, DSS Hardware and Software, Static and Dynamic Models, Handling Certainty & Uncertainty, Mathematical, Programming, Simulation, Heuristic Programming, Forecasting, Financial and Planning Modeling. Artificial versus Natural Intelligence, Knowledge in AI. Fundamentals of Expert Systems.									
Textbook	Hillier, F.S., and Lieberman, G. J., 2014. Introduction to Operation Research. 10th ed., New York: McGraw-Hill, Inc.									
STRS423	Financial Management	3	2	2						4
	Pre-requisites: STRS321									
	Review of accounting principles - Financial planning – Capital-cost control; cycle; economic study – financial ratio analysis – financial markets - Value-control cycle: preliminary return analysis; comparative return analysis – Debit and loan management – risk and return – stocks and bonds – mortgagee: first market; second market.									
Textbook	Construction Financial Management, S.L. Tang , 2015 , Book boon the e-book , FINANCIAL ANALYSIS: TOOLS AND TECHNIQUES A Guide for Managers ERICH A. HELFERT, D.B.A. 2022									
STRS428	Introduction to construction Contracts & Contract Administration	3	2	2						4
	Pre-requisites: STRS327									
	National and international legal systems, types of Engineering Contracts. Construction Contracts. Standard forms of contract and FIDIC. Bidding, Tendering and evaluation of Tenders. The Employer, The Engineer and The Contractor. Time, Taking-Over and Defects Liability. Price Adjustment Formula. Variations, Insurance and Guarantees. Breaches, Defaults and Termination. Claims, Disputes and Arbitration. Introduction to Contract Administration. Contract Administration for FIDIC Forms									
Textbook	CONSTRUCTION CONTRACTS - Law and Management, by John Murdoch and Will Hughes, Fifth Edition, 2015									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
STRS441	Reinforced Concrete Design III	3	2	2						4
	Pre-requisites: STRN303									
	Design and details of Frames, Cracking limit state; Design of water tanks; Design of footings, raft foundations and pile caps.									
Textbook	Design of Reinforced Concrete Structures (Mashhour and El-Mihilmy) Volumes 2 and 3., 2008 الكود المصري لتصميم وتنفيذ المنشآت الخرسانية كود رقم 203- 2020									
STRS445	Steel Structures Design III	3	2	2						4
	Pre-requisites: STRN304									
	Steel bridges – Special steel structures (Tanks, silos, and towers) – Steel fabrication and erection (inspection procedures and tolerances) – Shop drawings									
Textbook	· Egyptian Code of Practice for Steel Construction and Bridges. , latest edition,2018 . Design Standard for High Voltage Overhead Transmission Lines 33kV–500kV. Ministry of Energy and Electricity. . American Water Works Association – AWWA- D100									
Elective Group E-4										
STRS429	Heavy Construction Methods	3	2	2						4
	Pre-requisites: STRS425									
	Highway construction methods, mass-balance diagrams, pile construction, diaphragm walls, bridge construction, pipeline construction, trenchless pipeline construction, construction dewatering, equipment economics									
STRS404	Construction Material and Quality Control	3	2	2						4
	Pre-requisites: STRS202 + STRS203									
	Specifications and codes- QA & QC- Inspection- Special types of concrete; self-compacting concrete, high strength concrete, durable concrete-Fiber concrete-, QC of materials and manufacture of concrete testing- statistical evaluation of testing results- Nondestructive testing of concrete in structures. Bricks, mortar, and grout for masonry- QC procedures and testing. Structural steel, steel pipes, QC testing									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
STRS447	Strategic Planning	3	2	2						4
	Pre-requisites: STRS321 + STRS322									
	Competitiveness and strategies, strategic management goals, strategic management process, mission and objectives, resources and capabilities, types and levels of strategies, strategy formulation, Porter's generic strategies, portfolio planning, adaptive strategies, strategy implementation, management practices and systems, corporate governance, leadership									
Textbook	Essentials of Strategic Management - Charles W L Hill; Gareth R Jones									
STRS464	Sustainability and Public Policy in the Construction Industry	3	2	2						4
	Pre-requisites: STRS324									
	Evaluating the sustainability of engineering activities, Life Cycle Assessment, Introduction to green building technologies, Environmental management in construction, Establishing policy objectives and goals, Frameworks for the analysis of public policy, Case studies in policy analysis									

