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

الكليات التقنية

CURRICULUM
FOR
Department
Mechanical Technology
Major
Production

Program Description:

The Production Engineering Technology (PET) Bachelor of Science program is offered by the Mechanical Technology departmentsin the TVTC'saffiliated Colleges of Technology. It is an applied engineering technology program which is positioned to meet the growing national market's need for qualified production engineering technologists. The program encompasses the junior and senior years of the four-year training period required to receive the B.S. degree in PET. It succeeds another two-year program leading to an associate degree in Production Technology.

The training curriculum for the PET program focuses on strengthening and extending the knowledge and skills acquired in theassociate degree program. It is carefully designed to provide its graduates with solid knowledge and readily marketable skills which enable them to adapt to a wide variety of technical careers and to assume managerial and leadership positions. Its core coursework comprises a range of courses, including: Plastic Technology, Advanced Materials Technology, Control Technology, Operations Research, Production Planning and Control, CIM, Non-conventional Machining, Industrial Maintenance, Facilities Planning, and a graduation project. These courses are complemented with general courses necessary to enhance and broaden the trainee's knowledge and proficiency in English, math, physics, computer programming and applications, and management. The latter is given a considerable weight in the PET program by incorporating five management related courses, including: Introduction to Management and Leadership, Communication Skills, Engineering Project Management, Quality Tools and Applications, and Engineering Economy. In addition to the aforementioned subjects, the programrequires a one-trimester of full time co-op training in the local industry. Upon completion of the PET program, trainees will have the ability to:

- Identify, analyze, formulate and solve manufacturing related problems by using current knowledge and adapting to emerging applications of mathematics, science, and engineering.
- Apply the technologies of materials, manufacturing processes, tooling, automation, production operations, maintenance, quality, industrial organization and management, and computer software to the solutions of manufacturing problems.
- Conduct, analyze and interpret experiments and apply experimental results to improve processes.
- Perform effectively on multi-disciplinary teamsby exercising leadership and contributing as a member.
- Communicate effectively in written and oral formats to a variety of audiences.
- Engage in lifelong learning and professional development.
- Understand professional and ethical responsibilities.

Index

Seventh Trimester								
	Course Code	Course Name	Prereq	No. of Units				
				CRH	L	P	T	CTH
1	ISL 305	Islamic studies (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	Advanced Computer Applications	-	**2**	-	**4**	0	**4**
5	ENG 305	English Language (1)	-	**2**	**2**	0	**2**	**4**
Total				**14**	**10**	**8**	**3**	**21**
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 Language	-	**2**	**2**	0	0	**2**
2	MAH 326	Mathematics (4)	-	**4**	**3**	**2**	**1**	**6**
3	ENG 306	English Language (2)	-	**2**	**2**	0	**2**	**4**
4	CMT 325	Computer Programming	-	**3**	**2**	**2**	0	**4**
5	MEC377	Advanced Material Technology	-	**3**	**2**	**2**	0	**4**
6	MEC378	Control Systems Technology	-	**3**	**2**	**2**	0	**4**
Total				**17**	**13**	**8**	**3**	**24**
L = Lecture Hours, W = Workshop/Laboratory Hours, T = Tutorial Hours								

Ninth Trimester								
	Course Code	Course Name	Prereq	No. of Units				
				CRH	L	P	T	CTH
1	ENG307	English Language (3)	-	**2**	**2**	0	**2**	**4**
2	GMS435	Introduction to Management and Leadership	-	**2**	**2**	0	**2**	**4**
3	GMS436	Communication Skills	-	**2**	**2**	0	**2**	**4**
4	MEC379	Plastic Technology	-	**3**	**2**	**2**	0	**4**
5	MEC355	Operations Research	MAH 325	**4**	**4**	0	0	**4**
6	MEC365	Production Planning and control	-	**4**	**4**	0	0	**4**
Total				**17**	**16**	**2**	**6**	**24**
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 Language (4)	-	**2**	**2**	0	**2**	**4**
2	GMS 437	Engineering Project Management	-	**3**	**3**	0	**2**	**5**
3	MAH 425	Engineering Statistics and Probability	-	**4**	**3**	**2**	**1**	**6**
4	MEC456	Non- Conventional Machining Processes	-	**3**	**3**	**0**	0	**3**
5	MEC459	Computer Integrated Manufacturing	-	**4**	**4**	**0**	0	**4**
6	MEC496	Graduation Project-1	-	**1**	0	2	0	**2**
Total				**17**	**15**	**4**	**5**	**24**

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 Language (5)	-	2	2	0	2	4
2	GMS 438	Quality Tools and Applications	-	3	3	0	2	5
3	GMS 439	Engineering Economy	-	2	2	0	2	4
4	MEC457	Facilities Planning	MEC355 MEC365	**4**	**4**	0	0	**4**
5	MEC458	Industrial Maintenance	MAH 425	**3**	**3**	0	0	**3**
6	MEC497	Graduation Project-2	MEC496	**2**	0	4	0	**4**
Total				**16**	**14**	**4**	**6**	**24**
L = Lecture Hours, W = Workshop/Laboratory Hours, T = Tutorial Hours								

Twelfth Trimester								
	Course Code	Course Name	Prereq	No. of Units				
				CRH	L	P	T	CTH
1	MEC499	Cooperative Training	Completion of All Courses	4	**420**			
Total				4	-	-	-	**4**
The total training hours				**85**	**67**	**20**	**25**	**122**
L = Lecture Hours, W = Workshop/Laboratory Hours, T = Tutorial Hours								

Brief description

MEC 377 Advanced Material Technology:

This course about engineering materials such as Ceramic, Composites, non ferrous alloys, powder metallurgy and smart materials as well as their properties, structures and applications to be able to select a material for given application based on considerations of cost and performance and to understand the limits of materials also to be able to create a new materials that will have desirable properties.

MEC 378 Control Systems Technology :

This course covers the basic architecture, main components of programmable logic controller and its programming methods as well as appropriate applications. The student will be able to write programs and construct hydraulic/ pneumatic systems controlled by programmable controller.

MEC 379 Plastic Technology:

This course is about Polymer definition and polymerization types. Relation between polymer properties and polymer structures. Types, grades, properties, processing characteristics and applications of Thermoplastics and Thermoses. Additives used to enhance or to maintain polymers properties. Polymers testing**.**

MEC 355 Operation Research:

This is an introductory course in Operations Research (OR) with primary emphasis on Linear Programming and its applications. It involves formulating models and developing solution methods for a variety of real-world optimization problems using deterministic methods of OR. No computer programming is required in this course. However, OR software packages are used for implementing solution algorithms.

