



المملكة العربية السعودية  
المؤسسة العامة للتدريب التقني والمهني  
الإدارة العامة لتصميم وتطوير المناهج

## الكليات التقنية

**CURRICULUM**

**FOR**

**Department**

**Civil and Architectural**

**Major**

**Construction Engineer**





### **Program Description:**

This program of Construction Technology is designed to develop skills and training required to meet the needs of the local labor market. The program tends to qualify technical engineer capable of supervising different constructions fields. Training in this program includes general skills in English, mathematics and professional ethics, methods of human communication, interaction skills, project management, quality management and leadership. It also emphasizes knowledge of structure and civil works. The scope of the program include, engineering drawings, material technology, structural analysis, concrete design, steel design, foundation engineering, water technology, road design, surveying, mechanical and electrical systems for buildings, building maintenance . The program consist of six semesters, in the fourth and fifth semester, trainee with super vision provide a project in one of relevant subjects. To accomplish the program graduation requirement, trainee spends the sixth semester training in the local company working in a related field.



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Seventh Trimester								
	Course Code	Course Name	Prereq	No. of Units				
				CRH	L	P	T	CTH
1	ISL 305	Islamic Culture (3)		2	2	0	0	2
2	MAH 325	Mathematics (3)		4	3	2	1	6
3	PHY 325	Physics (2)		4	3	2	0	5
4	CMT 385	Advance Computer Applications		2	0	4	0	4
5	ENG 305	English (1)		2	2	0	2	4
6	ARC 350	Construction Drawings(Mandatory for Civil engineering technology graduates)	-	3	-	6	-	6
	CIV 350	Introduction to Structural Design (Mandatory for Architectural engineering technology graduates)	CIV 113	3	3	-	3	6
<b>Total</b>				17	10	14	6	33
L = Lecture Hours, P = Workshop/Laboratory Hours, T = Tutorial Hours								

Eighth Trimester								
	Course Code	Course Name	Prereq	No. of Units				
				CRH	L	P	T	CTH
1	ARB 305	Arabic (2)		2	2	0	0	2
2	MAH 326	Mathematics (4)		4	3	2	1	6
3	ENG 306	English (2)		2	2	0	2	4
4	CMT 325	Computer Programming		3	2	2	0	4
5	CIV 351	Construction Technology	-	3	3	-	-	3
6	CIV 352	Soil mechanics and foundations	-	3	2	2	-	4
<b>Total</b>				17	14	6	3	23
L = Lecture Hours, P = Workshop/Laboratory Hours, T = Tutorial Hours								

Ninth Trimester								
	Course Code	Course Name	Prereq	No. of Units				
				CRH	L	P	T	CTH
1	ENG 307	English (3)		2	2	0	2	4
2	GMS 435	Introduction to Management & Leadership		2	2	0	2	4
3	GMS 436	Commutation Skills		2	2	0	2	4
4	CIV 353	Structural Analysis	-	3	3	-	3	6
5	CIV 355	Survey (2)	-	3	2	2	-	4
	CIV 354	Water Supply and wastewater systems design	-	2	2	-	2	4
<b>Total</b>				14	13	2	11	26
L = Lecture Hours, P= Workshop/Laboratory Hours, T = Tutorial Hours								



Tenth Trimester								
	Course Code	Course Name	Prereq	No. of Units				
				CRH	L	P	T	CTH
1	ENG 308	English (4)		2	2	0	2	4
2	GMS 437	Engineering Project Management		3	3	0	2	5
3	MAH 425	Statistic & Probability		4	3	2	1	6
4	CIV 450	Design of Concrete Structures	CIV 353	3	3	-	2	5
5	ARC 351	Mechanical and Electrical Systems	-	3	3	-	-	3
6	CIV451	Project (1)	-	2	-	4	-	4
<b>Total</b>				17	14	6	7	27
L = Lecture Hours, P = Workshop/Laboratory Hours, T = Tutorial Hours								

Eleventh Trimester								
	Course Code	Course Name	Prereq	No. of Units				
				CRH	L	P	T	CTH
1	ENG 309	English (5)		2	2	0	2	4
2	GMS 438	Quality Tools & Applications		3	3	0	2	5
	GMS 439	Engineering Economics		2	2	0	2	4
3	CIV 452	Design of Steel Structures	CIV 353	2	2	-	2	4
4	CIV 453	Maintenance and repair of constructions	-	2	2	-	-	2
5	CIV 454	Highway Engineering	CIV 352	3	2	2	-	4
6	CIV456	Project (2)	-	2	-	4	-	4
<b>Total</b>				16	13	6	8	27
L = Lecture Hours, P = Workshop/Laboratory Hours, T = Tutorial Hours								

Twelfth Trimester								
	Course Code	Course Name	Prereq	No. of Units				
				CRH	L	P	T	CTH
		Co-operative Training	Pass all Courses	4				
<b>Total</b>				85				130
<b>The total training hours (130X13) + 420</b>				2110				
L = Lecture Hours, p = Workshop/Laboratory Hours, T = Tutorial Hours								



## Brief description

### **ARCH 350 Construction Drawings :**

This course aims to expand in trainee their knowledge of construction drawings, to read and interpret working drawings of the major construction fields Architecture, Civil, Mechanical and Electrical. Besides that, the course develops the ability to visualize and communicate three-dimensional shapes.

### **CIV 350 Introduction to Structural Design :**

This course is divided into three Parts. It provides trainee with a basic knowledge of:

Part 1: Concrete structures: Types of concrete structures, Types of loads, fundamentals of structures analysis, principles of designing beams, slabs, columns and footings.

Part 2: Steel Constructions: Types of steel constructions, their components, and their construction systems; fundamentals of designing steel members; types of joints and connections between members.

Part 3: Introduction to soil mechanics: Soil formation, structures and problems; soil engineering properties; behavior of soil under the effect of vertical loads.

### **CIV 351 Construction Technology :**

Preparation of the site, earth works, formwork, scaffolding, different structural elements of the construction, precast concrete, masonry works, floors and roofs, internal and external finishes, insulation and protection, shell structures.

### **CIV 352 Soil mechanics and foundations :**

This course deals with soil as an engineering material. It includes the description and classification of soil, the analysis of stress in soil, and soil behavior under conditions of major engineering significance that include the characteristics of water flow through soil, consolidation settlement and shear strength. It also covers the development and application of earth pressure theory. The primary goal of the course is to develop analytical skills in dealing with soil as a medium of water flow, a medium for structural support, and a primary earth structure material.

### **CIV 353 Structural Analysis :**

Classification of structural systems; structural design process; computation of loads on structures; analysis of statically determinate and indeterminate structures by different methods; Computer applications in structural analysis and design; influence lines for moving loads.

### **CIV 355 Survey (2) :**

This course covers basic surveying topics that construction engineer deal with regularly. These topics include: cross – sections, leveling and global positioning system. Trainees will handle these topics theoretically and practically.

### **CIV 354 Water Supply and wastewater systems design :**

Surface and groundwater, quality control, water distribution systems, storm water collection systems, wastewater systems and sewerage, pumps and pumping stations, wastewater Treatment.



**CIV 450 Design of Concrete Structures :**

In this course, trainee get to know how to analyze and design continuous beams; continuous one-way, two-way, ribbed ,Flat slabs; Analyze and Design stair slabs, Column under eccentrically loads, and R.C. frames; Apply the principles, procedures and basic theory of pre-stressed concrete to structural design; Apply current code requirements to the analysis and design of R.C structures through a design project.

**ARCH 351 Mechanical and Electrical Systems :**

This course is an overview of the mechanical and electrical systems for building, methods of design and implementation. These systems contain everything needed by the building to be suitable for living and work such as HAVC, Plumbing, Fire fighting and Fire alarm, Elevators, Electrical power systems, lighting, telephone and data systems.

**CIV451 Project (1) :**

Graduation project will be accomplished in two phases. This course is the first stage where trainee discovers and decides the project subject. By the end of the sixth week, trainee ended searching and preparation step and ready to start the project. The project subject will be in one of the topics that have been studied and under supervision of qualified trainer to ensure that trainee utilize skills and knowledge gained during study.

**CIV 452 Design of Steel Structures :**

In this course, trainee get to know how to analyze and design tension and compression steel members, Columns under eccentric loadings, Column bases and footings, Beams for Flexure and Shear, bolted and welded Connections, Structural Steel design Project (Apply computer calculation).

**CIV 454 Maintenance and repair of constructions :**

Maintenance and repair strategies, serviceability and durability of concrete, materials for repair, techniques for repair and demolition, repairs, rehabilitation and retrofitting of structures.

**CIV 454 Highway Engineering :**

The course is presented in 2 strands. The first strand is concerned with the fundamentals of highway and pavement engineering. It introduces the design process of roads and intersections, including horizontal and vertical alignment design, cross-sections and earthworks. The second half of this strand deals with pavement design and evaluation. Topics include: pavement composition, pavement materials, asphalt mix design, the pavement thickness design. and, defects in Flexible pavements and, failures in Rigid pavements.

The second strand is presents briefly bridges classification and construction methods.

**CIV456 Project (2) :**

This course is the second phase where trainee continue the project he started in the previous semester.



## Courses Description

<b>Department</b>	General Study	<b>Major</b>	All Majors
<b>Course Name</b>	Arabic 2	<b>Course Code</b>	ARB 305
<b>Prerequisites</b>		<b>Credit Hours (L,W,T)</b>	2 (2,0,0)

### Course description :

This course concentrates on improving the advance skills of arabic composition of technical colleges students according to their needs and knowledge. It enables them to acquire enough knowledge of types of writing in Arabic. It also gives the theoretical description and practical training of the basic types : summarizing, report, and administrative message,..etc. The course also intends to introduce dictative and grammatic subjects to solve the problems of writing and the common mistakes in composition with training on them to change them to acquired linguistic experiences.

### Topics :

- Building elements of the text.
- Types of functional writing.
- Types of technical writing.
- Writing mistakes.

### Textbook :

كتاب: " التحرير الكتابي" للمؤلفين : د. حمدان الزهراني، د. فهد اللهبي، د. سعد المطرفي . دار النشر: دار حافظ بجدة





<b>Department</b>	General Study	<b>Major</b>	All Majors
<b>Course Name</b>	Islamic Culture 3	<b>Course Code</b>	ISL 305
<b>Prerequisites</b>		<b>Credit Hours</b> (L,W,T)	2 (2,0,0)

**Course description :**

This course covers principle areas of Islam and Contemporary Issues such as islam systems (the aims of Islam, profession in Islam , and human right ) considering to the determination of the general objectives of profession conception , the purposes, and the principles that islam brought, concentrating on what distinguishes islam in its organization with respect to its completeness, its detailing, and its linking between the purposes of sharia and what it brought as a social and economic system

**Topics :**

- Introduction to assets approach Sunnis.
- profession in Islam.
- Human Right in Islam.
- Suspicious cases in Human Right and response.

**Textbook :**

المدخل الى الثقافة الإسلامية – جامعة الملك سعود



<b>Department</b>	General Study	<b>Major</b>	All Majors
<b>Course Name</b>	Advance Computer Applications	<b>Course Code</b>	CMT 385
<b>Prerequisites</b>		<b>Credit Hours</b> (L,W,T)	2 (0,4,0)

**Course description :**

This course designed to give the student an advance skill of the Microsoft Word, Microsoft Excel and Microsoft Project. The student has to know how to use the advance option and create a professional document.

**Topics :**

- Microsoft Word : Use advance option and inset it inside the document
- Microsoft Excel : Use the high level option with workbooks
- Microsoft Project : Give a brief knowledge about how the student use the Microsoft Project

**Experiments:** if applicable it will support the theoretical topics.

**References :**

- Microsoft MOS



<b>Detailed of practicals Contents</b>			
<b>Week No</b>	<b>Contents</b>	<b>material</b>	<b>Hours</b>
<b>1</b>	Create new documents apply templates	Microsoft Word	<b>4</b>
<b>2</b>	Inserting special characters (©, ™, £) Configure AutoCorrect Options Inserting Special Characters Using AutoCorrect Disabling AutoCorrect		<b>4</b>
<b>3</b>	Record simple macros Assign shortcut keys Manage macro security		<b>4</b>
<b>4</b>	Create new workbooks using templates Select a Template from the New Tab Search for Additional Templates	Microsoft Excel	<b>4</b>
<b>5</b>	Display dates and times with functions Summarize data with functions Use a financial function Use formulas to create subtotals Uncover formula errors		<b>4</b>
<b>6</b>	Demonstrate how to apply the SUM function Demonstrate how to apply the COUNT function Demonstrate how to apply the AVERAGE function Demonstrate how to apply the MIN and MAX functions		<b>4</b>
<b>7</b>	Import files Set data validation Create outlines Collapse groups of data in outlines Filter records Change the sort order Remove duplicates Manage macro security		<b>4</b>
<b>8</b>	Navigate in Microsoft Project Create a Project Schedule Define Project Calendars Enter Tasks and Task Details Organize Tasks into Phases Link Tasks Document Tasks	Microsoft Project	<b>4</b>



	Review the Project Schedule's Duration		
<b>9</b>	<ul style="list-style-type: none"> <li>Establish people resources</li> <li>Establish equipment resources</li> <li>Establish material resources</li> <li>Establish cost resources</li> <li>Establish resource pay rates</li> <li>Adjust resource working times</li> <li>Add resource notes</li> </ul>	Microsoft Project	<b>4</b>
<b>10</b>	<ul style="list-style-type: none"> <li>Assign work resources to tasks</li> <li>Add more work resource assignments to tasks</li> <li>Assign material resources to tasks</li> <li>Assign cost resources to tasks</li> </ul>		<b>4</b>
<b>11</b>	<ul style="list-style-type: none"> <li>Apply a task calendar to an individual task</li> <li>Change task types</li> <li>Split a task</li> <li>Establish recurring tasks</li> <li>Apply task constraints</li> <li>Review the project's critical path</li> <li>View resource allocations over time</li> </ul>		<b>4</b>



<b>Department</b>	General Study	<b>Major</b>	All Majors
<b>Course Name</b>	Computer Programming	<b>Course Code</b>	CMT 325
<b>Prerequisites</b>		<b>Credit Hours</b> (L,W,T)	3 (2,2,0)

**Course description :**

The main purpose of this course is to help the trainees increase their programming and problem solving skills.