Elective Group E-5

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
STRS463	Building Information Modeling Industry	3	2	2						4
	Pre-requisites: ARCS216 + STRS324									
	Introduction to building product models, information interoperability, practical aspects associated with the use of Building Information Model (BIM) in planning the execution of building construction projects. This is a project-based course where students gain knowledge on the implementation of BIM concepts throughout the lifecycle of a building, from planning and design, to construction and operations									
PBWS446	Deep Excavation and Side Support	3	2	2						4
	Pre-requisites: PBWS302									
	Introduction to deep excavation – Slope stability – Construction of: sheet pile walls - Selection of proper Retaining system – nsulation									
Textbook	Das, B. M., & Sobhan, K. (2014). Principles of geotechnical engineering, SI edition. Boston: Cengage Learning.									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
STRS452	Information Technology in Construction	3	2	2						4
	Pre-requisites: STRS324									
	Software systems in construction management: scheduling, cost estimating, material management, documents management and, 4D CAD systems. Introduction to Building Information Modeling. Use and design of databases and programmable spreadsheets for construction applications									
Textbook	* Introduction to Construction Contract Management, By Brian Greenhalgh,2017 * "Applications of Information Technology in Construction", by Institution of Civil Engineers (Author), J. W. S. Maxwell (Editor), Thomas Telford Publishing; First Edition edition (January 1, 1994)									
STRS454	Special Problems in Construction	3	2	2						4
	Pre-requisites: 130 cr + STRS324									
	Special problems in the field are studiec under supervision of a faculty member from the program. A final report is submitted to fulfill course requirements									
STRN470	Dispute Resolution in Construction Industry	3	2	2						4
	Pre-requisites: STRS327									
	Arbitration; Commercial & International, Why Arbitration, Abitration and State jurisdiction, Arbitration Clause, Arbitral Tribunal; The Arbitrator. Arbitration Procedures, Arbitration Award. Dispute Adjudication/Avoidance Bord in FIDIC, Other Dispute Resolution Strategies; Adjudication, Mediation, Mini Trial, Partnership,									
Textbook	المختصر فى مسئولية المهندس والمقاول فى عقود التشييد- 2024									
STRS465	Inspection and Maintenance of Structures	3	2	2						4
	Pre-requisites: STRS303									
	Introduction – Causes of Deterioration and needs for Repair - Methodology and strategy of repair - Symptoms, Diagnosis, Treatment - Assessment of strength of concrete structures - Repair: materials, methods, strengthening - Brick walls: inspection and repair									
Textbook	الكود المصري لتصميم وتنفيذ المنشآت الخرسانية كود رقم 203- 2020 ACI 562M-16- Code Requirements for Assessment, Repair, and Rehabilitation of Existing Concrete Structures and Commentary – 2016									

Elective Group E-6										
Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
STRS421	Risk Management in Construction Industry	3	2	2						4
	Pre-requisites: STRS428									
	Roots of uncertainty in construction projects, need for risk management, steps for managing project risks, risk identification, risk assessment and analysis, qualitative and quantitative approaches, risk mitigation and transfer strategies, risk sharing, risk control during project execution, organizing for risk management, role of risk manager, risk-based decision making, risk considerations for various project participants									
Textbook	Book: "Managing Risks in Construction Projects" by Nigel J. Smith, Tony Merna, and Paul Jobling Journal articles and conference proceedings									
STRS427	Cost Engineering	3	2	2						4
	Pre-requisites: STRS426									
	Importance of cost engineering, cost estimating, types of estimates, feasibility estimate, budget estimate, detailed estimate, direct cost estimating, quantity take-off, construction resource pricing, indirect costs, general and administrative expenses, risk and contingency estimate, concept of cost monitoring and control, cost breakdown structure, earned value concept, performance indices, cost prediction at completion, value engineering.									
Textbook	Preparing Construction Claims - by By Stephen C. Hall, First Edition, 2020									
STRS448	Quality and Safety Management	3	2	2						4
	Pre-requisites: STRS324									
	Quality and safety concerns in construction, organizing for quality and safety, work and material specifications, quality control and inspection, statistical methods, sampling by attributes and variables, total quality management (TQM), ISO concepts and regulations, basics of safety management, OSHA requirements for construction operations, safety plans.									

Code	Name/Content	Credit Hours	Contact Hours							
			Lec	Tut (2)	App. Tut	Lab	Stud	Off. Tut	Off. Hrs	Total
STRS449	Organization Management	3	2	2						4
	Pre-requisites: STRS324									
	Effective design of organization structural – strategic organization design – job design – power and politics - organization culture – type of departmentalization - method of vertical coordination – method of horizontal coordination - rewards and motivation – managing change and innovation – impact of the global economy – controlling the organization – managerial control methods									
Textbook	Organizational behavior, Steven I. L. Mcshane									
STRS453	Project Specification and Bids	3	2	2						4
	Pre-requisites: STRS428									
	Bids vs. negotiations, open bids vs. short listed bidders, instructions to bidders, bid forms, pre-qualifications, bid management, addenda and response to queries, bid opening & review, evaluation and recommendation, bid documents and their priority, preliminary vs. general requirements, types of specifications, reference, cash allowance, specification deficiency and common errors, specifications and liability, case studies.									
STRS456	Claims in Construction Industry	3	2	2						4
	Pre-requisites: STRN428 + STRN322									
	Definition & Classification, Generation and Procedure of Claims, Claim categories: Claims concerning the Existence of a contract, Claims arising form documentation, Claims arising in connection with exclusion of the works, Claims concerning payment provisions, Claims concerning time, Claims arising from default, determination, Presentation of claims: Mediation, Conciliation, Adjudication, Arbitration, Litigation									
Textbook	Preparing Construction Claims - by By Stephen C. Hall, First Edition, 2020									