MEC 365 Production Planning and Control:

Once the forecast of sales is done in a manufacturing company, production managers start planning for materials. This task is no small one and has very high impacts on the company's responsiveness to market demands, optimizing the utilization of production lines as well as the total cost of production. This course offers a clear understanding of the relation between forecast and planning, the value of scheduling and planning for production, the different inventory management techniques as well as the tools and performance indicators used in these activities.

MEC 456 Non-Conventional Machininh Processes:

This course will give a good perspective with adequate depth to understand the unconventional machining processes. *It will* describe the working principle and application of various non conventional machining processes.

MEC 459 Computer Integrated Manufacturing:

This course introduces the trainee to the basic essential of manufacturing systems, concepts and associated mathematical models, production economics, numerical control, flexible manufacturing systems, computer process control, CAD/CAM and computer aided process planning. It explain technology about industrial robotics, automated assembly, automated material handling and storage, automated inspection, shop floor control, computer networks for manufacturing and manufacturing productivity.

MEC 457 Facilites Planning:

This is an introductory course on facilities planning with emphasis on the design, analysis, and selection of manufacturing facilities and material handling systems. It provides some fundamental concepts, theory and procedures for the study of facilities location, physical layouts, material flow, and material handling. Analytical procedures are developed to enhance the decision-making process in the design, rationalization and improvement of manufacturing facilities. The knowledge learned in this course is integrated with knowledge from related courses to prepare a facility plan project for a selected product.

MEC 458 Industrial Maintenance:

This program about Industrial Maintenance such as Maintenance and maintenance engineering Objective , Maintenance Facts and Figure , information Sources, Maintenance Department Function and origination , Maintenance Management by objective critical , Maintenance policy,Job planning scheduling ,Preventive Maintenance elements plant characteristic in need of a PM Important steps for Establishing a PM , PM Advantage and disadvantages ,Corrective Maintenance Types , Corrective Maintenance steps, Downtime Components and time , Reliability Centered Maintenance ,ABC Classification Approach for Maintenance inventory Control,Maintenance cost , Maintenance Budget types preparation approaches and steps,Reliability Measures and Reliability Function.

MEC 459 Computer Integrated Manufacturing:

This course introduces the trainee to the basic essential of manufacturing systems, concepts and associated mathematical models, production economics, numerical control, flexible manufacturing systems, computer process control, CAD/CAM and computer aided process planning. It explain technology about industrial robotics, automated assembly, automated material handling and storage, automated inspection, shop floor control, computer networks for manufacturing and manufacturing productivity.

Courses description

Department	General Study	**Major**	All Majors
Course Name	Arabic 2	**Course Code**	ARB 305
Prerequisites		**Credit Hours *(L,W,T)***	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 adminstrative 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 اللهيبي، د. سعد المطرفي . دار النشر :دار حافظ بجدة

Department	General Study	**Major**	All Majors
Course Name	Islamic Culture 3	**Course Code**	ISL 305
Prerequisites		**Credit Hours** *(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

Department	General Study	**Major**	All Majors
Course Name	Advance Computer Applications	**Course Code**	CMT 385
Prerequisites		**Credit Hours** *(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

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

	Document Tasks Review the Project Schedule's Duration		
9	Establish people resources Establish equipment resources Establish material resources Establish cost resources Establish resource pay rates Adjust resource working times Add resource notes	Microsoft Project	**4**
10	Assign work resources to tasks Add more work resource assignments to tasks Assign material resources to tasks Assign cost resources to tasks		**4**
11	Apply a task calendar to an individual task Change task types Split a task Establish recurring tasks Apply task constraints Review the project's critical path View resource allocations over time		**4**

Department	General Study	Major	All Majors
Course Name	Computer Programming	Course Code	CMT 325
Prerequisites		Credit Hours *(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	**Problem-Solving and Introduction programs and C++:** - Algorithms and Flowchart. - Understand software development cycle. - Realize the fundamental of C ++.	**1**	**2**
2	**Elementary programming :** - Study basic data types, their declarations and initializations. - Characters, and Strings. - Use variables to store data.	**2**	**4**
3	**Selections :** - Implement selection control using if and switch statements - Combine conditions using logical operators - Write expressions using the conditional operator. - Format output using stream manipulators. - Examine the rules governing operator precedence and operator associativity .	**1**	**2**
4	**Loops:** - Write loops using do-while, while and for statements. - Control a loop with the user confirmation or a sentinel value. - Write nested loops. - Learn the techniques for minimizing numerical errors. - Implement program control with break and continue .	**1**	**2**
5	**Function basics:** - Mathematical Functions. - Define and invoke different types of functions. - Use function prototypes for function headers. - Know how to pass arguments. - Create header files for reusing functions. - Develop functions for various tasks - Develop applications using C++ functions .	**2**	**4**
6	**Advanced function feature:** - Experience advanced topics on pass-by-value, pass-by-reference. - Understand the difference between them. - Determine the scope of local and global variables. - Define functions with default arguments. - Improve runtime efficiency by using inline functions .	**1**	**2**
7	**Arrays** : - Understand the necessity of an array in programming.	**2**	**4**

	- Know how to declare and initialize an array. - Program common array operations. - Develop and invoke functions with array arguments. - Process string using C-strings .		
8	**Objects and classes:** - Describe objects and classes. - Create objects using constructors. - Distinguish between instance and static variables and functions. - Access data fields and invoke functions using the object member access operator. - Declare private data fields for data field encapsulation and make classes easy to maintain .	**2**	**4**
9	**Files and streams:** - Learn ifstream, ofstream, and fstream classes for processing and manipulating files. - Read and write data using the getline, get and put functions. - Study functions to test file existence and the end of a file. - Open a file for both input and output to update files .	**1**	**2**
Textbook:	Y. Daniel Liang, Introduction to Programming with C++, 3/E**.** Gary J. Bronson, C++ for Engineers and Scientists, 3/E.		

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**
Textbook:	Y. Daniel Liang, Introduction to Programming with C++, 3/E.		