This course should provide trainees with basic Knowledge of C++-Programming, regarding syntax and applied practice, with a focus on object-oriented design principles.

**Topics :**

- Problem-Solving and Introduction programs and C++.
- Elementary programming.
- Selections.
- Mathematical Functions, Characters, and Strings.
- Loops.
- Functions.
- Arrays.
- Objects and classes.

**Experiments:** if applicable it will support the theoretical topics.

**References :**

- Y. Daniel Liang, Introduction to Programming with C++, 3/E.
- Gary J. Bronson, C++ for Engineers and Scientists, 3/E.



Detailed of Theoretical Contents			
	Contents	Week no.	Hours
1	<b>Problem-Solving and Introduction programs and C++:</b> <ul style="list-style-type: none"> <li>- Algorithms and Flowchart.</li> <li>- Understand software development cycle.</li> <li>- Realize the fundamental of C ++.</li> </ul>	1	2
2	<b>Elementary programming :</b> <ul style="list-style-type: none"> <li>- Study basic data types, their declarations and initializations.</li> <li>- Characters, and Strings.</li> <li>- Use variables to store data.</li> </ul>	2	4
3	<b>Selections :</b> <ul style="list-style-type: none"> <li>- Implement selection control using if and switch statements</li> <li>- Combine conditions using logical operators</li> <li>- Write expressions using the conditional operator.</li> <li>- Format output using stream manipulators.</li> <li>- Examine the rules governing operator precedence and operator associativity .</li> </ul>	1	2
4	<b>Loops:</b> <ul style="list-style-type: none"> <li>- Write loops using do-while, while and for statements.</li> <li>- Control a loop with the user confirmation or a sentinel value.</li> <li>- Write nested loops.</li> <li>- Learn the techniques for minimizing numerical errors.</li> <li>- Implement program control with break and continue .</li> </ul>	1	2
5	<b>Function basics:</b> <ul style="list-style-type: none"> <li>- Mathematical Functions.</li> <li>- Define and invoke different types of functions.</li> <li>- Use function prototypes for function headers.</li> <li>- Know how to pass arguments.</li> <li>- Create header files for reusing functions.</li> <li>- Develop functions for various tasks</li> <li>- Develop applications using C++ functions .</li> </ul>	2	4
6	<b>Advanced function feature:</b> <ul style="list-style-type: none"> <li>- Experience advanced topics on pass-by-value, pass-by-reference.</li> <li>- Understand the difference between them.</li> <li>- Determine the scope of local and global variables.</li> <li>- Define functions with default arguments.</li> <li>- Improve runtime efficiency by using inline functions .</li> </ul>	1	2
7	<b>Arrays :</b> <ul style="list-style-type: none"> <li>- Understand the necessity of an array in programming.</li> <li>- Know how to declare and initialize an array.</li> </ul>	2	4



	<ul style="list-style-type: none"> <li>- Program common array operations.</li> <li>- Develop and invoke functions with array arguments.</li> <li>- Process string using C-strings .</li> </ul>		
<b>8</b>	<p><b>Objects and classes:</b></p> <ul style="list-style-type: none"> <li>- Describe objects and classes.</li> <li>- Create objects using constructors.</li> <li>- Distinguish between instance and static variables and functions.</li> <li>- Access data fields and invoke functions using the object member access operator.</li> <li>- Declare private data fields for data field encapsulation and make classes easy to maintain .</li> </ul>	<b>2</b>	<b>4</b>
<b>9</b>	<p><b>Files and streams:</b></p> <ul style="list-style-type: none"> <li>- Learn ifstream, ofstream, and fstream classes for processing and manipulating files.</li> <li>- Read and write data using the getline, get and put functions.</li> <li>- Study functions to test file existence and the end of a file.</li> <li>- Open a file for both input and output to update files .</li> </ul>	<b>1</b>	<b>2</b>
<b>Textbook:</b>	<p>Y. Daniel Liang, Introduction to Programming with C++, 3/E.</p> <p>Gary J. Bronson, C++ for Engineers and Scientists, 3/E.</p>		



Detailed of practical Contents			
	Contents	Week no.	Hours
1	Algorithms and draw flowchart exercises.	1	2
2	Develop a simple C++ program for console output using Visual C++. Read input from keyboard. Program with assignment statements and expressions familiar with C++ documentation, programming style. Experience various errors and debug logic errors .	2	4
3	Training on Selections statements.	1	2
4	Training on looping statements.	1	2
5	Training on functions.	3	6
6	Training on Arrays .	2	4
8	Training on Objects and classes.	2	4
9	Training on Files and streams.	1	2
<b>Textbook:</b>		Y. Daniel Liang, Introduction to Programming with C++, 3/E.	





<b>Department</b>	All Departments	<b>Major</b>	All Majors
<b>Course Name</b>	English 1	<b>Course Code</b>	ENG 305
<b>Prerequisites</b>		<b>Credit Hours (L,W,T)</b>	2 (2,0,2)

**Course description :**

**English 1** is reading course. It is about improving and empowering Student's reading. Through exposure to different types of reading and approach to reading, the learners learn the strategies and practice for strengthening comprehension skills, building vocabulary, and test preparation.

**Topics :**

- **Reading for Pleasure:**  
lets students select their own reading materials to practice new strategies and broaden their vocabulary.
- **Reading Comprehension Skills:**  
covers skimming, scanning, recognizing topics and main ideas, understanding sentences, and making inferences.
- **Thinking Skills:**  
involves targeted practice in inference and analytic skills.
- **Reading Faster:**  
helps students develop speed and flexibility in reading with high interest, short fiction and non-fiction selections.
- **Reading Faster texts** (which includes different types of reading) Fiction, Biography, Non-fiction

**Experiments :**if applicable it will support the theoretical topics.

**References :**

- Skillful Reading: A Text and Workbook for Students of English as a Second Language  
by Amy L. Sonka , Elizabeth Whalley.
- Practice Makes Perfect Intermediate English Reading and Comprehension  
by Diane Engelhardt
- NorthStar: Reading and Writing, Level 2, 3rd Edition  
by Natasha Haugnes, Beth Maher



Detailed of Theoretical Contents			
	Contents	Week no.	Hours
1	Part 1- Extensive Reading	1	2
2	Part 2- Vocabulary Learning and Building	2-3	4
3	Part 3- Comprehension Skills	4	2
4	Previewing	5	2
5	Scanning	6	2
6	Making Inferences	7	2
7	Focusing on the Topic	8	2
8	Understanding Paragraphs	9	2
9	Identifying the Pattern	10	2
10	Thinking in English	11	2
11	Summarizing	12	2
12	Final Assessment	13	2
<b>Textbook:</b>	<u>Reading Power 2 (4th Edition) [Paperback]</u> Linda Jeffries, Beatrice S. Mikulecky Pearson Education ESL; •ISBN-10: 0138143889 •ISBN-13: 978-0138143886		



<b>Department</b>	All Departments	<b>Major</b>	All Majors
<b>Course Name</b>	English 2	<b>Course Code</b>	ENG 306
<b>Prerequisites</b>	English 1	<b>Credit Hours</b> (L,W,T)	2 (2,0,2)

**Course description :**

**English 2** is a reading course for intermediate students of English. It builds on high-interest, authentic reading passages that serve as springboards for reading skills development, vocabulary building, Language analysis, and thought-provoking discussions and writing.

**Topics :**

- Using context
- Skimming
- Topic vs. Main idea
- Inferencing
- Using headings
- Using headings
- Using context
- Reading Instructional materials
- Finding details
- Main ideas
- Using examples

**Experiments:** if applicable it will support the theoretical topics.

**References :**

- Select Readings: Student Book Upper-Intermediate  
by Linda Lee
- Academic Reading  
by Kathleen T. McWhorter, Brette M Sember



<b>Detailed of Theoretical Contents</b>			
	<b>Content</b>	<b>Week no.</b>	<b>Hours</b>
1	Father teaches son a lesson	1	4
2	How to work In groups with classmates	2	4
3	An exchange student in the US	3	4
4	Disability leads to Success	4	4
5	The art of good speech making	5	4
6	The art of good speech making	6	4
7	An interview with Bill Gates about the future	7	4
8	Applying for effectively in	8	4
9	Spanish siesta tradition	9	4
10	How can the public be 'helped to understand I science?	10	4
11	Ways that geniuses think	11	4
Textbook:		Select readings intermediate by Linda Lee and Erik Gundersen. OXFORD UNIVERSITY PRESS ISBN 0-19-437475-0	



<b>Department</b>	All Departments	<b>Major</b>	All Majors
<b>Course Name</b>	English 3	<b>Course Code</b>	ELC 307
<b>Prerequisites</b>	English 2	<b>Credit Hours</b> (L,W,T)	2 (2,0,2)

**Course description :**

*English 3 is writing course. It is an intermediate course for English language. It helps students to master the standard organisational patterns of the paragraph and the basic concepts of essay writing. It integrates the study of rhetorical patterns and the writing process with extensive practice in sentence structure and mechanics.*

**Topics :**

- Paragraph Format
- Narrative Paragraphs
- Paragraph Structure
- Descriptive Paragraphs
- logical Division of ideas
- Process Paragraphs
- Comparison/Contrast Paragraphs
- Definition Paragraphs
- Essay Organization
- Opinion Essays

**Experiments:** if applicable it will support the theoretical topics.

**References :**

- First Steps in Academic Writing , by Ann Hogue
- Academic Writing Student's Book , by Dorothy Zemach and Lisa Rumisek



Detailed of Theoretical Contents			
	Content	Week	Hours
1	Definition Paragraphs Paragraph 1: Paragraph 2: Sentence Structure Appositives and Adjective Clauses Appositives Adjective Clauses Complex Sentences with Adjective Clauses Subject Pronouns: who, which, that Object Pronouns: whom, which, that, and 0 (no pronoun) Clauses with when	1	4
2	Tim order Time Order Signal Sentence Structure Compound Sentences Coordinating Conjunctions Punctuation Three Comma Rules The Writing Process Freewriting Model: Freewriting	1	4
3	Three Parts of a Paragraph A Hawaiian Wedding The Topic Sentence Supporting Sentences The Concluding Sentence Punctuation Apostrophes The Writing Process Outlining Detailed Outlining	2	8



4	<p>Model: Descriptive Paragraph Spatial Order Spatial Order Signals Topic Sentences for Descriptive Paragraphs Supporting Sentences for Descriptive Paragraphs Model: Descriptive Details Paragraph Unity Sentence Structure Model: Compound Sentences Compound Sentences Varying Sentence Openings Clustering</p>	1	4
5	<p>Logical Division of Ideas Paragraph Logical Division of Ideas Coherence Using Nouns and Pronouns Consistently Transition Signals Run-Ons and Comma Splices</p>	1	4
6	<p>Process Paragraph Time Order Time Order Signals Clauses and Complex Sentences Clauses Complex Sentences Subordinators</p>	2	8
7	<p>Comparison/Contrast Paragraphs Paragraph 1: Right Brain/Left Brain Paragraph 2: Two Job Applicants Block Organization Point-by-Point Organization Comparison/Contrast Signals Comparison Signals Contrast Signals</p>	1	4



8	Definition Paragraphs Paragraph 1: Paragraph 2: Sentence Structure Appositives and Adjective Clauses Appositives Adjective Clauses Complex Sentences with Adjective Clauses Subject Pronouns: who, which, that Object Pronouns: whom, which, that, and 0 (no pronoun) Clauses with when	1	4
9	Three Parts of an Essay Essay Structure The Introductory Paragraph Body Paragraphs The Concluding Paragraph Transitions Between Paragraphs Essay Outlining Essay Outline Planning an Essay Step 1 Prewriting 162 Step 2 Organizing Step 2A Group Ideas Logically Step 2B Make an Outline	2	8
10	Opinion Essay The Right to Die Organization The Introductory Paragraph Body Paragraphs The Concluding Paragraph Developing Supporting Details Quotations Rules for Using and Punctuating Quotations Statistics	1	4





<b>Department</b>	All Departments	<b>Major</b>	All Majors
<b>Course Name</b>	English 4	<b>Course Code</b>	ENG 308
<b>Prerequisites</b>	English 3	<b>Credit Hours</b> (L,W,T)	2 (2,0,2)

**Course description :**

**English 4** is a writing course .It covers transactional writing versus academic writing, producing informative and persuasive documents through process writing, developing analytical writing techniques, constructing technical reports, and writing letters, memos, email and related forms. In addition, it addresses the task of formulating resumes and cover letters for employment.

**Topics :**

- Description of a mechanism
- Description of a process
- Proposals
- Feasibility report
- Laboratory report
- Business communications
- Resume and coverletters

**References :**

- Writing Academic English

by Alice Oshima, Ann Hogue

- Cambridge Academic English

By Martin Hewings, Michael McCarthy



Detailed of Theoretical Contents			
	Contents	Week	Hours
1	Ethical Considerations	1	2
2	Technical Definition		2
3	Descriptions of a Mechanism	2	2
4	Descriptions of a Process		2
5	Proposals	3	4
6	Progress Reports	4	4
7	Feasibility and Recommendation Reports	5	4
8	Laboratory and Project Reports	6	2
9	Instructions and Manuals		2
10	Research Reports	7	4
11	Abstracts and Summaries	8	2
12	Grammar, Style, and Punctuation		2
13	Documentation	9	4
14	Visuals	10	2
15	Electronic Publishing		2
16	Presentations and Briefings	11	4
17	Business Communications	12	4
18	Resumes, Cover Letters, and Interviews	13	2
<b>Textbook:</b>		Pocket Book of Technical Writing, 3 <sup>rd</sup> , By Finkelstein, L., McGraw Hill, USA, 2008	



<b>Department</b>	All Departments	<b>Major</b>	All Majors
<b>Course Name</b>	English 5	<b>Course Code</b>	ENG 309
<b>Prerequisites</b>	English 4	<b>Credit Hours</b> (L,W,T)	2 (2,0,2)

**Course description :**

**English 5** is a communication skill course. It is a course designed to develop students' oral, written, and interpersonal communication skills essential for life and work. Students will learn communication principles, strategies, and methods through discussions, exercises, and examples. They will be trained in how to communicate clearly and effectively in various social, business, and intercultural situations. In addition, they will learn and practice verbal, nonverbal, and electronic communication.

**Topics :**

- What is Communication?
- Effective Listening Skills
- Verbal Communication
- Communicating Over the Phone
- Nonverbal Communication
- Written Communication
- Communicating Electronically

**Experiments:** if applicable it will support the theoretical topics.

**References :**

- Guide to Presentations , by Lynn Russell, Mary Munter
- Technical Communication , by Mike Markel



Detailed of Theoretical Contents			
	Content	Week	Hours
1	Good Communication Skills Lead to Success Different Forms of Communication Communication Is a Learned Activity Communication in the Workplace	1	4
2	What Is Listening? Listening to Learn Listening to Evaluate Listening Effectively Listening at Work	1	4
3	Your Voice Is a Tool Good Grammar Counts Starting a Conversation Ending a Conversation Speaking to Different Audiences Verbal Communication in the Workplace	2	8
4	Effective Phone Communication Using the Telephone Directory Long-Distance, Toll-Free, and Other Calls Phone Communication in the Workplace Using a Cell Phone	1	4
5	Body Action Body Language How Culture Affects Nonverbal Communication	2	8
6	Why Is Writing Important? Personal Letters Business Letters Business Memos Thank-You Notes Invitations	2	8
7	Communicating with E-mail Just Fax It to Me Instant Messaging Text Messaging How Technology Is Changing Workplace Communication	3	12



<b>Department</b>	General Study	<b>Major</b>	All Majors
<b>Course Name</b>	Physics (2)	<b>Course Code</b>	PHY325
<b>Prerequisites</b>	General physics	<b>Credit Hours</b> (L,W,T)	4(3,2,0)

**Course description :**

The course enables students to gain theoretical and practical background in physics. The course includes the development of skills and understanding of basic principles of Physical measurements. The student has to know the basic notions of the electric circuits and basic electronic devices like resistors and transistors, the measurement of characteristics of electric signals and the use of basic instrumentation and to know how to analyze any electric circuit using the different methods of analysis.. Also this course is designed to give the student a basic knowledge in the theory of electricity, electrostatics and magnetism.

**Topics :**

- Physical Measurements
- Direct-Current Circuits and Resistance
- Alternating Current Circuit (AC Circuit)
- Electrostatics
- The magnetic field
- Faraday's law of electromagnetic induction

**Experiments:** if applicable it will support the theoretical topics.

**References :**

- Microelectronics Digital and Analog Circuits and Systems – Jacob mill man- ISBN 0-07-042327. Update edition.
- Physics Principles and Problems- Robert B. Clark, Patrick Kenealy> ISBN 0-02826721-4.



Detailed of Theoretical Contents			
Chapter	Contents	Week no.	Hours
1	<p><b>Physical Measurements :</b> International System of Units, Base units, Derived Quantities, Derived units, Systems of units, Prefixes, Conversion between units, Fundamental Dimension, Derived dimension Dimensional Analysis, Dimensionally Homogeneous Equations, Examples and Problems.</p>	1-2	6
2	<p><b>Direct-Current Circuits and Resistance:</b> Electric Current, Resistance and Ohm's Law, Energy and Power in Electric Circuits, Joule's Law, Resistors in Series and Parallel Kirchhoff's Rules, Circuits Containing Capacitors, Capacitors connected in series, Capacitors connected in parallel, RC Circuits, RC charging circuit, RC discharging circuit, Ammeters and Voltmeters, Examples and Problems</p>	3- 4 - 5	9
3	<p><b>Alternating Current Circuit (AC Circuit):</b> AC source, Resistors in an AC circuit, rms current, rms voltage, Capacitors in an AC circuit, The capacitive reactance <math>X_C</math>, Inductors in an AC circuit, The inductive reactance <math>X_L</math>, The RLC series circuit, The impedance <math>Z</math>, The phase angle, The maximum voltages across the elements, Power in an AC circuit, Resonance in a series RLC circuit, The resonance frequency, The transformer, Examples and Problems</p>	6- 7 - 8	9
4	<p><b>Electrostatics:</b> electric charge, Coulomb's law, The electric field due to a point charge, The electric potential due to a point charge, stored energy in a capacitor, dielectric material in capacitor, examples and problems</p>	9- 10	6



<b>5</b>	<p><b>The magnetic field:</b> Magnetic field and magnetic field lines, Ampere's law: magnetic field due to a long straight wire, a circular conductor, a solenoid, Hall effect, Discovering of the electron and measuring <math>e/m</math>, The magnetic force, Examples and Problems</p> <p><b>Faraday's law of electromagnetic induction</b></p>	<b>11- 12- 13</b>	<b>9</b>
<b>Textbook:</b>		<p>1- Fundamentals of physics (extended edition ) David Halliday Robert Resnick Gearal Walker John Wiley and Son , INC , ISBN -0 -471 – 57578-x. Fifth edition -1997</p> <p>2- Foundations Of Physics for Technology Colleges and universities freshmen . Dr. Marwan A. Alfahha Third edition 2012</p>	



Detailed of practicals Contents			
	Contents	Week no.	Hours
1	Electric Components/Measurements and Instruments	1	2
		2	2
2	Current-Voltage (I-V) characteristics Evaluation of two unknown resistances $R_1$ and $R_2$	3	2
		4	2
3	Evaluate the equivalent resistance of some resistors connected in series and in parallel.	5	2
		6	2
4	RC circuit :Charging and discharging a capacitor when switching DC on and off	7	2
		8	2
5	Oscillator and oscilloscope	9	2
		10	2
6	Determination of the specific charge of the electron	11	2
		12	2
7	Study of the deflection of electron in a magnetic field into a circular orbit	13	2
<b>Textbook:</b>			





<b>Department</b>	General Study	<b>Major</b>	All Majors
<b>Course Name</b>	Mathematics (3) Linear Algebra	<b>Course Code</b>	MAT 325
<b>Prerequisites</b>	General Math	<b>Credit Hours</b> (L,W,T)	4 (3,2,1)

**Course description :**

This course is designed to give the student a basic knowledge of the Complex numbers and its operations. The student has to know the basic notions of vector spaces and how to solve any linear systems of equations using Gauss-Jordan Elimination. Also this course is designed to give the student an introduction to the first and second order linear differential equations and to solve initial value problem by Laplace Transforms.

**Topics :**

- ComplexNumber
- Vectorsspaces
- Linearsystems of equations
- Introduction to differentialequation
- Laplace Transform

**Experiments:** if applicable it will support the theoretical topics.

**References :**

- C. Edward and D.Penny, Elementary Linear Algebra.
- John Auer, Linear Algebra with application
- Albert L.Rabenstion, elementarydifferentialequationwithLinearAlgebra



<b>Detailed of Theoretical Contents</b>			
	<b>Contents</b>	<b>Week no.</b>	<b>Hours</b>
<b>1</b>	Complex Number: Operation on complex number- Demoiver theorem- Solution of a quadratic equation	<b>1-2-3</b>	<b>18</b>
<b>2</b>	Vector spaces: Basic notions of vectors spaces- subspaces- Linear combination, linear independent, basis and dimension of vector spaces	<b>4-5-6</b>	<b>18</b>
<b>3</b>	Linear systems of equations: Gauss-Jordan elimination- Elementary row operations- reduced row echelon form- Solution of linear system by gauss- Jordan elimination	<b>7-8</b>	<b>12</b>
<b>4</b>	Introduction to differential equations: Some first order of differential equation-Second order linear differential equation	<b>9-10-11</b>	<b>18</b>
<b>5</b>	Laplace transforms: Solving initial value problem by Laplace transform	<b>12-13</b>	<b>12</b>
<b>Textbook:</b>		<b>C.Edward and D. penny, Elementary Linear Algebra</b>	



<b>Department</b>	General Study	<b>Major</b>	All Majors
<b>Course Name</b>	Mathematics (4) Discrete and Numerical Analysis	<b>Course Code</b>	MAT 326
<b>Prerequisites</b>	General Math	<b>Credit Hours</b> (L,W,T)	4 (3,2,1)

**Course description :**

This course is designed to give the student a basic knowledge of the Sequences and the Numerical series. The student has to know the basic notions of the numerical method and how to solve any linear or non linear equations using Newton-Raphson method . Also this course is designed to learning the student how to apply the Linear and Quadratic Lagrange interpolation and the Rectangular and Trapezoidal method for numerical integration. Further, this course gives to the students an introduction to Fourier series and Fourier transform.

**Topics :**

- Sequences
- NumericalSeries
- NumericalMethod
- Computer compilation
- Fourier Analysis

**Experiments:** if applicable it will support the theoretical topics.

**References :**

- C. Woodford,Chris Phillips, Numerical Methods with Worked Examples.
- T. W. Körner, Fourier analysis
- PremKythe,Dongming Wei, An Introduction to Linear and Nonlinear Finite Element Analysis



<b>Detailed of Theoretical Contents</b>			
	<b>Contents</b>	<b>Week no.</b>	<b>Hours</b>
<b>1</b>	Sequences: Some important limits-Convergence and divergence - Monotonocity and boundedness of sequences.	<b>1-2-3</b>	<b>18</b>
<b>2</b>	Numerical Series: Convergence and divergence series- some usual series ( Harmonic, Geometric and P-series)- Positive series (integral, ratio tests)- Positive series: Integral, ratio, root and comparison tests.  Power series: Interval of convergence-representation of function. Maclaurin and Taylor series.	<b>4-5-6</b>	<b>18</b>
<b>3</b>	Numerical Method: Newton-Raphson method for solving linear or nonlinear equations.  Interpolation: Linear and quadratic Lagrange interpolation.  Numerical integration: Rectangular and Trapezoidal method.  Some Application on MATLAB	<b>7-8-9-10</b>	<b>18</b>
<b>4</b>	Fourier Analysis: Fourier seris- Fourier transform	<b>11-12-13</b>	<b>9</b>
<b>Textbook:</b>		Keith E. Hirst,Keith Edwin Hirst, Numbers, Sequences and Series	



<b>Department</b>	General Study	<b>Major</b>	All Majors
<b>Course Name</b>	Engineering statistics and probability	<b>Course Code</b>	STA 425
<b>Prerequisites</b>	General Math	<b>Credit Hours (L,W,T)</b>	4 (3,2,1)

**Course description :**

This course is designed for students majoring in engineering of technology. Topics include: probability, random variables, discrete and continuous probability distributions, statistical process control, and parameters estimation.

**Topics :**

- Introduction to Probability Vector spaces
- Random variable and Probability Distributions
- Some Discrete Probability Distribution
- Some Continuous Probability Distribution
- Introduction to statistics
- Parameter Estimation

**Experiments:** if applicable it will support the theoretical topics.

**References :**

- Ross, S. *A First Course in Probability*, Fifth Edition
- Devore, Jay L., *Probability and Statistics for Engineering and the Sciences*, Eighth Edition



<b>Detailed of Theoretical Contents</b>			
	<b>Contents</b>	<b>Week no.</b>	<b>Hours</b>
<b>1</b>	Introduction to Probability: Random Experiment - Sample space – Event – Counting Sample space – Probability of an Event - The Axioms of Probability – Conditional Probability – Independent Events	<b>1-2-3</b>	<b>18</b>
<b>2</b>	Random variable and Probability Distributions: Concept of a Random Variable - Discrete Probability Distribution-Continuous Probability Distribution - Mean and Variance of a Random Variable	<b>4-5-6</b>	<b>18</b>
<b>3</b>	Some Discrete Probability Distribution: Bernoulli Trials – Binomial Distribution – Poisson Distribution	<b>7-8</b>	<b>12</b>
<b>4</b>	Some Continuous Probability Distribution: Continuous Uniform Distribution – Normal Distribution – Exponential Distribution	<b>9-10-11</b>	<b>18</b>
<b>5</b>	Introduction to statistics and Parameter Estimation: Sampling Theory – Sample Distribution Function – Samples and Statistics – Methods of Estimation (Point , Interval) – Confidence Interval	<b>12-13</b>	<b>12</b>
<b>Textbook:</b>			



<b>Department</b>	General Study	<b>Major</b>	All Majors
<b>Course Name</b>	Introduction to management & leadership	<b>Course Code</b>	GMS 335
<b>Prerequisites</b>		<b>Credit Hours (L,W,T)</b>	2 (2,0,2)

**Course description :**

This course prepares students with a comprehensive introduction to effective management principles and conduct. It aims at providing students with an introduction to contemporary management concepts and skills, and encourages students to put these concepts and skills into practice. This course is an introduction to the management function. It will focus on the theory and fundamental concepts of management including planning, organization, leadership, and control. This class will review the evolution of management thought, function and practice and will stress current approaches and emerging concepts.