Department	All Departments	**Major**	All Majors
Course Name	English 1	**Course Code**	ENG 305
Prerequisites		**Credit Hours** *(L,W,T)*	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
  byDiane 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
Textbook:	Reading Power 2 (4th Edition) [Paperback] Linda Jeffries, Beatrice S. Mikulecky Pearson Education ESL; •ISBN-10: 0138143889 •ISBN-13: 978-0138143886		

Department	All Departments	**Major**	All Majors
Course Name	English 2	**Course Code**	ENG 306
Prerequisites	English 1	**Credit Hours** *(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 :

- Usingcontext
- Skimming
- Topicvs.Mainidea
- Inferencing
- Using headings
- Usingheadings
- Usingcontext
- Reading Instructionalmaterials
- Findingdetails
- Main ideas
- Usingexamples

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

Detailed of Theoretical Contents			
	Content	**Week no.**	**Hours**
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. OXTORD UNIVERSITY PRESS ISBN 0-19-437475-0		

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

Course description :

English 3 *is writing course. Itis 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
- ProcessParagraphs
- Comparison/ContrastParagraphs
- DefinitionParagraphs
- EssayOrganization
- 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	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	1	4
5	Logical Division of Ideas Paragraph Logical Division of Ideas Coherence Using Nouns and Pronouns Consistently Transition Signals Run-Ons and Comma Splices	1	4
6	Process Paragraph Time Order Time Order Signals Clauses and Complex Sentences Clauses Complex Sentences Subordinators	2	8
7	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	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 Bogy Paragraphs The Concluding Paragraph Developing Supporting Details Quotations Rules for Using and Punctuating Quotations Statistics	1	4

Department	All Departments	**Major**	All Majors
Course Name	English 4	**Course Code**	ENG 308
Prerequisites	English 3	**Credit Hours** *(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
Textbook:	Pocket Book of Technical Writing, 3rd,By Finkelstein, L., McGraw Hill, USA, 2008		

Department	All Departments	**Major**	All Majors
Course Name	English 5	**Course Code**	ENG 309
Prerequisites	English 4	**Credit Hours** *(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 :

- Whatis Communication؟
- Effective ListeningSkills
- Verbal Communication
- Communicating Over the Phone
- Nonverbal Communication
- Written Communication
- CommunicatingElectronically

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
	Body Action Body Language How Culture Affects Nonverbal Communication	2	8
	Why Is Writing Important? Personal Letters Business Letters Business Memos Thank-You Notes Invitations	2	8
	Communicating with E-mail Just Fax It to Me Instant Messaging Text Messaging How Technology Is Changing Workplace Communication	3	12

Department	General Study	**Major**	All Majors
Course Name	Physics (2)	**Course Code**	PHY325
Prerequisites	General physics	**Credit Hours** *(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 knowledgein the theory of electricity, electrostatics and magnetism.

Topics :

- PhysicalMeasurements
- Direct-Current Circuits and Resistance
- AlternatingCurrent Circuit (AC Circuit)
- Electrostatics
- The magnetic field
- Faraday'slow of electromagnetic induction

Experiments: if applicable it will support the theoretical topics.

References :

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

Detailed of Theoretical Contents			
Chapter	**Contents**	**Week no.**	**Hours**
1	**Physical Measurements :** 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.	**1-2**	**6**
2	**Direct-Current Circuits and Resistance:** Electric Current, Resistance and Ohm's Law, Energy and Power in Electric Circuits, Joule's Low, 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	**3- 4 - 5**	**9**
3	**Alternating Current Circuit (AC Circuit):** AC source, Resistors in an AC circuit, rms current, rms voltage, Capacitors in an AC circuit, The capacitive reactance $X_{C,}$ Inductors in an AC circuit, The inductive reactance $X_{L,}$ The RLC series circuit, The impedance Z, 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	**6- 7 - 8**	**9**
4	**Electrostatics:** electric charge, Coulomb's low, The electric field due to a point charge, The electric potential due to a point charge, stored energy in a capacitor, dielectric materiel in capacitor, examples and problems	**9- 10**	**6**

5	**The magnetic field:** Magnetic field and magnetic field lines, Ampere's low: magnetic field due to a long straight wire, a circular conductor, a solenoid, Hall effect, Discovering of the electron and measuring e/m, The magnetic force, Examples and Problems **Faraday's low of electromagnetic induction**	**11- 12- 13**	**9**
Textbook:	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 2- Foundations Of Physics for Technology Colleges and universities freshmen . Dr. Marwan A. Alfahha Third edition 2012		

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**
Textbook:			

Department	General Study	**Major**	All Majors
Course Name	Mathematics (3) Linear Algebra	**Course Code**	MAT 325
Prerequisites	General Math	**Credit Hours** *(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

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

Department	General Study	**Major**	All Majors
Course Name	Mathematics (4) Discrete and Numerical Analysis	**Course Code**	MAT 326
Prerequisites	General Math	**Credit Hours** *(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

Detailed of Theoretical Contents			
	Contents	**Week no.**	**Hours**
1	Sequences: Some important limits-Convergence and divergence - Monotonocity and boundedness of sequences.	**1-2-3**	**18**
2	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.	**4-5-6**	**18**
3	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	**7-8-9-10**	**18**
4	Fourier Analysis: Fourier seris- Fourier transform	**11-12-13**	**9**
Textbook:	Keith E. Hirst,Keith Edwin Hirst, Numbers, Sequences and Series		

Department	General Study	**Major**	All Majors
Course Name	Engineering statistics and probability	**Course Code**	STA 425
Prerequisites	General Math	**Credit Hours** *(L,W,T)*	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 ProbabilityVectorsspaces
- Random variable and Probability Distributions
- SomeDiscreteProbability Distribution
- SomeContinuousProbability 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

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

Department	General Study	**Major**	All Majors
Course Name	Introduction to management & leadership	**Course Code**	GMS 335
Prerequisites		**Credit Hours** *(L,W,T)*	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

Detailed of Theoretical Contents			
	Contents	**Week no.**	**Hours**
1	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.	**4**	**8**
2	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.	**3**	**6**
3	Resource Management. Managing Change and Innovation. Understanding Groups and Teams. Leadership skills. Foundations of Control. Operations and Supply Chain Management.	**2**	**4**
4	Contemporary Management Competencies - Time Management Skills. Effective Communication Skills. Problem Solving Skills. Crisis Management	**4**	**8**
Textbook:	Robbins, Stephen P, and Coulter, Mary. (2012) Management, 11th Edition, Prentice Hall		

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

Course description :

This course is intended to provide the studentswithplainunderstandingofthekeysubjects, matters andideaseducativein the field of communication studies.

Topics :

- Communication Today.
- Reports and proposals.
- Nonverbal communication.
- Interpersonalskills
- Interpersonalskills
- Negotiationskills
- 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**
Textbook:	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 Theoretical Contents			
	Contents	**Week no.**	**Hours**
1	Communicating in meetings	**12**	**2**
2	Employment communication and social media. *** Final Exam.	**13**	**2**
Textbook:	Communicating in the 21st Century, 3rd edition By Baden Eunson 2011 1149 pages ISBN: 978-1-742- 16617-9 John Wiley & Sons Limited Inc.		