**Topics :**

- introduction to management
- integrativemanagerial issues
- Planning
- Organizing
- Leading
- controlling

**Experiments :** if applicable it will support the theoretical topics.

**References :**

- Robbins, Stephen P, and Coulter, Mary. (2012) Management, 11th Edition, Prentice Hall



<b>Detailed of Theoretical Contents</b>			
	<b>Contents</b>	<b>Week no.</b>	<b>Hours</b>
<b>1</b>	Effective Management for Managers Today - Introduction to Management and Organizations. Management Yesterday and Today. Organizational Culture and Environment: The Constraints. Social Responsibility and Managerial Ethics.	<b>4</b>	<b>8</b>
<b>2</b>	Management Functions and Techniques - Decision-Making: The Essence of the Manager's Job. Foundations of Planning, planning tools and techniques. Organizational Structure and Design. Human.	<b>3</b>	<b>6</b>
<b>3</b>	Resource Management. Managing Change and Innovation. Understanding Groups and Teams. Leadership skills. Foundations of Control. Operations and Supply Chain Management.	<b>2</b>	<b>4</b>
<b>4</b>	Contemporary Management Competencies - Time Management Skills. Effective Communication Skills. Problem Solving Skills. Crisis Management	<b>4</b>	<b>8</b>
<b>Textbook:</b>		Robbins, Stephen P, and Coulter, Mary. (2012) Management, 11th Edition, Prentice Hall	





<b>Department</b>	General Study	<b>Major</b>	All Majors
<b>Course Name</b>	Communication Skills	<b>Course Code</b>	GMS 336
<b>Prerequisites</b>		<b>Credit Hours (L,W,T)</b>	2 (2,0,2)

**Course description :**

This course is intended to provide the students with plain understanding of the key subjects, matters and ideas educative in the field of communication studies.

**Topics :**

- Communication Today.
- Reports and proposals.
- Nonverbal communication.
- Interpersonal skills
- Interpersonal skills
- Negotiation skills
- Conflict management
- Intercultural communication
- Organizational communication
- Public communication
- Team communication

**Experiments:** if applicable it will support the theoretical topics.

**References:**

- Communicating in the 21st Century, 3rd edition By Baden Eunson 2011 1149 pages ISBN: 978-1-742-16617-9 John Wiley & Sons Limited Inc.



Detailed of practical's Contents			
	Contents	Week no.	Hours
1	Communication Today. Letters, emails and memos.	1	2
2	Reports and proposals. Academic writing the essay.	2	2
3	Nonverbal communication.	3	2
4	Interpersonal skills: 1- Emotional intelligence , Self- talk and	4	2
5	Interpersonal skills: 2- Listening, questioning and feed-back.	5	2
6	Negotiation skills	6	2
7	Conflict management *** Mid-term Exam	7	2
8	Intercultural communication	8	2
9	Organizational communication	9	2
10	Public communication	10	2
11	Team communication	11	2
<b>Textbook:</b>		<u>Communicating in the 21st Century, 3rd edition</u> By Baden Eunson 2011 1149 pages ISBN: 978-1-742- 16617-9 John Wiley & Sons Limited Inc.	



Detailed of Theoretical Contents			
	Contents	Week no.	Hours
1	Communicating in meetings	12	2
2	Employment communication and social media.  *** Final Exam.	13	2
<b>Textbook:</b>		<u>Communicating in the 21st Century, 3rd edition</u> By Baden Eunson 2011 1149 pages ISBN: 978-1-742- 16617-9 John Wiley & Sons Limited Inc.	



<b>Department</b>	General Study	<b>Major</b>	All Majors
<b>Course Name</b>	Engineering Project Management	<b>Course Code</b>	GMS 437
<b>Prerequisites</b>		<b>Credit Hours</b> (L,W,T)	(3,0,2)3

**Course description :**

The Engineering Project Management Course is intended to help meet the requirements of industry by educating undergraduate engineering students to understand engineering projects, project organizations and project management methods. Students completing this course will be able to work effectively in multidisciplinary engineering projects immediately after completion and to advance more rapidly within the project management organization and profession. The management of projects entails technical knowledge, engineering skills and management skills.

**Topics :**

- Introduction to project management
- Organizational influences and project life cycle.
- Project management processes
- Project integration management
- Project scope management.
- Project time management
- Project cost management.
- Project quality management
- Project humanresource management.
- Project communications management.
- Project risk management
- Project procurement management.
- Project stakeholder management

**Experiments:** if applicable it will support the theoretical topics.

**References :**

- A Guide to the Project Management Body of Knowledge (PMBOK® Guide), Fifth Edition, Project Management Institute , Project Management Institute © 2013



<b>Detailed of Theoretical Contents</b>			
	<b>Contents</b>	<b>Week no.</b>	<b>Hours</b>
<b>1</b>	<p>1. Introduction to Project Management</p> <p>1.1 History of Project Management</p> <p>1.2 What is a Project?</p> <p>1.2.1. The Relationships among Portfolios, Programs, and Projects.</p> <p>1.3 What is Project Management?</p> <p>1.4 Relationships among Portfolio Management, Program Management, Project Management, and Organizational Project Management</p> <p>1.4.1 Program Management</p> <p>1.4.2 Portfolio Management</p> <p>1.4.3 Projects and Strategic Planning.</p> <p>1.4.4 Project Management Office</p> <p>1.5 Relationship between Project Management, Operations Management, and Organizational Strategy.</p> <p>1.5.1 Operations and Project Management</p> <p>1.5.2 Organizations and Project Management</p> <p>1.6 Business Value</p> <p>1.7 Role of the Project Manager</p> <p>1.7.1 Responsibilities and Competencies of the Project Manager.</p> <p>1.7.2 Interpersonal Skills of a Project Manager</p> <p>1.8 Project Management Body of Knowledge</p>	<b>1</b>	<b>3</b>



<p><b>2</b></p>	<p>2. ORGANIZATIONAL INFLUENCES AND PROJECT LIFE CYCLE.</p> <p>2.1 Organizational Influences on Project Management.</p> <p>2.1.1 Organizational Cultures and Styles</p> <p>2.1.2 Organizational Communications</p> <p>2.1.3 Organizational Structures.</p> <p>2.1.4 Organizational Process Assets.</p> <p>2.1.5 Enterprise Environmental Factors</p> <p>2.2 Project Stakeholders and Governance.</p> <p>2.2.1 Project Stakeholders.</p> <p>2.2.2 Project Governance.</p> <p>2.2.3 Project Success.</p> <p>2.3 Project Team</p> <p>2.3.1 Composition of Project Teams</p> <p>2.4 Project Life Cycle.</p> <p>2.4.1 Characteristics of the Project Life Cycle</p> <p>2.4.2 Project Phases.</p>	<p><b>2</b></p>	<p><b>3</b></p>
<p><b>3</b></p>	<p>3. PROJECT MANAGEMENT PROCESSES</p> <p>3.1 Common Project Management Process Interactions.</p> <p>3.2 Project Management Process Groups</p> <p>3.3 Initiating Process Group</p> <p>3.4 Planning Process Group</p> <p>3.5 Executing Process Group</p> <p>3.6 Monitoring and Controlling Process Group</p> <p>3.7 Closing Process Group</p> <p>3.8 Project Information</p>	<p><b>3</b></p>	<p><b>3</b></p>



	3.9 Role of the Knowledge Areas		
<b>4</b>	<p>4. PROJECT INTEGRATION MANAGEMENT</p> <p>4.1 Develop Project Charter</p> <p>4.2 Develop Project Management Plan.</p> <p>4.3 Direct and Manage Project Work</p> <p>4.4 Monitor and Control Project Work</p> <p>4.5 Perform Integrated Change Control</p> <p>4.6 Close Project or Phase</p>	<b>4</b>	<b>3</b>
<b>5</b>	<p>5. PROJECT SCOPE MANAGEMENT.</p> <p>5.1 Plan Scope Management.</p> <p>5.2 Collect Requirements</p> <p>5.3 Define Scope</p> <p>5.4 Create WBS</p> <p>5.5 Validate Scope.</p> <p>5.6 Control Scope</p>	<b>5</b>	<b>3</b>
<b>6</b>	<p>6. PROJECT TIME MANAGEMENT</p> <p>6.1 Plan Schedule Management</p> <p>6.2 Define Activities.</p> <p>6.3 Sequence Activities.</p> <p>6.4 Estimate Activity Resources.</p> <p>6.5 Estimate Activity Durations.</p> <p>6.6 Develop Schedule</p> <p>6.7 Control Schedule.</p>	<b>6</b>	<b>3</b>
<b>7</b>	<p>7. PROJECT COST MANAGEMENT.</p> <p>7.1 Plan Cost Management.</p> <p>7.2 Estimate Costs.</p>	<b>7</b>	<b>3</b>



	7.3 Determine Budget 7.4 Control Costs.		
<b>8</b>	8. PROJECT QUALITY MANAGEMENT 8.1 Plan Quality Management. 8.2 Perform Quality Assurance. 8.3 Control Quality.	<b>8</b>	<b>3</b>
<b>9</b>	9. PROJECT HUMAN RESOURCE MANAGEMENT. 9.1 Plan Human Resource Management. 9.2 Acquire Project Team 9.3 Develop Project Team 9.4 Manage Project Team	<b>9</b>	<b>3</b>
<b>10</b>	10. PROJECT COMMUNICATIONS MANAGEMENT. 10.1 Plan Communications Management. 10.2 Manage Communications. 10.3 Control Communications.	<b>10</b>	<b>3</b>
<b>11</b>	11. PROJECT RISK MANAGEMENT 11.1 Plan Risk Management. 11.2 Identify Risks. 11.3 Perform Qualitative Risk Analysis 11.4 Perform Quantitative Risk Analysis 11.5 Plan Risk Responses. 11.6 Control Risks.	<b>11</b>	<b>3</b>
<b>12</b>	12. PROJECT PROCUREMENT MANAGEMENT. 12.1 Plan Procurement Management. 12.2 Conduct Procurements	<b>12</b>	<b>3</b>





	12.3 Control Procurements. 12.4 Close Procurements		
<b>13</b>	13. PROJECT STAKEHOLDER MANAGEMENT 13.1 Identify Stakeholders 13.2 Plan Stakeholder Management. 13.3 Manage Stakeholder Engagement 13.4 Control Stakeholder Engagement.	<b>13</b>	<b>3</b>
<b>Textbook:</b>	A Guide to the Project Management Body of Knowledge (PMBOK® Guide), Fifth Edition, Project Management Institute, Project Management Institute © 2013.		

<b>Detailed of Tatorial Contents</b>			
	<b>Contents</b>	<b>Week no.</b>	<b>Hours</b>
<b>1</b>	Workshop: Forming Project Team and Project Selection	<b>1</b>	<b>2</b>
<b>2</b>	Workshop: Defining Project Business Case	<b>2</b>	<b>2</b>
<b>3</b>	Workshop: Developing Project Charter	<b>3</b>	<b>2</b>
<b>4</b>	Workshop: Project Configuration & Integration	<b>4</b>	<b>2</b>
<b>5</b>	Workshop: Collect Project Requirements, Creating Project Scope Statement, and Developing Project WBS	<b>5</b>	<b>2</b>
<b>6</b>	Workshop: Developing Project Schedule Using Project Management Tools	<b>6</b>	<b>2</b>
<b>7</b>	Workshop: Developing Project Budget and Cash flow	<b>7</b>	<b>2</b>
<b>8</b>	Workshop: Developing Project Quality Management Plan	<b>8</b>	<b>2</b>
<b>9</b>	Workshop: Developing Project HR Management Plan	<b>9</b>	<b>2</b>
<b>10</b>	Workshop: Developing Project Communications	<b>10</b>	<b>2</b>



	Management Plan		
<b>11</b>	Workshop: Developing Project Risk Management Plan	<b>11</b>	<b>2</b>
<b>12</b>	Workshop: Developing Project Procurement Management Plan	<b>12</b>	<b>2</b>
<b>13</b>	Workshop: Developing Project Stakeholders Management Plan	<b>13</b>	<b>2</b>
<b>Textbook:</b>		A guide to the project management body of knowledge (pmbok® guide), fifth edition, project management institute, project management institute © 2013.	



<b>Department</b>	General Study	<b>Major</b>	All Majors
<b>Course Name</b>	Quality Tools and Applications	<b>Course Code</b>	GMS 438
<b>Prerequisites</b>		<b>Credit Hours</b> (L,W,T)	3 (3,0,2)

**Course description :**

This course gives the student basic foundation knowledge on Quality Management and its Tools and Applications, this course has been design to help the student to understand the quality concept as a major successful factor for the competitiveness at any sector.

By the end of this course, the student should know when, why and how to apply the quality concepts and tools successfully on his workplace.

**Topics :**

- Quality Management as a Concept
- Quality Management as a Culture
- Quality Management as a Strategic Planning
- Overview on Quality Management Tools
- ProblemsSolving and DecisionsMaking
- Optimizing and ControllingProcesses
- Implementing the Quality Management

**Experiments:**if applicable it will support the theoretical topics.

**References :**

- Introduction to Total Quality Management for Production, Processing and Services. (Sixth Edition)
- By David L. Goetsch and Stanley B. Davis



<b>Detailed of Theoretical Contents</b>			
	<b>Contents</b>	<b>Week no.</b>	<b>Hours</b>
<b>1</b>	Quality Management as a Concept: <ul style="list-style-type: none"> <li>- How Quality is defined.</li> <li>- 8 principles of Total Quality Management.</li> <li>- Customer Satisfaction.</li> </ul>	<b>1-3</b>	<b>15</b>
<b>2</b>	Quality Management as a Culture: <ul style="list-style-type: none"> <li>- Understanding the quality culture VS. the traditional culture</li> <li>- Change management</li> </ul>	<b>4-5</b>	<b>10</b>
<b>3</b>	Quality Management as a Strategic Planning: <ul style="list-style-type: none"> <li>- Developing Plan (vision, mission and objectives)</li> <li>- Execution Plan (action plan, operations, KPIs)</li> </ul>	<b>6-7</b>	<b>10</b>
<b>4</b>	Overview on Quality Management Tools: <ul style="list-style-type: none"> <li>- The basic 7 tools for quality management</li> </ul>	<b>8</b>	<b>5</b>
<b>5</b>	Problems Solving and Decisions Making: <ul style="list-style-type: none"> <li>- Root Cause analysis techniques.</li> <li>- Decision making support techniques.</li> </ul>	<b>9-10</b>	<b>10</b>
<b>6</b>	Optimizing and Controlling Processes: <ul style="list-style-type: none"> <li>- Statistical Process Control (SPC) applications.</li> <li>- Control Charts.</li> </ul>	<b>11-12</b>	<b>10</b>
<b>7</b>	Implementing the Quality Management: <ul style="list-style-type: none"> <li>- Plan, Do, Check, Act (implementation project)</li> </ul>	<b>13</b>	<b>5</b>
<b>Textbook:</b>	Quality Management Introduction to Total Quality Management for Production, Processing and Services. (Sixth Edition) By David L. Goetsch and Stanley B. Davis		



<b>Department</b>	General Study	<b>Major</b>	All Majors
<b>Course Name</b>	Engineering Economy	<b>Course Code</b>	GMS 439
<b>Prerequisites</b>		<b>Credit Hours</b> (L,W,T)	(2,0,2)2

**Course description :**

This course covers the basics of economic analysis from an engineering perspective. The concepts and techniques required to facilitate the evaluation and comparison of investment opportunities on an economic basis are presented, along with the corresponding Excel spreadsheet functions. Topics include: foundations of engineering economy, nominal and effective interest rates, engineering economy factors, present worth analysis, annual worth analysis, rate of return analysis, benefit/cost analysis and public sector economics, breakeven and payback analysis, and depreciation methods.

**Topics:**

- Foundations of Engineering Economy
- Engineering Economy Factor
- Nominal and Effective Interest Rates
- Present Worth (PW) Analysis
- Annual Worth (AW) Analysis
- Rate of Return (ROR) Analysis
- Benefit /Cost (B/C) Analysis and Public Sector Economics
- Breakeven and PaybackAnalysis

**Experiments:** if applicable it will support the theoretical topics.

**References :**

- William G. Sullivan, Elin M. Wicks, and C. Patrick Koelling, "Engineering Economy", 15th Edition, Printice Hall, ISBN 978-0132554909.
- Jerald J. Thuesen and W. J. Fabrycky, " Engineering Economy", 9th Edition, Printice Hall, ISBN 978-0130281289.



Details of Theoretical Contents			
	Contents	Week no.	Hours
1	<p><b>Foundations of Engineering Economy:</b></p> <ul style="list-style-type: none"> <li>- Engineering economics: description and role in decision making process.</li> <li>- How to perform an Engineering Economy study.</li> <li>- Interest rate and rate of return.</li> <li>- Engineering economy terminology and symbols.</li> <li>- Cash flows: estimation and diagramming.</li> <li>- Economic Equivalence.</li> <li>- Simple and compound interests.</li> <li>- Meaning and use of Minimum Attractive Rate of Return (MARR).</li> <li>- Spreadsheets use in engineering economy.</li> </ul>	1-2	4
2	<p><b>Engineering Economy Factors:</b></p> <ul style="list-style-type: none"> <li>- Deriving and using the following factors: F/P, P/F, P/A, A/P, F/A, A/F, P/G, and A/G.</li> <li>- Linear interpolation of factors values.</li> <li>- Combining factors (Calculations pertaining to Shifted uniform series and randomly placed single amounts).</li> </ul>	3-4	4
3	<p><b>Nominal and Effective Interest Rates:</b></p> <ul style="list-style-type: none"> <li>- Difference between nominal and effective interest rates.</li> <li>- Calculating the effective interest rate.</li> <li>- Equivalence calculations under single and series cash flows in the case where payment and compounding periods are unequal.</li> </ul>	5	2
4	<p><b>Present Worth (PW) Analysis:</b></p> <ul style="list-style-type: none"> <li>- Formulating alternatives.</li> <li>- PW analysis of equal- life alternatives.</li> <li>- PW analysis of different- life alternatives.</li> <li>- Future worth analysis.</li> </ul>	6-7	3
5	<p><b>Annual Worth (AW) Analysis:</b></p> <ul style="list-style-type: none"> <li>- Advantages and uses of AW analysis.</li> <li>- Calculation of Capital Recovery (CR) and AW values.</li> <li>- Evaluating alternatives by AW analysis.</li> </ul>	8	2



6	<p><b>Rate of Return (ROR) Analysis:</b></p> <ul style="list-style-type: none"> <li>- Interpretation of a ROR value.</li> <li>- ROR calculation using a PW or AW relation.</li> <li>- Using ROR analysis to evaluate a single project.</li> <li>- Special considerations when using the ROR method.</li> <li>- Incremental ROR analysis and the issue of inconsistent rankings.</li> <li>- Using incremental ROR analysis to compare two alternatives.</li> <li>- Using incremental ROR analysis to compare several alternatives .</li> </ul>	9-10	5
7	<p><b>Benefit /Cost (B/C) Analysis and Public Sector Economics:</b></p> <ul style="list-style-type: none"> <li>- The fundamental differences between public and private sector projects.</li> <li>- B/C analysis for a single project.</li> </ul>	11	2
8	<p><b>Breakeven and Payback Analysis:</b></p> <ul style="list-style-type: none"> <li>- Breakeven analysis for a single project.</li> <li>- Payback analysis.</li> </ul>	12	2
9	<p><b>Depreciation Methods:</b></p> <ul style="list-style-type: none"> <li>- Definition of asset depreciation.</li> <li>- The Straight Line (SL) method.</li> <li>- The Declining Balance (DB) method.</li> <li>- The unit-of -production (UOP) method.</li> </ul>	13	2
<p><b>Textbook:</b></p>		<p>Leland Blank and Anthony Tarquin., " Engineering Economy", 7<sup>th</sup> Edition, McGraw-Hill , ISBN 978 – 0073376301.</p>	



<b>Department</b>	Civil And ARCitectural	<b>Major</b>	Construction Engineer
<b>Course Name</b>	Construction Drawings	<b>Course Code</b>	ARC 350
<b>Prerequisites</b>		<b>Credit Hours (L,W,T)</b>	3

**Course description :**

This course aims to expand in trainee their knowledge of construction drawings, to read and interpret working drawings of the major construction fields ARCitecture, Civil, Mechanical and Electrical. Besides that, the course develops the ability to visualize and communicate three-dimensional shapes.

**Topics :**

**Unit 1: Introduction to construction graphic reading.**

**Unit 2: Type of construction drawings.**

**Unit 3: Construction details.**

**Experiments:** if applicable it will support the course topics.

**References:**

1-Understanding Construction Drawings, Author: Huth, M.

2-Blueprint Reading , Author: Sam Kubba.

3- Blue Print Reading: Interpreting Working Drawings, Author: E. M. Wyatt





Detailed of practicals Contents			
	Contents	Week no.	Hours
1	<b>Reviewing orthographic drawing.</b> <ul style="list-style-type: none"> <li>• Plans.</li> <li>• Elevations.</li> <li>• Sections.</li> </ul>	1	6
2	<b>Three-dimensional graphics.</b> <ul style="list-style-type: none"> <li>• Isometric drawings.</li> <li>• Axonometric drawings.</li> <li>• Oblique drawings.</li> </ul>	2	6
3	<b>Type of construction drawings.</b> <ul style="list-style-type: none"> <li>• Preliminary drawings.</li> <li>• Presentation drawings (ARCitectural drawing).</li> <li>• Working drawings.</li> <li>• Shop drawings.</li> <li>• As-built drawings.</li> </ul>	3	6
4	<b>Civil drawings.</b> <ul style="list-style-type: none"> <li>• Site plan.</li> <li>• Plat map.</li> <li>• Demolition plan.</li> <li>• Topography map.</li> <li>• Drainage an utility plans.</li> <li>• Landscaping and irrigation plans002E</li> </ul>	4-5	12
5	<b>ARCitectural drawing.</b> <ul style="list-style-type: none"> <li>• Plans.</li> <li>• Elevations.</li> <li>• Sections.</li> </ul>	6-7	12
6	<b>Structural drawings.</b> <ul style="list-style-type: none"> <li>• Footing Plan and schedule.</li> <li>• Grade beam layout and beams schedule.</li> <li>• Floors farming plans and beam and columns schedules.</li> </ul>	8-9	12
7	<b>Mechanical drawings.</b> <ul style="list-style-type: none"> <li>• Layout and dimensions of ductwork.</li> <li>• Mechanical equipment location.</li> <li>• Diffuser locations .</li> <li>• Plumbing layout (Drainage and water supply).</li> <li>• Fire fighting layout.</li> </ul>	10	6
8	<b>Electrical drawings.</b> <ul style="list-style-type: none"> <li>• - Lighting system.</li> <li>• - Power system (Type and location of outlet).</li> </ul>	11	6



9	RC details.	12	6
10	Steelworks details.	13	6
Textbook:		<p><b>1-Understanding Construction Drawings.</b> Author: Huth, M.</p> <p><b>2-Blueprint Reading</b> Author: Sam Kubba.</p> <p><b>3- Blue Print Reading: Interpreting Working Drawings.</b> Author: E. M. Wyatt</p>	



<b>Department</b>	Civil And ARCitectural	<b>Major</b>	Construction Engineer
<b>Course Name</b>	Introduction to Structural Design	<b>Course Code</b>	CIV 350
<b>Prerequisites</b>	CIV 113	<b>Credit Hours (L,W,T)</b>	3

**Course description :**

This course is divided into three Parts. It provides trainee with a basic knowledge of:

**Part 1: Concrete structures:**

Types of concrete structures, Types of loads, fundamentals of structures analysis, principles of designing beams, slabs, columns and footings.

**Part 2: Steel Constructions:**

Types of steel constructions, their components, and their construction systems; fundamentals of designing steel members; types of joints and connections between members.

**Part 3: Introduction to soil mechanics:**

Soil formation, structures and problems; soil engineering properties; behavior of soil under the effect of vertical loads.

**Topics :**

Part 1: Concrete structures.

Part 2: Steel Constructions.

Part 3: Introduction to soil mechanics.

**Experiments:** if applicable it will support the course topics.

**References :**

- "Reinforced Concrete Slabs", Second Edition, by Robert Park and William L. Gamble; John Wiley & Sons Inc 2000.
- " Design of Steel Structures" , 3<sup>rd</sup> Edition, by Edwin, H. Gaylord, Jr. , Charles, N. Gaylord & James, E. Stallmeyer; McGraw-Hill, 1992.
- "An Introduction to the Mechanics of Soils and Foundations", Atkinsom, J., McGraw-Hill Inc, 1993.



<b>Detailed of Theoretical And Practical Contents</b>			
	<b>Contents</b>	<b>Week no.</b>	<b>Hours</b>
<b>Part 1: Concrete structures:</b>			
<b>1</b>	<b>Concepts of Structural design for structural elements:</b> <ul style="list-style-type: none"> <li>- Concrete structures types</li> <li>- Types of loads, shifting loads</li> <li>- Mechanical properties of concrete and reinforcement steel.</li> <li>- Factor of safety.</li> <li>- Different design methods.</li> </ul>	<b>1-2</b>	<b>5</b>
<b>2</b>	<b>Affecting Loads on concrete Members:</b> <ul style="list-style-type: none"> <li>- Dead Loads</li> <li>- Live Loads</li> <li>- Solved examples</li> </ul>	<b>2-3</b>	<b>3</b>
<b>3</b>	<b>Design of Concrete simple Beams:</b> <ul style="list-style-type: none"> <li>- Analysis of beams</li> <li>- Design of simply supported Beams (rectangular section)</li> <li>- Draw longitudinal and cross sections for beams, and show details of reinforced steel.</li> </ul>	<b>3-4</b>	<b>3</b>
<b>4</b>	<b>Design of Concrete Slabs:</b> <ul style="list-style-type: none"> <li>- Types of concrete Slabs</li> <li>- Design of one-way solid slab</li> <li>- Design of one-way Hollow slab</li> <li>- Draw horizontal and vertical sections in the slab, showing details of reinforcement steel.</li> </ul>	<b>4-5</b>	<b>3</b>
<b>5</b>	<b>Design concrete Columns:</b> <ul style="list-style-type: none"> <li>- Types of column sections</li> <li>- Design concrete column (rectangular section) under axial Load.</li> <li>- Draw horizontal and vertical sections of column, and show details of reinforcement steel.</li> </ul>	<b>5-6</b>	<b>3</b>