Department	General Study	**Major**	All Majors
Course Name	Engineering Project Management	**Course Code**	GMS 437
Prerequisites		**Credit Hours** *(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

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

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

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

	7.2 Estimate Costs. 7.3 Determine Budget 7.4 Control Costs.		
8	8. PROJECT QUALITY MANAGEMENT 8.1 Plan Quality Management. 8.2 Perform Quality Assurance. 8.3 Control Quality.	**8**	**3**
9	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	**9**	**3**
10	10. PROJECT COMMUNICATIONS MANAGEMENT. 10.1 Plan Communications Management. 10.2 Manage Communications. 10.3 Control Communications.	**10**	**3**
11	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.	**11**	**3**
12	12. PROJECT PROCUREMENT MANAGEMENT.	**12**	**3**

	12.1 Plan Procurement Management. 12.2 Conduct Procurements 12.3 Control Procurements. 12.4 Close Procurements		
13	13. PROJECT STAKEHOLDER MANAGEMENT 13.1 Identify Stakeholders 13.2 Plan Stakeholder Management. 13.3 Manage Stakeholder Engagement 13.4 Control Stakeholder Engagement.	**13**	**3**
Textbook:	A Guide to the Project Management Body of Knowledge (PMBOK® Guide), Fifth Edition, Project Management Institute, Project Management Institute © 2013.		

Detailed of Tatorial Contents			
	Contents	**Week no.**	**Hours**
1	Workshop: Forming Project Team and Project Selection	**1**	**2**
2	Workshop: Defining Project Business Case	**2**	**2**
3	Workshop: Developing Project Charter	**3**	**2**
4	Workshop: Project Configuration & Integration	**4**	**2**
5	Workshop: Collect Project Requirements, Creating Project Scope Statement, and Developing Project WBS	**5**	**2**
6	Workshop: Developing Project Schedule Using Project Management Tools	**6**	**2**
7	Workshop: Developing Project Budget and Cash flow	**7**	**2**
8	Workshop: Developing Project Quality Management Plan	**8**	**2**
9	Workshop: Developing Project HR Management Plan	**9**	**2**
10	Workshop: Developing Project Communications Management Plan	**10**	**2**
11	Workshop: Developing Project Risk Management Plan	**11**	**2**
12	Workshop: Developing Project Procurement Management Plan	**12**	**2**
13	Workshop: Developing Project Stakeholders Management Plan	**13**	**2**
Textbook:	A guide to the project management body of knowledge (pmbok® guide), fifth edition, project management institute, project management institute © 2013.		

Department	General Study	**Major**	All Majors
Course Name	Quality Tools and Applications	**Course Code**	GMS 438
Prerequisites		**Credit Hours** *(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

Detailed of Theoretical Contents			
	Contents	**Week no.**	**Hours**
1	Quality Management as a Concept: - How Quality is defined. - 8 principles of Total Quality Management. - Customer Satisfaction.	**1-3**	**15**
2	Quality Management as a Culture: - Understanding the quality culture VS. the traditional culture - Change management	**4-5**	**10**
3	Quality Management as a Strategic Planning: - Developing Plan (vision, mission and objectives) - Execution Plan (action plan, operations, KPIs)	**6-7**	**10**
4	Overview on Quality Management Tools: - The basic 7 tools for quality management	**8**	**5**
5	Problems Solving and Decisions Making: - Root Cause analysis techniques. - Decision making support techniques.	**9-10**	**10**
6	Optimizing and Controlling Processes: - Statistical Process Control (SPC) applications. - Control Charts.	**11-12**	**10**
7	Implementing the Quality Management: - Plan, Do, Check, Act (implementation project)	**13**	**5**
Textbook:	Quality Management Introduction to Total Quality Management for Production, Processing and Services. (Sixth Edition) By David L. Goetsch and Stanley B. Davis		

Department	General Study	Major	All Majors
Course Name	Engineering Economy	Course Code	GMS 439
Prerequisites		Credit Hours *(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	**Foundations of Engineering Economy**: - Engineering economics: description and role in decision making process. - How to perform an Engineering Economy study. - Interest rate and rate of return. - Engineering economy terminology and symbols. - Cash flows: estimation and diagramming. - Economic Equivalence. - Simple and compound interests. - Meaning and use of Minimum Attractive Rate of Return (MARR). - Spreadsheets use in engineering economy.	**1-2**	**4**
2	**Engineering Economy Factors**: - Deriving and using the following factors: F/P, P/F, P/A, A/P, F/A, A/F, P/G, and A/G. - Linear interpolation of factors values. - Combining factors (Calculations pertaining to Shifted uniform series and randomly placed single amounts).	**3-4**	**4**
3	**Nominal and Effective Interest Rates**: - Difference between nominal and effective interest rates. - Calculating the effective interest rate. - Equivalence calculations under single and series cash flows in the case where payment and compounding periods are unequal.	**5**	**2**
4	**Present Worth (PW) Analysis**: - Formulating alternatives. - PW analysis of equal- life alternatives. - PW analysis of different- life alternatives. - Future worth analysis.	**6-7**	**3**
5	**Annual Worth (AW) Analysis**: - Advantages and uses of AW analysis. - Calculation of Capital Recovery (CR) and AW values. - Evaluating alternatives by AW analysis.	**8**	**2**

6	**Rate of Return (ROR) Analysis**: - Interpretation of a ROR value. - ROR calculation using a PW or AW relation. - Using ROR analysis to evaluate a single project. - Special considerations when using the ROR method. - Incremental ROR analysis and the issue of inconsistent rankings. - Using incremental ROR analysis to compare two alternatives. - Using incremental ROR analysis to compare several alternatives .	**9-10**	**5**
7	**Benefit /Cost (B/C) Analysis and Public Sector Economics**: - The fundamental differences between public and private sector projects. - B/C analysis for a single project.	**11**	**2**
8	**Breakeven and Payback Analysis**: - Breakeven analysis for a single project. - Payback analysis.	**12**	**2**
9	**Depreciation Methods**: - Definition of asset depreciation. - The Straight Line (SL) method. - The Declining Balance (DB) method. - The unit-of -production (UOP) method.	**13**	**2**
Textbook:	Leland Blank and Anthony Tarquin.," Engineering Economy", **7**th Edition, McGraw-Hill , ISBN 978 – 0073376301.		

Department	Mechanical Technology	Major	Production
Course Name	Advanced Materials Technology	Course Code	MEC377
Prerequisites		Credit Hours (L,W,T)	3

Course description :

This course about engineering materials such as Ceramic, Composites, non ferrous alloys, powder metallurgy and smart materials as well as their properties, structures and applications to be able to select a material for given application based on considerations of cost and performance and to understand the limits of materials also to be able to create a new materials that will have desirable properties.

Topics :

- Evaluate the types of ceramic crystal structures and the importance of their imperfections
- Relate thermal properties of ceramic materials to their structure and applications
- Critically discuss and evaluate the processing of polymeric, ceramic and metallic based composite materials.
- Appraise the properties and applications of polymeric, ceramic and metallic based composite materials
- Introduce a wide range of ferrous and non-ferrous alloys used in domestic, industrial and engineering applications.
- Appraise the properties and applications of polymeric, ceramic and metallic based smart materials.