6	<p><b>Design Separate Concrete Footings:</b></p> <ul style="list-style-type: none"> <li>- Types of Foundations</li> <li>- How to Design separate Footings under Axial Load.</li> <li>- Show horizontal and vertical sections of footings, and show details of reinforcement steel.</li> </ul>	6-7	3
<b>Part 2: Steel Constructions:</b>			
7	<p><b>Iron and Steel:</b></p> <ul style="list-style-type: none"> <li>- Industry of iron and Steel</li> <li>- Products of iron and steel</li> <li>- Structural steel and its elements</li> <li>- Sections of structural steel</li> </ul>	7	1
8	<p><b>Steel Structures:</b></p> <ul style="list-style-type: none"> <li>- Types of Steel Structures</li> <li>- Advantages and disadvantages of structural steels.</li> <li>- Elements and components of steel structures.</li> <li>- types of joints and connections between members</li> </ul>	8	3
9	<p><b>Fundamentals of structural Design of steel structures elements:</b></p> <ul style="list-style-type: none"> <li>- Mechanical properties of structural steel</li> <li>- Design members exposed to: <ul style="list-style-type: none"> <li>-Axial Tension Force.</li> <li>-Axial Compression Force.</li> <li>-Bending Moment.</li> </ul> </li> </ul>	9-10	6
<b>Part 3: Introduction to soil mechanics:</b>			
10	<p><b>Soil Formation, structure and problems:</b></p> <ul style="list-style-type: none"> <li>- Definitions</li> <li>- Soil formation</li> <li>- Soil structure</li> <li>- Soil problems</li> </ul>	11	1
11	<p><b>Fundamentals of Soil Engineering Properties:</b></p> <ul style="list-style-type: none"> <li>- Soil volumes and weights relationships</li> <li>- Soil consistency</li> </ul>	11-12	3
12	<p><b>Elements of Stress Analysis:</b></p> <ul style="list-style-type: none"> <li>- Stresses induced by the self-weight of the soil</li> </ul>	12-13	4



	<ul style="list-style-type: none"> <li>- Total Stress with a surface surcharge load</li> <li>- Stresses in soil due to Footing pressure</li> <li>- The Boussinesq method for soil Stresses</li> </ul>		
<b>13</b>	<p><b>Introduction to bearing Capacity of Soils:</b></p> <ul style="list-style-type: none"> <li>- Bearing capacity terms: ultimate, safe and allowable bearing pressure</li> <li>- Presumed safe bearing capacity values (Table).</li> </ul>	<b>13</b>	<b>1</b>
<b>Textbook:</b>		<ul style="list-style-type: none"> <li>- " Structural Concrete – Theory and Design ", 4<sup>th</sup> Edition, Wiley, 2008.</li> <li>- " Design of Reinforced Concrete " 4<sup>th</sup> Edition, by Addison W. Longman, Inc. 1998.</li> <li>- " Elements of Soil mechanics " seventh edition, by G.N. Smith and Ian G.N. Smith, Blackwell Science, 1998.</li> </ul>	



<b>Department</b>	Civil And ARCitectural	<b>Major</b>	Construction Engineer
<b>Course Name</b>	Construction Technology	<b>Course Code</b>	CIV 351
<b>Prerequisites</b>		<b>Credit Hours</b> (L,W,T)	3

**Course description :**

Preparation of the site, earth works, formwork, scaffolding, different structural elements of the construction, precast concrete, masonry works, floors and roofs, internal and external finishes, insulation and protection, shell structures.

**Topics :**

- Site preparation.
- Earth work: excavation, filling, compaction.
- Formwork and scaffolding.
- Concrete structural elements.
- Precast concrete.
- Masonry works.
- Floors and roofs.
- Internal and external finishes.
- Insulation and protection: water-proofing, thermal, sound, fire.
- Shell structures.

**Experiments:** if applicable it will support the course topics.

**References :**

Roy Chudley, 5<sup>th</sup> edition, (2012) "Advanced Construction technology", Pearson, Prentice Hall.  
 Tony Bryan (2010), " Construction technology". John Wiley and Sons.  
 Eric Fleming (2009) " Construction technology". John Wiley and Sons.



<b>Detailed of Theoretical And Practical Contents</b>			
	<b>Contents</b>	<b>Week no.</b>	<b>Hours</b>
<b>1</b>	<b>Site preparation</b> Site temporary works Accommodation, storage and security	<b>1</b>	<b>3</b>
<b>2</b>	<b>Earth work</b> Excavation and timbering Transport Filling Compaction Drilling Tunneling Equipments : Dozers, Excavators, compactors, graders and hauling	<b>2-3</b>	<b>6</b>
<b>3</b>	<b>Formwork and scaffolding</b> Timber formwork Metal formwork Modular formwork Formwork table Tunnel forms Suspended scaffolds Supported scaffolds : frame or fabricated, mobile, pump jack...	<b>4</b>	<b>3</b>
<b>4</b>	<b>Concrete structural elements</b> Mixing, placing, finishing and curing of concrete Reinforcing Prestressing Reinforced structural elements Concrete structural frames	<b>5-6</b>	<b>6</b>
<b>5</b>	<b>Precast concrete</b> Precast concrete structural elements The manufacture of precast concrete structural elements Assembly concepts for precast concrete buildings Joining precast elements The construction process	<b>7</b>	<b>3</b>
<b>6</b>	<b>Masonry works</b> Bricks and block walls Mortar for brickwork and block work	<b>8-9</b>	<b>6</b>





	<p>Jointing and pointing Walls of brick and block Interior walls and partitions External walls and cladding Cladding panels Mastics and sealants Openings in walls Stone masonry walls</p>		
<b>7</b>	<p><b>Floors and roofs</b>  Functional requirements Concrete ground floors Floor surface finishes Reinforced concrete upper floors Flat roofs Pitched roofs Tiles and slates Parapet walls</p>	<b>10</b>	<b>3</b>
<b>8</b>	<p><b>Internal and external finishes</b>  Plaster Gypsum plasterboard Skirting and ARCitraves External rendering</p>	<b>11</b>	<b>3</b>
<b>9</b>	<p><b>Insulation and protection</b>  Protection against moisture Thermal insulation Sound insulation Fire protection</p>	<b>12</b>	<b>3</b>
<b>10</b>	<p><b>Shell structures</b>  Barrels vault shell roofs Waveform translational Hyperbolic paraboloids shell roofs Intersecting cylinders Various double curvature Construction of shell structures</p>	<b>13</b>	<b>3</b>
<b>Textbook:</b>		Roy Chudley (2011) "Construction technology", Pearson, Prentice Hall.	



<b>Department</b>	Civil And ARChitectural	<b>Major</b>	Construction Engineer
<b>Course Name</b>	Soil mechanics and foundations	<b>Course Code</b>	CIV 352
<b>Prerequisites</b>		<b>Credit Hours</b> (L,W,T)	3

**Course description :**

This course deals with soil as an engineering material. It includes the description and classification of soil, the analysis of stress in soil, and soil behavior under conditions of major engineering significance that include the characteristics of water flow through soil, consolidation settlement and shear strength. It also covers the development and application of earth pressure theory. The primary goal of the course is to develop analytical skills in dealing with soil as a medium of water flow, a medium for structural support, and a primary earth structure material.

**Topics :**

- Physical properties of soils
- Stress distribution in soils
- Shear strength of soils
- Soil compaction
- Deep foundations
- Consolidation of soil
- Lateral earth pressure
- Slope stability
- Shallow foundations

**Experiments:** if applicable it will support the course topics.

**References :**

- Coduto, D.P., "Geotechnical Engineering Principles and Practices", Prentice Hall of India Private Limited, New Delhi, 2002.
- McCarthy D.F., "Essentials of Soil Mechanics and Foundations Basic Geotechniques", Sixth Edition, Prentice-Hall, New Jersey, 2002.
- . Das, B.M, "Principles of Geotechnical Engineering", (fifth edition), Thomas Books/ cole, 2002.
- . Muni Budhu, "Soil Mechanics and Foundations", John Willey & Sons, Inc, New York, 2000.



<b>Detailed of Theoretical Contents</b>			
	<b>Contents</b>	<b>Week no.</b>	<b>Hours</b>
<b>1</b>	<b>Physical properties of soils</b> Formation and structure of soils Weight-volume relationships Grain-size distribution of soil Consistency of soils Soil classification Darcy's law Determination of coefficient of permeability Equivalent permeability for stratified soil	<b>1</b>	<b>2</b>
<b>2</b>	<b>Stress distribution in soils</b> Equations of static equilibrium Hooke's law Relations between moisture content, effective pressure and strength The Boussinesq method for soil stresses	<b>2-3</b>	<b>4</b>
<b>3</b>	Shear strength of soils Components of shear strength Soil tests to determine shear strength Soil types according to shear strength Mohr-Coulomb failure theory	<b>4</b>	<b>2</b>
<b>4</b>	Consolidation of soil Types of ground movements Compressibility Terzaghi's theory of consolidation Consolidation test Determination of consolidation coefficient Settlements	<b>5</b>	<b>2</b>



5	<p><b>Lateral earth pressure</b></p> <p>Lateral earth pressure at rest</p> <p>Active earth pressure</p> <p>Passive earth pressure</p> <p>Active lateral pressure on inclined soil surface</p> <p>Coulomb theory</p> <p>Rankine theory</p> <p>Retaining wall</p>	6	2
6	<p><b>Slope stability</b></p> <p>Types of movement slopes</p> <p>Factors in instability</p> <p>Analysis of stability of slopes</p> <p>Method of slices</p> <p>Friction-circle method</p> <p>Taylor's stability number</p> <p>Analysis of a plane translational slip</p>	7-8	4
7	<p><b>Shallow foundations</b></p> <p>Types and bearing capacity</p> <p>Design of isolated footings</p> <p>Design of strip foundations</p> <p>Design of combined footings</p> <p>Design of rafts</p> <p>Numerical analysis of foundations</p>	9-11	6
8	<p><b>Deep foundations</b></p> <p>Design of pile foundations</p> <p>Design of piers and caissons</p> <p>Sheet Pile Walls (SPW)</p> <p>Foundations for offshore structures</p>	12-13	4
<p><b>Textbook:</b></p>		<p>Atkinsom, J. (1993) "An introduction to the mechanics of soils and foundations", McGraw-Hill Inc.</p>	



<b>Detailed of practicals Contents</b>			
	<b>Contents</b>	<b>Week no.</b>	<b>Hours</b>
<b>1</b>	Permeability tests	<b>1</b>	<b>2</b>
<b>2</b>	Proctor test	<b>2</b>	<b>2</b>
<b>3</b>	CBR (Californian Bearing Ratio) test	<b>3</b>	<b>2</b>
<b>4</b>	Consolidation test	<b>4</b>	<b>2</b>
<b>5</b>	Unconfined compression test	<b>5</b>	<b>2</b>
<b>6</b>	Direct shear test	<b>6</b>	<b>2</b>
<b>7</b>	Triaxial shear test : Explanation : CD – CU – UU Execution : UU	<b>7-8-9</b>	<b>6</b>
<b>8</b>	Field soil tests : Field density with sand cone Standard penetration test SPT Vane shear test	<b>10-12</b>	<b>6</b>
<b>Textbook:</b>		Atkinsom, J. (1993) "An introduction to the mechanics of soils and foundations", McGraw-Hill Inc.	



<b>Department</b>	Civil And ARCitectural	<b>Major</b>	Construction Engineer
<b>Course Name</b>	Structural Analysis	<b>Course Code</b>	CIV 353
<b>Prerequisites</b>	Math (2)	<b>Credit Hours (L,W,T)</b>	3

**Course description :**

Classification of structural systems; structural design process; computation of loads on structures; analysis of statically determinate and indeterminate structures by different methods; Computer applications in structural analysis and design; influence lines for moving loads.

**Topics :**

- Classification of Structures
- Normal, Shear and Moment Diagrams of Structures Under Static Loads
- Methods Of Analysis of Indeterminate Structures
- Method of virtual work
- Basic Concepts of Force (Flexibility) Method
- STIFFNESS MATRIX METHOD
- FINITE ELEMENT METHOD
- FINITE ELEMENT SOFTWARE APPLICATIONS
- INFLUENCE LINES

**Experiments:** if applicable it will support the course topics.

**References :**

- Hibbler Russel C., Structural analysis, 8<sup>th</sup> SI edition, Pearson, 2012. ISBN 981-06-8007-4
- Kennet M. Leet, Chia Ming Uang, Anne M. Gilbert, Fundamentals of Structural Analysis, 4<sup>th</sup> edition, McGraw-Hill.
- C.H.Morris, J.B. Willbur, and S. Utku, Elementary Structural Analysis, 3<sup>th</sup> edition, McGraw-Hill, 1976



Detailed of Theoretical and practicals Contents			
	Contents	Week no.	Hours
1	<b>Classification of Structures:</b> statically determinate structures, statically indeterminate structures, condition of indeterminacy and geometric stability.	1	3
2	<b>Normal, Shear and Moment Diagrams of Structures Under Static Loads:</b> analysis and behavior of beams, trusses , frames; deflections of simple structures.	2-3	4
3	<b>Methods Of Analysis of Indeterminate Structures:</b> Slope deflection Method Moment distribution method .	3-5	6
4	<b>Method of virtual work:</b> Energy principles. Application to Trusses, Beams, Frames	5-6	4
5	<b>Basic Concepts of Force (Flexibility) Method:</b> Description of the force Method Procedure, Force Method Examples: Beams, Trusses, Frames.	7	3
6	<b>STIFFNESS MATRIX METHOD:</b> Element and Global Stiffness Matrices Analysis of continuous Beams Co-ordinate transformation Rotation Matrices Transformations of Stiffness Matrices, Load Vectors and displacements Vectors	8-9	6
7	<b>FINITE ELEMENT METHOD:</b> Discretisation of a structure Displacement Fonctions Truss element, Beam element, Plane Stress and Plane Strain, Triangular element...	10	3
8	<b>FINITE ELEMENT SOFTWARE APPLICATIONS:</b> Presentation of the structural problems, Analyze essential elements of structure using computer programs: STAAD Pro, SAP2000, ETABS, PROKON, ...	11-12	6
9	<b>INFLUENCE LINES:</b> Basic Concepts :moving loads and influence lines .	13	3



<b>Department</b>	Civil And ARChitectural	<b>Major</b>	Construction Engineer
<b>Course Name</b>	Survey (2)	<b>Course Code</b>	CIV 355
<b>Prerequisites</b>	Specialized mathematics (116 math)	<b>Credit Hours (L,W,T)</b>	3

**Course description :**

This course covers basic surveying topics that construction engineer deal with regularly. These topics include: cross – sections, leveling and global positioning system. Trainees will handle these topics theoretically and practically.