Experiments: if applicable it will support the course topics.

References :

- Materials Science and Engineering, by William Callister
- Fundamentals of Materials Science and Engineering, by Smith (McGraw-Hill)

Detailed of Theoretical Contents			
	Contents	**Week no.**	**Hours**
1	**1. Review and Background:** 1.1 Engineering Materials 1.2 Structures of Metals	**1**	**2**
2	**2. Non-Ferrous Alloys:** 2.1 Copper Alloys. 2.2 Aluminum Alloys. 2.3 Titanium Alloys. 2.4 Super Alloys.	**2,3**	**4**
3	**3. Engineering Ceramic Materials:** 3.1 Ceramics. 3.2 Mechanical Behavior of Ceramics 3.3 Ultra-Hard Materials. 3.4 Processing of Ceramic Materials	**4**	**2**
4	**4. Composite Materials:** 4.1Clasification and Material Combinations. 4.2 Reinforced Materials. 4.3 Rule of Mixture. 4.4 structural Composites.	**5,6**	**4**
5	**6. Performance of Materials in Service (Types of Failure):** 6.1 Ductile Fracture and Brittle Fracture. 6.2 Stress Raisers 6.2 Fracture Toughness. 6.3 Fatigue Crack Growth Rate 6.4 Fatigue 6.5 Monitoring of Fatigue Crack Length 6.6 Creep.	**7,8,9**	**6**
6	**6.Powder metallurgy**	**10**	**2**
7	**7. Nano-Materials**	**11**	**2**
8	**8. Smart materials:** 8.1 thermochromic pigment . 8.2 Shape memory alloys. 8.3 Piezoelectric materials. 8.4 Fiber optical	**12,13**	**4**
Textbook:	1- Materials Science and Engineering, by William Callister 2- Fundamentals of Materials Science and Engineering, by Smith (McGraw-Hill)		

Detailed of practical Contents			
	Contents	**Week no.**	**Hours**
1	**Hardness testing of Non-Ferrous Alloys and Ceramics**	**1**	**2**
2	**Tensile testing of Non-Ferrous Alloys**	**2**	**2**
3	**Impact testing of Non-Ferrous Alloys and Ceramics**	**3**	**2**
4	**Optical microscope : Specimen Preparation**	**4**	**2**
5	**Optical microscope: of fracture surfaces**	**5**	**2**
6	**Scanning Electron Microscope (SEM)**	**6,7**	**4**
7	**Energy dispersive X-ray (EDAX)**	**8,9**	**4**
8	**Powder Processing of Metal Matrix Composites**	**10,11,12**	**6**
9	**Bending test for MMC**	**13**	**2**

Textbook:	1- Materials Science and Engineering, by William Callister 2- Fundamentals of Materials Science and Engineering, by Smith (McGraw-Hill)

Department	Mechanical Technology	Major	Production
Course Name	Control System Technology	Course Code	MEC378
Prerequisites		Credit Hours (L,W,T)	3

Course description :

This course covers the basic architecture, main components of programmable logic controller and its programming methods as well as appropriate applications. The student will be able to write programs and construct hydraulic/ pneumatic systems controlled by programmable controller.

Topics :

- Introduction to control systems
- Programmable logic controllers PLC and its components
- Input/output
- Number systems
- PLC Programming languages and logic gate
- Boolean Algebra
- Jump and Call
- Timers
- Counters
- Register and Shift
- Applications

Experiments: if applicable it will support the course topics.

References :

- Integration and Automation of Manufacturing Systems, by Hugh Jack
- Programmable Controllers, Theory and Implementation, Second Edition, L.A. Bryan, E.A. Bryan
- Programmable Logic Controllers, Fifth Edition, W. Bolton
- Automating Manufacturing Systems with PLCs (Version 5.1, March 21, 2008), Hugh Jack

Detailed of Theoretical Contents			
	Contents	**Week no.**	**Hours**
1	**Introduction to control systems** Open loop Close loop controller	**1**	**2**
2	**Programmable logic controllers PLC and its components** Historical background Applications Components Types of PLC design Packaged type Modular type or Rack type	**1**	**2**
3	**Input/output** I/O devices Input devices Output devices Relays I/O units	**1**	**2**
4	**Number systems** Binary number Decimal number Hexagonal number From binary to decimal	**2**	**4**
5	**PLC Programming languages and logic gates** Ladder programming STL programming Function block diagrams Logic gates and ladder diagram	**2**	**4**
6	**Boolean Algebra** Conversion between logic gate, ladder diagram and Boolean algebra Rules Simplification	**2**	**4**
7	**Jump and Call** Repeated Jump Subroutine	**1**	**2**

8	**Timers** On- Delay Timers Off- Delay Timers Pulse Timers	**1**	**2**
9	**Counters** Down- counters Up- counters Up-Down counters	**1**	**2**
10	**Register and Shift**	**1**	**2**
11	**Applications**	**1**	**2**
Textbook:	Programmable Logic Controllers, 4th edition, Frank D. Petruzella		

Detailed of practical Contents			
	Contents	**Week no.**	**Hours**
1	1st Experiment: PLC description	**1**	**2**
2	2nd Experiment: working on Step 7 Program	**2**	**4**
3	3rd Experiment: Series and parallel circuits	**2**	**4**
4	4th Experiment: Input/Output commands	**1**	**2**
5	5th Experiment: Set/Reset	**2**	**4**
6	6th Experiment: Timers	**1**	**2**
7	7th Experiment: Counters	**1**	**2**
8	8th Experiment: Comparsions	**1**	**2**
9	9th Experiment: Applications	**1**	**2**
10	10th Experiment: Project	**1**	**2**

Department	Mechanical Technology	**Major**	Production
Course Name	Plastic Technology	**Course Code**	MEC379
Prerequisites		**Credit Hours** (L,W,T)	3

Course description :

This course is about Polymer definition and polymerization types. Relation between polymer properties and polymer structures. Types, grades, properties, processing characteristics and applications of Thermoplastics and Thermoses. Additives used to enhance or to maintain polymers properties. Polymers testing**.**

Topics :

- Assess polymer properties in relation to polymer structures.
- Assess the effect of additives on the processing and service properties of polymers.
- Distinguish between different types, grades,properties, processing characteristics and applications of commodity thermoplastics, engineering thermoplastics and thermosets.
- Select an appropriate plastics material for a specified application.

Experiments: if applicable it will support the course topics.

References :

- Plastics Materials, J.A.Bryson

Detailed of Theoretical Contents			
	Contents	**Week no.**	**Hours**
1	POLYMER , POLYMERS CLASSIFICATION, POLYMERIZATION	**1**	**2**
2	POLYMERS STRUCTURES	**2**	**2**
3	STYRENIC POLYMERS	**3**	**2**
4	POLYALKENES	**4**	**2**
5	CELLULOSIC POLYMERS	**5**	**2**
6	VINYL POLYMERS	**6**	**2**
7	POLYACETAL, POLYAMIDES, POLYPARAPHENYLENE	**7**	**2**
8	POLYPHENYLENE OXIDE, POLYCARBONATE, FLUOROPOLYMERS	**8**	**2**
9	THERMOSETS	**9**	**2**
10	ELASTOMER, ADDITIVES	**10**	**2**
11	MATERIALS SELECTION	**11**	**2**
12	FORMING TECHNIQUES FOE PLASTICS	**12**	**2**
13	POLYMER , POLYMERS CLASSIFICATION, POLYMERIZATION	**13**	**2**
Textbook:	1- Plastics Materials, J.A.Bryson		

Detailed of practical Contents			
	Contents	**Week no.**	**Hours**
1	IMPACT TESTING OF PLASTIC	**1**	**2**
2	TENSILE TISTING OF PLASTIC	**2,3**	**4**
3	PRELIMINARY EXAMINATION TO IDENTIFY A POLYMER	**4**	**2**
4	CREEP TESTING	**5,6**	**4**
5	MELTFLOW RATE TEST	**7,8**	**4**
6	DIFFERENTIAL SCANNING CALORIMER	**9,10**	**4**
7	INFRARED SPECTROSCOPY	**11,12,13**	**6**
Textbook:	1- Plastics Materials, J.A.Bryson		

Department	Mechanical Technology	Major	Production
Course Name	Operations Research	Course Code	MEC355
Prerequisites	MAH325	Credit Hours (4,0 ,0)	4

Course Description:

This is an introductory course in Operations Research (OR) with primary emphasis on Linear Programming and its applications. It involves formulating models and developing solution methods for a variety of real-world optimization problems using deterministic methods of OR. No computer programming is required in this course. However, OR software packages are used for implementing solution algorithms.

Topics:

- Introduction to Operations Research.
- Linear Programming.
- Solving LP Problems Using the Simplex Method.
- Sensitivity Analysis for LP solutions.
- The Transportation Problem.
- The Assignment Problem.
- Network Flow Models.
- Integer Programming.

Experiments: if applicable it will support the course topics.

References :

- W. L. Winston & M. Venkataramanan, " Introduction to Mathematical Programming: Applications and Algorithms", 4th ed., Duxbury Press, ISBN: 0-534-35964-7.

- Hillier F. S. and Lieberman G. J., " Introduction to Operations Research", 8th Edition, McGraw-Hill, ISBN: 9780816238675.

Details of Theoretical Contents			
	Contents	**Week no.**	**Hours**
1	**Introduction to Operations Research**: • Definition, history, and impact of OR. • OR approach to problem solving. • The basic elements of a decision model. • Deterministic versus stochastic models. • Brief introduction to mathematical programming techniques. • Computer usage in OR.		**4**
2	**Linear Programming (LP)**: • LP basic assumptions. • LP advantages and limitations. • Formulating LP models. • Solving two-dimensional LP problems using the Graphical method.		**8**
3	**Solving LP Problems Using the Simplex Method**: • Brief review of linear algebra and convexity. • The underlying concepts of the simplex method. • LP model conversion to the standard form. • The simplex tableau. • The simplex algorithm. • The Big-M and Two-Phase methods. • Special situations: alternate optimal solutions, infeasibility, unboundness and degeneracy.		**10**
4	**Sensitivity Analysis for LP solutions**: • Change in the objective function coefficients. • Change in the RHS components.		**4**
5	**The Transportation Problem**: • Problem statement and LP formulation. • The Northwest corner and Vogel methods. • The Stepping Stone and MODI methods. • The Transshipment model.		**6**
6	**The Assignment Problem:** • Problem statement and LP formulation. • The Hungarian method.		**4**

7	**Network Flow Models:** • Structure and terminology of the network flow model. • Popular types of network flow problems and how they relate to each other. • Advantages of network flow models over LP models. • Solving the Shortest Path problem using the Dijkstra algorithm.		**6**
8	**Integer Programming (IP)**: • IP assumptions and limitations. • Formulation of BIP models. • Heuristic algorithms for hard combinatorial optimization problems (Hill climbing, Tabu Search, and Simulated Annealing)		**10**
Textbook:	Stephen N. Chapman, " Linear Programming: Methods & Applications ", Printice Hall, ISBN: 9780130176158.		

Department	Mechanical Technology	**Major**	Production
Course Name	Production Planning and Control	**Course Code**	MEC365
Co-requisite		**Credit Hours** (4,0,0)	4

Course description :

Once the forecast of sales is done in a manufacturing company, production managers start planning for materials. This task is no small one and has very high impacts on the company's responsiveness to market demands, optimizing the utilization of production lines as well as the total cost of production. This course offers a clear understanding of the relation between forecast and planning, the value of scheduling and planning for production, the different inventory management techniques as well as the tools and performance indicators used in these activities.

Topics :

- Introduction to Production Planning and Control.
- Framework of Production Planning and Control.
- Master Production Scheduling.
- Capacity Requirement Planning.
- Materials Requirement Planning.
- Inventory Control.
- Production Scheduling.
- Just-In-Time and Lean Manufacturing.

Experiments: if applicable it will support the course topics.

References :

- Robert Jacobs F, Berry William and Whybark D, "Manufacturing Planning and Control Systems for Supply Chain Management", 6th Edition (2011), McGraw-Hill .

- Norman Gaither and Greg Frazier, "Production and Operations Management", 9th Edition (2002), ITP.

Details of Theoretical Contents			
	Contents	**Week no.**	**Hours**
1	**Introduction to Production Planning and Control:** • Purpose of production planning. • Manufacturing operation process . • production philosophy. • Advantages of production control. • Sources of production control. • Characteristics of modern manufacturing		4
2	**Framework of Production Planning and Control:** • Problems faced by production managers in diverse manufacturing units. • Resolving the issues. • Strategies for production planning and control		**4**
3	**Master Production Scheduling (MPS):** • Forecasting and demand management. • Master production scheduling (MPS) activity • Symptoms of MPS • Aggregate planning • Work exercises		**6**
4	**Capacity Requirement Planning:** • Capacity management and planning • Types of capacity planning • Factors affecting planning.		**6**
5	**Materials Requirement Planning (MRP):** • MRPII overview • Independent and dependent demands • Materials planning process		**6**

6	**Inventory Control :** • Inventory planning . • Finished good inventories control • Calculations on lot order sizing		**6**
7	**Production Scheduling :** • Scheduling objectives • Job scheduling –Forward/Back scheduling • Input/Output control • Dispatching rules –FIFS, ODD, SPT. etc • Critical ratio rule		**8**
8	**Theory of constraint (TOC) principles:** • Definition of TOC. • Bottleneck and non- bottleneck resources. • Generic TOC principles. • Drum-buffer-rope (DBR) scheduling.		**6**
9	**Just-In-Time and Lean Manufacturing:** • Principles of JIT • Identify the causes of JIT wastes • JIT manufacturing key activities • JIT implementation and its draw back. • Continuous improvement • The primary causes of inventories • Schedule released and planned areas		**8**
Textbook:	Stephen N. Chapman, " Fundamentals of Production Planning and Control.", Prentice Hall, ISBN: 9780130176158.		