**Topics :**

- Longitudinal and cross sections
- Leveling net
- Applications of Global Positioning System

**Experiments:** if applicable it will support the course topics.

**References :**

- Fundamentals of Surveying by S. K. Roy.





Detailed of Theoretical Contents			
	Contents	Week no.	Hours
1	<p><b>Longitudinal and cross sections:</b></p> <ul style="list-style-type: none"> <li>leveling work required along longitudinal and along cross sections of the project.</li> <li>Computation of designed project levels along center line.</li> <li>Compute and draw Longitudinal and cross sections along the project.</li> <li>Compute fill and cut volumes.</li> </ul>	1-6	12
2	<p><b>Leveling net:</b></p> <ul style="list-style-type: none"> <li>requirements leveling net.</li> <li>Methods of leveling nets.</li> <li>Land leveling on average level.</li> <li>Compute and draw contour lines.</li> </ul>	7-9	6
3	<p><b>Applications of Global Positioning System:</b></p> <ul style="list-style-type: none"> <li>Main components of the system.</li> <li>Coordinate systems.</li> <li>Observation methods.</li> <li>Errors resources.</li> </ul>	10-13	8
<b>Textbook:</b>		Surveying for Engineers by: John Uren and Bill Price	



Detailed of practicals Contents			
	Contents	Week no.	Hours
1	<p><b>Longitudinal and cross sections:</b></p> <ul style="list-style-type: none"> <li>- Perform field leveling along longitudinal section ( Center line) and along cross sections of road.</li> <li>- Compute designed project levels along center line.</li> <li>- Compute and draw Longitudinal and cross sections along the project.</li> <li>- Compute fill and cut volumes.</li> </ul>	1-5	10
2	<p><b>Leveling net:</b></p> <ul style="list-style-type: none"> <li>- Determine borders of the project area, and perform survey measurements of the border lines.</li> <li>- Divide the area of the project into a net of squares.</li> <li>- Determine levels of points of intersections along squares net.</li> <li>- Draw area of the project with appropriate scale.</li> <li>- Write levels on the map points.</li> <li>- Compute quantities of cut and fill on the project area based on the average level.</li> </ul>	6-8	6
3	<p><b>Applications of Global Positioning System:</b></p> <ul style="list-style-type: none"> <li>- Get to know available GPS receivers and applied program.</li> <li>- Setting GPS Receivers for operations.</li> <li>- Performing planimetric Surveying using ( Stop and Go Method)</li> <li>- Transferring data from receivers to computer, and performing data processing and adjustment and computing coordinates and drawing map.</li> </ul>	8	9-12
			<b>Textbook:</b>



<b>Department</b>	Civil And ARCitectural	<b>Major</b>	Construction Engineer
<b>Course Name</b>	Water Supply and wastewater systems design	<b>Course Code</b>	CIV 354
<b>Prerequisites</b>		<b>Credit Hours</b> (L,W,T)	2

**Course description :**

Surface and groundwater, quality control, water distribution systems, storm water collection systems, wastewater systems and sewerage, pumps and pumping stations, wastewater Treatment.

**Topics :**

- Water sources
- Water distribution works
- Storm water collection systems
- Wastewater systems
- Pumps and pumping stations
- Wastewater Treatment

**Experiments:** if applicable it will support the course topics.

**References :**

Lin, Shun D. and Lee, C. C. (2001) "Water and wastewater calculation manual", McGraw-Hill Professional.



<b>Detailed of Theoretical And Practical Contents</b>			
	<b>Contents</b>	<b>Week no.</b>	<b>Hours</b>
<b>1</b>	<b>Water sources</b> Surface water Groundwater Quality control	<b>1</b>	<b>2</b>
<b>2</b>	<b>Water distribution works</b> Purposes of water uses Rates of water consumption Design population Predicting demand for water Fire demand Types of tanks and reservoirs Period of design Types of distribution systems Pressure zones and pressure in pipes Types of pipes Design of distribution systems Appurtenances : joints pipes, valves, water meters... Management, operation and maintenance of distribution system	<b>2-4</b>	<b>6</b>
<b>3</b>	<b>Storm water collection systems</b> Collection of hydrological data Precipitation Evaporation and transpiration Runoff Rainfall and runoff analysis Frequency of intense storms Intensity-duration-frequency relationships Collection of storm waters Hydraulic design Appurtenances Operation and maintenance of drainage systems	<b>5-7</b>	<b>6</b>



<b>4</b>	<p><b>Sewerage systems</b></p> <p>Domestic and industrial wastes Collection of sanitary wastewater Choice of collecting system flow through sewers Design of sewers Gravity sewer pipe material Building connections Manholes Trenchless technology Appurtenances Maintenance and sewer system rehabilitation</p>	<b>8-9</b>	<b>4</b>
<b>5</b>	<p><b>Pumps and pumping stations</b></p> <p>Types of pumps Pump characteristics Pumps and their applications Pumping station types Pumping equipment Inspection and maintenance</p>	<b>10-11</b>	<b>4</b>
<b>6</b>	<p><b>Wastewater Treatment</b></p> <p>Wastewater characteristics Wastewater treatment processes Levels of wastewater treatment Reuse of wastewater</p>	<b>12-13</b>	<b>4</b>
<b>Textbook:</b>		Nazih K. Shammam, Lawrence K. Wang (2011) "Water supply and wastewater removal". John Wiley and Sons, Inc. USA.	



<b>Department</b>	Civil And ARChitectural	<b>Major</b>	Construction Engineer
<b>Course Name</b>	Design of Concrete Structures	<b>Course Code</b>	CIV 450
<b>Prerequisites</b>	CIV 353	<b>Credit Hours</b> (L,W,T)	3

**Course description :**

In this course, trainee get to know how to analyze and design continuous beams; continuous one-way, two-way, ribbed ,Flat slabs; Analyze and Design stair slabs, Column under eccentrically loads, and R.C. frames; Apply the principles, procedures and basic theory of pre-stressed concrete to structural design; Apply current code requirements to the analysis and design of R.C structures through a design project.

**Topics :**

- Analysis and Design of R.C. frames.
- Design of Combined R.C. Footings.
- Analysis and Design of retaining walls.
- Principles, procedures and basic Design of Pre-stressed concrete members.
- Structural reinforced Concrete design Project (Apply computer calculation)
- Review of knowledge gained in Reinforced Concrete Structures (I)
- Analysis and design of continuous beams using moments coefficients method, and direct design method.
- Analysis and Design of floor systems: continuous one-way, two-way, ribbed and Flat slabs.
- Design of Stair Slabs.
- Design of rectangular R.C. columns under eccentrically loads.

**Experiments:** if applicable it will support the course topics.

**References :**

- " Reinforced Concrete- Design theory and Examples ", Third Edition, by Prab Bhatt, Thomas J.MacGinley & Ban sang Choo.



Detailed of Theoretical and practicals Contents			
	Contents	Week no.	Hours
1	<p><b>Review of knowledge gained in Reinforced Concrete Structures (I):</b></p> <ul style="list-style-type: none"> <li>- Structural design and limit states</li> <li>- Concepts of structural design for structural elements</li> <li>- Checking existing sections</li> <li>- Affecting loads on concrete loads</li> <li>- Analysis and design of simply one-solid slab, simply supported beam, column under axial load, separate concrete footings.</li> </ul>	1	3
2	<p><b>Analysis and design of continuous beams:</b></p> <ul style="list-style-type: none"> <li>- using moments coefficients method</li> <li>- using direct design method</li> <li>- Draw longitudinal and cross sections for beams, and show details of reinforced steel.</li> </ul>	2	3
3	<p><b>Analysis and Design of floor systems:</b></p> <ul style="list-style-type: none"> <li>- Types of slabs and design methods</li> <li>- Analyze and Design of one-way solid slab</li> <li>- Analyze and Design of two-way solid slab</li> <li>- Analyze and design of one-way spanning ribbed slabs: design procedure and reinforcement</li> <li>- Analyze and design of Flat Slabs: General code prevision, design for internal and edge panels and reinforcement details.</li> </ul>	3-5	9
4	<p><b>Design of Stair Slabs:</b></p> <ul style="list-style-type: none"> <li>- Building regulations</li> <li>- Types of Stair slabs</li> <li>- Code design requirements</li> <li>- Example of design of stair slab</li> </ul>	6	3
5	<p><b>Design of rectangular R.C. columns under eccentrically loads:</b></p> <ul style="list-style-type: none"> <li>- Combined axial load and bending moments</li> <li>- Moment strength of column</li> <li>- Interaction diagram for combined bending and axially load</li> <li>- Design of column reinforcement</li> </ul>	7	3
6	<p><b>Analysis and Design of R.C. frames:</b></p> <ul style="list-style-type: none"> <li>- Analysis of frames: Normal diagram, Shear diagram, Moment diagram</li> <li>- Draw longitudinal and cross sections for frames, and show details of reinforced steel.</li> </ul>	8	3



7	<p><b>Design of Combined R.C. Footings:</b></p> <ul style="list-style-type: none"> <li>- Types of combined footings</li> <li>- Centroid of combined footings</li> <li>- Procedure to find out the footing dimensions</li> <li>- Design the steel reinforcement</li> <li>- Show the construction section and elevation with the reinforcement information.</li> </ul>	9	3
8	<p><b>Analysis and Design of retaining walls:</b></p> <ul style="list-style-type: none"> <li>- Types of retaining walls</li> <li>- Effective loads</li> <li>- Retaining wall dimensions: Proportioning</li> <li>- Stability against Overturning</li> <li>- Stability against Sliding</li> <li>- Bearing Pressure Analysis</li> <li>- Design of Cantilever retaining Walls</li> <li>- Draw details of reinforced steel.</li> </ul>	10	3
9	<ul style="list-style-type: none"> <li>- Principles, procedures and basic Design of Pre-stressed concrete members:</li> <li>- Basic Principle of Pre-stressing</li> <li>- Advantages of Pre-stressed Concrete</li> <li>- Materials</li> <li>- Methods of Pre-stressing</li> <li>- Uses of Pre-stressed Concrete</li> <li>- Basis Design of PSC Members:</li> <li>- Minimum Section Modulus</li> <li>- Pre-stressing Force &amp; Eccentricity</li> <li>- Eccentricity Limits and Tendon Profile</li> <li>- Pre-stressing Losses</li> </ul>	11	3
10	<p><b>Structural reinforced Concrete design Project (Apply computer calculation):</b></p> <p>The project let the trainee practice the skills which he had gained during this course.</p> <ul style="list-style-type: none"> <li>- Study subject of the project and determine its goals, and its benefits in work market.</li> <li>- Determine required work in the project</li> <li>- Analyze and Design essential elements of the project R. C. structure using one of more of these computer programs: STAAD Pro, SAP2000, ETABS, PROKON, ROBOBAT,...</li> </ul> <p>Prepare drawings and write technical report using computer.</p>	12-13	6
<b>Textbook:</b>	" Structural Concrete – Theory and Design ", Hasson M.N. and Al- Manseer A. , 4 <sup>th</sup> edition, John Wiley and Sons, Inc. 2008.		





<b>Department</b>	Civil And ARCitectural	<b>Major</b>	Construction Engineer
<b>Course Name</b>	Mechanical and Electrical Systems	<b>Course Code</b>	ARC 351
<b>Prerequisites</b>		<b>Credit Hours (L,W,T)</b>	3

**Course description :**

This course is an overview of the mechanical and electrical systems for building, methods of design and implementation. These systems contain everything needed by the building to be suitable for living and work such as HAVC, Plumbing, Fire fighting and Fire alarm, Elevators, Electrical power systems, lighting, telephone and data systems.

**Topics :**

- Building Mechanical Systems.
- Building Electrical Systems.

**Experiments:** if applicable it will support the course topics.

**References :**

- Mechanical and Electrical Systems in Buildings , Author: Richard R. Janis, William K. Y. Tao
- Mechanical and Electrical Equipment for Buildings, 10<sup>th</sup> Edition , Author: Benjamin Stein , John S. Reynolds , Walter T. Grondzik , Alison G. Kwok
- Building Services Engineering (5th, 07) , Author: Chadderton, David V
- Building Services Handbook [Paperback] , Author: Fred Hall , Fred Hall (Author)



<b>Detailed of Theoretical And Practical Contents</b>			
	<b>Contents</b>	<b>Week no.</b>	<b>Hours</b>
1	<b>Introduction to Mechanical Systems</b>	<b>1</b>	<b>3</b>
2	<b>HVAC for small building</b>	<b>1</b>	
3	<b>HVAC for big building</b>	<b>2</b>	<b>3</b>
4	<b>HVAC Equipment and Delivery</b>	<b>3</b>	<b>3</b>
5	<b>Plumping</b>	<b>4</b>	<b>3</b>
6	<b>Fire Fighting Systems</b>	<b>5</b>	<b>3</b>
7	<b>Elevators and Escalator Systems</b>	<b>6</b>	<b>3</b>
8	<b>Other Mechanical Systems</b>	<b>7</b>	<b>3</b>
9	<b>Introduction to Electricity</b>	<b>8</b>	<b>3</b>
10	<b>Principles of electric grounding</b>	<b>8</b>	
11	<b>Electrical Power System</b>	<b>9</b>	<b>3</b>
12	<b>Lighting systems</b>	<b>10</b>	<b>3</b>
13	<b>Fire Alarm Systems</b>	<b>11</b>	<b>3</b>
14	<b>Telephone, Data and Sound System</b>	<b>12</b>	<b>3</b>
	<b>Textbook:</b>	1-Mechanical and Electrical Systems in Buildings Author: Richard R. Janis, William K. Y. Tao  2- Mechanical and Electrical Equipment for Buildings, 10 <sup>th</sup> Edition Author: Benjamin Stein , John S. Reynolds , Walter T. Grondzik , Alison G. Kwok  3- Building Services Engineering (5th, 07) Author: Chadderton, David V  4- Building Services Handbook [Paperback] Author: Fred Hall , Fred Hall (Author)	



<b>Department</b>	<b>Civil And ARCitectural</b>	<b>Major</b>	<b>Construction Engineer</b>
<b>Course Name</b>	<b>Project (1)</b>	<b>Course Code</b>	CIV451
<b>Prerequisites</b>		<b>Credit Hours (L,W,T)</b>	<b>2</b>

**Course description :**

Graduation project will be accomplished in two phases. This course is the first stage where trainee discovers and decides the project subject. By the end of the sixth week, trainee ended seARcing and preparation step and ready to start the project. The project subject will be in one of the topics that have been studied and under supervision of qualified trainer to ensure that trainee utilize skills and knowledge gained during study.