Department	Mechanical Technology	Major	Production
Course Name	Non-conventional Machining Processes	Course Code	MEC456
Prerequisites		Credit Hours (L,W,T)	3

Course description :

This course will give a good perspective with adequate depth to understand the unconventional machining processes. It will describe the working principle and application of various non conventional machining processes

Topics :

- Introduction
- Electric Discharge Machining (EDM)
- Laser Beam Machining
- Plasma Arc Machining
- Electron Beam Machining
- Elecrtochemical Machining
- Ultrasonic Machining (USM)
- Abrasive Jet Machining (AJM)
- Water Jet Cutting (WJC)
- Abrasive Water Jet Machining (AWJM)

Experiments: if applicable it will support the course topics.

References :

- Modern Machining Processes by P.C.Pandey, Tata McGraw Hill, NewDelhi.
- Unconventional Machining Processes by P.K.MishraAdvanced Machining Methods by JAMcGeough, Chapman and Halls, UK.

Detailed of Theoretical Contents			
	Contents	**Week no.**	**Hours**
1	**Introduction** Traditional machining Limitations of traditional machining Nontraditional machining process Classifications of nontraditional machining Traditional versus nontraditional machining Why do we need advanced machining processes (AMPs)?	**1**	**3**
2	**Electric Discharge Machining (EDM)** Introduction basic principles circuitry controls, metal removal rate, machining accuracy, selection of tool material and tool design, Applications	**2**	**6**
3	**Laser Beam Machining** Working principle Types of laser Equipments Process parameters Applications	**2**	**6**
4	**Plasma Arc Machining** Working principle Plasma arc cutting system Process parameters and characteristic Applications	**2**	**6**
5	**Electron Beam Machining** Working principle Electron beam machining system Equipments Applications	**1**	**3**
6	**Elecrtochemical Machining** Working Principle Process Parameters Analysis of material removing Applications	**1**	**3**
7	**Ultrasonic Machining (USM)** Introduction Ultrasonic Machining System Mechanics of Cutting Process parameters Applications	**1**	**3**

8	**Abrasive Jet Machining (AJM)** Introduction Working Principle equipments Process parameters MRR Applications	**1**	**3**
9	**Water Jet Cutting (WJC)** Introduction Working principles WJC machine Process characteristic Applications	**1**	**3**
10	**Abrasive Water Jet Machining (AWJM)** Working principle AWJM machine MMR Applications	**1**	**3**
Textbook:	Vijay.K. Jain "Advanced Machining Processes" Allied Publishers Pvt. Ltd., NewDelhi (2007) ISBN 978177642940.		

Department	Mechanical Technology	Major	Production
Course Name	Computer Integrated Manufacturing	Course Code	MEC 459
Prerequisites		Credit Hours (4,0,0)	4

Course description :

This course introduces the trainee to the basic essential of manufacturing systems, concepts and associated mathematical models, production economics, numerical control, flexible manufacturing systems, computer process control, CAD/CAM and computer aided process planning. It explain technology about industrial robotics, automated assembly, automated material handling and storage, automated inspection, shop floor control, computer networks for manufacturing and manufacturing productivity.

Topics :

- Introduction to Computer Integrated Manufacturing.
- Essential of Manufacturing Systems
- Automation:
- Design for manufacture :
- Production Process Systems:
- Production Planning :
- Shop Floor Control :
- Robotics (Automated Material Handling and storage systems)
- Quality Control and Automated Inspection:
- Computer Network for Manufacturing:
- Manufacturing Productivity and Implementation

Experiments: if applicable it will support the course topics.

References :

- Mikell P. Groover, 2008. Automation, Production Systems, and Computer-integrated Manufacturing, Prentice Hall, United State of America.
- S.K.Vajpayee, 1995. Principles of Computer-Integrated Manufacturing, Prentice Hall, United States of America.
- T.C.Chang et al, 1998. Computer-Aided Manufacturing second edition, Prentice Hall, , United States of America.

Detailed of Theoretical Contents			
	Contents	**Week no.**	**Hours**
1	**Introduction to Computer Integrated Manufacturing.**	**1**	**3**
2	**Essential of Manufacturing Systems:** • Type of Production • Function in Manufacturing • Organization and Information Processing in Manufacturing • Production Concepts and Mathematical Models	**2**	**3**
3	**Automation:** • Type of Automation • Computer Integrated Manufacturing • Reasons for Automating • Automation Strategies	**3**	**3**
4	**Design for manufacture :** • CAD • CAM • CAE • Transportability • CIM • Need of CIM	**4**	**3**
5	**Production Process Systems:** • NC / CNC / DNC • FMC / FMS • Tool management • Flexible Fixture • Flexible Assembly Systems	**5&6**	**6**
6	**Production Planning :** • CAPP • Computer Integrated Production Planning System	**7**	**3**
7	**Shop Floor Control :** • Data logging and acquisition • Automated Data Collection • Control Types • Sensor Technology	**8**	**3**

8	**Robotics (Automated Material Handling and storage systems)** • AGVs • AS/RS • Palletization	**9&10**	**6**
9	**Quality Control and Automated Inspection:** • Inspection and Test • SQC • Sensor technologies for automated inspection • CMM • Other types of inspection	**11**	**3**
10	**Computer Network for Manufacturing:** • Hierarchy of Computers in Manufacturing • LAN • MAP	**12**	**3**
11	**Manufacturing Productivity and Implementation:** • CIMs and Productivity • Requirements of CIM Implementation	**13**	**3**

Textbook:	1. Mikell P. Groover, 2008. Automation, Production Systems, and Computer-integrated Manufacturing, Prentice Hall, United State of America. 2. S.K.Vajpayee, 1995. Principles of Computer-Integrated Manufacturing, Prentice Hall, United States of America. 3. T.C.Chang et al, 1998. Computer-Aided Manufacturing second edition, Prentice Hall, , United States of America.

Department	Mechanical Technology	**Major**	Production
Course Name	Facilities Planning	**Course Code**	MEC457
Prerequisites	MEC355, MEC365	**Credit Hours** (4,0,0)	4

Course description :

This is an introductory course on facilities planning with emphasis on the design, analysis, and selection of manufacturing facilities and material handling systems. It provides some fundamental concepts, theory and procedures for the study of facilities location, physical layouts, material flow, and material handling. Analytical procedures are developed to enhance the decision-making process in the design, rationalization and improvement of manufacturing facilities. The knowledge learned in this course is integrated with knowledge from related courses to prepare a facility plan project for a selected product.

Topics :

- Introduction to facilities planning.
- Product, Process and Schedule Design.
- Flow systems, activity relationships, and space requirements.
- Material handling.
- Layout planning models and design alternatives.
- Warehouse operations.
- Quantitative facilities planning models.
- Preparing and evaluating the facilities Plan.

Experiments: if applicable it will support the course topics.

References :

- Richard L. Francis, F. McGinnis Jr, John A. White, " Facility Layout and Location: An Analytical Approach.", 2nd Edition, Prentice-Hal.
- Dileep R. Sule, "Manufacturing Facilities : Location, Planning and Design.", 3rd Edition, ISBN: 978-1450411172.

Details of Theoretical Contents			
	Contents	**Week no.**	**Hours**
1	**Introduction to Facilities Planning**: • Facilities planning defined. • Significance and objectives of facilities planning. • Facility planning process.		4
2	**Product, Process and Schedule Design:** • Introduction. • Product design. • Process design. • Schedule design. • Facilities design.		**4**
3	**Flow Systems, Activity Relationships, and Space Requirements:** • Introduction. • Flow systems. • Material flow system. • Departmental Planning. • Activity Relationships. • Space requirements.		**6**
4	**Material Handling (MH):** • Introduction. • Scope and definitions of MH. • MH principles. • Designing MH systems. • Unit load design. • MH equipment. • Estimating MH costs.		**12**
5	**Layout Planning models and Design Alternatives:** • Introduction. • Basic layout types. • Layout procedures. • Algorithmic approaches. • Simulated Annealing. • Commercial facility layout packages.		**8**

6	**Warehouse Operations:** • Introduction. • Missions of a warehouse. • Functions in the warehouse. • Receiving and shipping operations. • Dock locations. • Storage operations. • Order picking operations.		**8**
7	**Quantitative Facilities Planning Models:** • Introduction. • Facility location models. • Machine layout models. • Conventional storage models. • Waiting line models.		**6**
8	**Preparing and Evaluating the Facilities Plan:** • Introduction. • Preparing the facilities plan. • Evaluating the facilities plan.		**4**
Textbook:	James A. Tompkins , John A. White, Yavuz A. Bozer, and J. Tanchoco, "Facilities Planning ", 4th Edition (2010), John Wiley & Sons, ISBN: 978-0-470-44404-7.		

Department	Mechanical Technology	**Major**	Production
Course Name	Industrial Maintenance	**Course Code**	MEC458
Prerequisites	MAH425	**Credit Hours** (L,W,T)	3

Course description :

This program about Industrial Maintenance such as Maintenance and maintenance engineering Objective , Maintenance Facts and Figure , information Sources, Maintenance Department Function and origination , Maintenance Management by objective critical , Maintenance policy,Job planning scheduling ,Preventive Maintenance elements plant characteristic in need of a PM Important steps for Establishing a PM , PM Advantage and disadvantages ,Corrective Maintenance Types , Corrective Maintenance steps, Downtime Components and time , Reliability Centered Maintenance ,ABC Classification Approach for Maintenance inventory Control,Maintenance cost , Maintenance Budget types preparation approaches and steps,Reliability Measures and Reliability Function .

Topics :

- What are the maintenance
- The need to manage maintenance
- Function Maintenance Management
- Functions and maintenance work
- Organizational structure for the management of maintenance
- Maintenance workshops
- The basic elements of maintenance management
- Conservation goals
- Systematic procedure to create a maintenance plan
- Strategies Maintenance
- Types of maintenance
- Selection rules maintenance method
- Operational concepts for Maintenance Management
- The areas of maintenance operations
- Computer maintenance
- A Study of Crash

Experiments: if applicable it will support the course topics.

References :

- Engineering maintenance : a modern approach / by B.S. Dhillon. p. cm.
- Handbook of Maintenance Management and Engineering by Mohamed Ben-Daya • Salih O. Duffuaa Abdul Raouf • JezdimirKnezevic • DaoudAit-Kadi Editors

Detailed of Theoretical Contents			
	Contents	**Week no.**	**Hours**
1	**Maintenance Management and Control** Introduction Maintenance Department Function and origination Maintenance Management by objective critical Maintenance Management Principles and Maintenance program Effectiveness Evaluation Question for Maintenance Managers Elements of Effective Maintenance management Maintenance policy Material control	**3**	**9**
2	**Preventive Maintenance** Preventive Maintenance elements plant characteristic in need of a PM Important steps for Establishing a PM Program PM Measures Mean Preventive Maintenance time (MPMT) Median preventive Maintenance time (MDPMT) Maximum Preventive Maintenance Time (MXPMT) PM Advantage and disadvantages	**2**	**6**
3	**Corrective Maintenance** Corrective Maintenance Types Corrective Maintenance steps, Downtime Components and time Reduction Strategies at system level Corrective Maintenance Measures	2	**6**
4	**Quality and safety in maintained**		

	Need for quality maintenance process Maintenance work quality Quality control chart for use in maintenance c-charts Post maint5anance testing PMYT Key Elements	**1**	**3**
5	**Reliability Centered Maintenance** RCM Goals and principles RCM Process and Associated question Reactive Maintenance RCM Components Preventive Maintenance Predictive Testing and Inspection Proactive Maintenance Predictive Testing and inspection Technologies RCM Program Effectiveness Measurement Indicators Equipment Availability Emergency Percentage Index	**2**	**6**
6	**maintenance costing Introduction for maintenance Costing and factors influencing** Maintenance cost Maintenance Budget types preparation approaches and steps Budget preparation approaches Maintenance budget predation steps Maintenance labor cost estimation	**1**	**3**
7	**Reliability** Rate concept Reliability Measures Reliability Function Hazard rate Mean Time to Failure (MTTF)	**1**	**3**

8	**Software maintenance** Software Maintenance facts and figure Software maintenance importance effort distribution and request types Types of software maintenance Software maintenance tools and techniques Software configure management Impact Analysis Maintenance reduction Automated tools Software maintenance costing	**1**	**3**
Textbook:	*Engineering maintenance : a modern approach / by B.S. Dhillon. p. cm. * Handbook of Maintenance Management and Engineering by Mohamed Ben-Daya • Salih O. Duffuaa Abdul Raouf • Jezdimir Knezevic • Daoud Ait-Kadi Editors.		