**Topics :**

- Reviewing a number of projects.
- Starting the project.

**Experiments:** if applicable it will support the course topics.



<b>Detailed of Theoretical And Practical Contents</b>			
	<b>Contents</b>	<b>Week no.</b>	<b>Hours</b>
<b>1</b>	<b>Reviewing a number of projects</b>	<b>1-2</b>	<b>8</b>
<b>2</b>	<b>Starting the project</b>	<b>3-13</b>	<b>44</b>
<b>Textbook:</b>			



<b>Department</b>	Civil And ARChitectural	<b>Major</b>	Construction Engineer
<b>Course Name</b>	Design of Steel Structures	<b>Course Code</b>	CIV 452
<b>Prerequisites</b>	CIV 352	<b>Credit Hours</b> (L,W,T)	2

**Course description :**

In this course, trainee get to know how to analyze and design tension and compression steel members, Columns under eccentric loadings, Column bases and footings, Beams for Flexure and Shear, bolted and welded Connections, Structural Steel design Project (Apply computer calculation).

**Topics :**

- Design of welded Connections.
- Design of Beams for Flexure and Shear.
- Industrial building Project.
- Structural Steel design Project (Apply computer calculation)
- Review of knowledge gained in Steel Structures (I)
- Design of Tension and Compression members: Analysis and design of roof Trusses.
- Design of Columns under eccentric loadings.
- Design of Column bases and footings.
- Design of bolted Connections.

**Experiments:** if applicable it will support the course topics.

**References :**

- " Design of Steel Structures" , 3<sup>rd</sup> Edition, by Edwin, H. Gaylord, Jr. , Charles, N. Gaylord & James, E. Stallmeyer; McGraw-Hill, 1992.



<b>Detailed of Theoretical and practicals Contents</b>			
	<b>Contents</b>	<b>Week no.</b>	<b>Hours</b>
<b>1</b>	<b>Review of knowledge gained in Steel Structures (I):</b> <ul style="list-style-type: none"> <li>• Mechanical properties of steel</li> <li>• The manufacturing of steel structures</li> <li>• Advantages and disadvantages of steel structures</li> <li>• Principles of limit state design</li> </ul>	<b>1</b>	<b>2</b>
<b>2</b>	<b>Design of Tension and Compression members:</b> <ul style="list-style-type: none"> <li>• Behavior of tension/compression members</li> <li>• Design strength of tension/compression members</li> <li>• Design Procedure</li> <li>• Analysis and design of roof Trusses</li> </ul>	<b>2-3</b>	<b>4</b>
<b>3</b>	<b>Design of Columns under eccentric loadings:</b> <ul style="list-style-type: none"> <li>• Types of eccentric loading of columns</li> <li>• Bending moment for eccentricity</li> <li>• Superposing The stresses due to centric load and Couple</li> <li>• Design of eccentric loading: the Secant Formula.</li> </ul>	<b>4</b>	<b>2</b>
<b>4</b>	<b>Design of Column bases and footings:</b> <ul style="list-style-type: none"> <li>• Types of column bases</li> <li>• Slab Base</li> <li>• Gusset base</li> <li>• Design of welded column bases.</li> </ul>	<b>5</b>	<b>2</b>
<b>5</b>	<b>Design of bolted Connections:</b> <ul style="list-style-type: none"> <li>• Advantages and disadvantages of bolted connections</li> <li>• Specifications for spacing and edge distances of bolt holes</li> <li>• Assumptions in design of bearing bolts</li> <li>• Design strength of bearing bolts</li> <li>• Design criteria for bolt subjected to combined shear and tension</li> </ul>	<b>6</b>	<b>2</b>
<b>6</b>	<b>Design of welded Connections:</b> <ul style="list-style-type: none"> <li>• Advantages and disadvantages of welded connections</li> <li>• Important Specifications for welding</li> <li>• Design stresses in welds</li> <li>• Reduction in design stresses for long joints</li> </ul>	<b>7</b>	<b>2</b>



7	<p><b>Design of beams for Flexure and Shear:</b></p> <ul style="list-style-type: none"> <li>• Plastic moment carrying capacity of a section</li> <li>• Classification of cross-sections</li> <li>• Design procedure</li> <li>• Bending strength of a laterally supported beam</li> <li>• Shear strength of a laterally supported beam</li> <li>• Deflection limits</li> <li>• Design Principles of bolted beam connections</li> <li>• Design Principles of welded beam connections</li> </ul>	8-9	4
8	<p><b>Industrial building Project:</b></p> <ul style="list-style-type: none"> <li>• Modeling of essential structure systems</li> <li>• Analyze of elements and components of the steel structure</li> <li>• Methods of shifting and transferring loads</li> <li>• Understand how the elements of the steel structures were designed.</li> </ul>	10	2
9	<p><b>Structural Steel design Project (Apply computer calculation):</b></p> <p>The project let the trainee practice the skills which he had gained during this course.</p> <ul style="list-style-type: none"> <li>• Study subject of the project and determine its goals, and its benefits in work market.</li> <li>• Determine required work in the project</li> <li>• Analyze and Design essential elements of the project steel structure using one of more of these computer programs: STAAD Pro, SAP2000, ETABS, PROKON, ROBOBAT...</li> <li>• Prepare drawings and write technical report using computer.</li> </ul>	11-13	6
<b>Textbook:</b>	<p>" Applied Structural Steel Design ", by L. Spiegel &amp; G. F. Limbrunner.          - " Simplified Design of steel structures " 7<sup>th</sup> Edition, by James Ambrose,          • John Wiley &amp; sons, Inc ; 1997.</p>		



<b>Department</b>	Civil And ARChitectural	<b>Major</b>	Construction Engineer
<b>Course Name</b>	Maintenance and repair of constructions	<b>Course Code</b>	CIV 454
<b>Prerequisites</b>		<b>Credit Hours (L,W,T)</b>	2

**Course description :**

Maintenance and repair strategies, serviceability and durability of concrete, materials for repair, techniques for repair and demolition, repairs, rehabilitation and retrofitting of structures.

**Topics :**

- Maintenance and repair strategies
- Evaluation and inspection of concrete
- Repair materials
- Techniques for repair and rehabilitation
- Repairs, rehabilitation and retrofitting of structures

**Experiments:** if applicable it will support the course topics.

**References :**

Krishan Kumar ER (2002), handbook on Repair and rehabilitation of RCC buildings. general public works dept.





Detailed of Theoretical and practicals Contents			
	Contents	Week no.	Hours
1	<b>Introduction :</b> Maintenance methods repair and rehabilitation practices, various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration	1	2
2	<b>Causes of deterioration:</b> Structural analysis Mechanical properties Types of damages. Causes of damages.	2	2
3	<b>Evaluation and inspection of existing concrete</b> survey of concrete Inspection of damages, concrete tests: non destructive tests Hammer test- ultrasonic test destructive tests Core test- load bearing test chemical tests, corrosion evaluation,	3-5	6
4	<b>Materials for repair</b> Parameters for selection of materials concrete repair chemicals, special strength concrete, Fiber reinforced concrete. Corrosion repair materials.	6-7	4
5	<b>Rehabilitation methods</b> Mortar repair for cracks, Methods of corrosion protection. Engineered demolition techniques.	8-9	4
6	<b>structural Repairs work</b> Repair stages Concrete removal and preparation Concrete frame work Chemical application. corrosion protection Structural maintenance	10-11	4
7	<b>nonstructural Repairs work</b> plastering, water proofing, retrofitting , retiling etc.	12-13	4
<b>Textbook:</b>		Krishan Kumar ER (2002), handbook on Repair and rehabilitation of RCC buildings. general public works dept.	



<b>Department</b>	Civil And ARCitectural	<b>Major</b>	Construction Engineer
<b>Course Name</b>	Highway Engineering	<b>Course Code</b>	CIV 454
<b>Prerequisites</b>	CIV 352	<b>Credit Hours (L,W,T)</b>	3

**Course description :**

The course is presented in 2 strands. The first strand is concerned with the fundamentals of highway and pavement engineering. It introduces the design process of roads and intersections, including horizontal and vertical alignment design, cross-sections and earthworks. The second half of this strand deals with pavement design and evaluation. Topics include: pavement composition, pavement materials, asphalt mix design, the pavement thickness design. and, defects in Flexible pavements and, failures in Rigid pavements.

The second strand is presents briefly bridges classification and construction methods.

**Topics :**

- TerminologyUsedin the design/construction of highways and roadway pavements.
- Application of analytical Methods in the Geometric design of a highway Project
- Drainage design, soil improvement and earthwork for highways.
- Properties of pavement materials, pavement mix design and thickness design for asphalt andConcrete pavements.
- Pavements evaluation.
- Bridges classification, and construction methods.

**Experiments:** if applicable it will support the course topics.

**References :**

- Traffic and Highway Engineering , Fourth Edition, Nicholas J. Garber, Lester A. Hoel, University of Virginia. 2009, Cengage Learning, 1120 Birchmount Road, Toronto ON M1K 5G4 Canada
- O'Flaherty, C.A. (ed) Highways: The Location, Design, Construction and Maintenance of Road Pavements. Butterworth Heinemann.
- Design of Highway Bridges , Authors: Richard Barker & Jay Puckett , Publisher: Wiley Interscience.



<b>Detailed of Theoretical Contents</b>			
	<b>Contents</b>	<b>Week no.</b>	<b>Hours</b>
<b>1</b>	History of Road Construction, Highway Development in Saudi Arabia.  Highway Development Programmers at National Level in Saudi Arabia.	<b>1</b>	<b>2</b>
<b>2</b>	The Highway planning process and principles of route location.	<b>2</b>	<b>2</b>
<b>3</b>	Factors controlling Highway alignment .Engineering surveys for alignment - Conventional methods and Modern methods (Remote sensing, GIS and GPS techniques)	<b>3</b>	<b>2</b>
<b>4</b>	Geometric design of Highways.	<b>4-5</b>	<b>4</b>
<b>5</b>	Highways drainage.	<b>6</b>	<b>2</b>
<b>6</b>	Classification, Improvement and Stabilization of soil and Earthworks for Highways.	<b>7</b>	<b>2</b>
<b>7</b>	Sources description properties and uses of Bituminous binders.  Asphalt mix design.  Asphalt plants.	<b>8-9</b>	<b>4</b>
<b>8</b>	Design and construction of different Pavement layers.	<b>10</b>	<b>2</b>
<b>9</b>	Design of rigid Pavements.  Pavement management.	<b>11</b>	<b>2</b>
<b>10</b>	Types of defects in Flexible Pavements. Types of Pavement, failures in Rigid Pavements. Pavement Evaluation.	<b>12</b>	<b>2</b>
<b>11</b>	Introduction to Bridges including (briefly): Bridges classification, bridge types and Bridges construction methods.	<b>13</b>	<b>2</b>
<b>Textbook:</b>			



<b>Detailed of practicals Contents</b>			
	<b>Contents</b>	<b>Week no.</b>	<b>Hours</b>
<b>1</b>	Method for Effect of Heat and Air on a Moving Film of Asphalt	<b>2</b>	<b>2</b>
<b>2</b>	Asphalt mix design according to Marshal Method.	<b>3-4</b>	<b>4</b>
<b>3</b>	Quantitative Extraction of Bitumen From Bituminous Paving Mixtures.	<b>5</b>	<b>2</b>
<b>4</b>	Rotational Viscosity.	<b>6</b>	<b>2</b>
<b>5</b>	Pressure Aging Vessel.	<b>7</b>	<b>2</b>
<b>6</b>	Dynamic Shear Rheometer.	<b>8</b>	<b>2</b>
<b>7</b>	Bending Beam Rheometer.	<b>9</b>	<b>2</b>
<b>8</b>	Direct Tension test.	<b>10</b>	<b>2</b>
<b>9</b>	Gyratory Compaction test.	<b>11</b>	<b>2</b>
<b>10</b>	Asphalt mix design by using E Pave Program ( Superpaves Method ).	<b>12</b>	<b>2</b>
<b>Textbook:</b>			



<b>Department</b>	Civil And ARCitectural	<b>Major</b>	Construction Engineer
<b>Course Name</b>	Project (2)	<b>Course Code</b>	CIV 456
<b>Prerequisites</b>	CIV 451	<b>Credit Hours (L,W,T)</b>	2

**Course description :**

This course is the second phase where trainee continue the project he started in the previous semester.

**Topics :**

- **Working on finishing the Project**