COURSE PROFILES

NED University of Engineering and Technology, Karachi.

Department: INDUSTRIAL AND MANUFACTURING

Programme: Bachelor of Engineering

F/QSP 11/17/00

Course Profile

COURSE CODE& TITLE	SEMESTER		CREDIT HOURS
MT-114 Calculus	☐SPRING ■FALL		TH■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PRE-REQUISITE COURSE:	DATE OF APPROVAL 24-05-2016		BATCH 2015-2016

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	SET	Define rational, irrational and real numbers; rounding off a numerical value to specified value to specified number of decimal places or significant figures; solving quadratic, and rational inequalities in involving modulus with graphical representation; Definition of set, set operations, Venn diagrams, DeMorgan's laws, Cartesian product, Relation.	
2	Functions	Function and their types (Absolute value, greatest integer and combining functions). Graph of some well-known functions. Limit of functions and continuous and discontinuous functions with graphical representation.	
3	Differential Calculus	Differentiation and Successive differentiation and its application: Leibnitz theorem. Taylor and Maclaurin theorems with remainders in Cauchy and Lagrange form, power series. Taylor and Maclaurin series, L Hopitals rule.	
4	Differential Calculus	Extreme values of a function of one variable using first and second derivative test, asymptotes of a function, curvature and radius of curvature of a curve.	
5	Differential Calculus	Partial differentiation, exact differential and its application in computing errors, extreme values of a function of two variables with and without constraints. Solution of non-linear equation, using Newton Raphson method.	
6	Integral Calculus	Indefinite integrals and their computational techniques, reduction formulae, definite integrals and their convergence. Beta and Gamma functions and their identities, applications of integration Centre of pressure and depth of center of pressure.	
7	Sequence and Series	Sequence, Infinite Series, Application of convergence tests such as comparison, Root, Ratio, Raabe's and Gauss tests on the behavior of series.	
8	Complex Numbers	Argand diagram, De Moivre formula, root of polynomial equations, curve and regions in the complex plane, standard functions and their inverses (exponential, circular and Hyperbolic functions).	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. Engineering Mathematics. Anthony Croft Second Edition
2. Calculus Thomas & Finney 1994
3. Calculus & Analytical Geometry Howard Anton Fifth

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME:

NED University of Engineering and Technology, Karachi.

Department: INDUSTRIAL AND MANUFACTURING

Programme: Bachelor of Engineering

F/QSP 11/17/00

Course Profile

CLO	Description	Mapping with PLOs	Taxonomy-Cognitive (Maximum Level)
1	Identify functions and define real and complex numbers	PLO-1	C1
2	Apply differential and integral calculus to engineering problems.	PLO-2	C3
3	Discuss the behavior of sequence and series.	PLO-2	C2

Recommended by : _____ 23/5/22 _____

(Chairperson/Date)

Approved by : _____

(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department Industrial and Manufacturing Engineering

Programme B.E

F/QSP 11/17/00

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
ME-101 Engineering Mechanics	O SPRING ⊙ FALL	TH ■3 O2 O1 O0 PR O3 O2 ⊙1 O0

PREREQUISITE COURSE(S) Nil	DATE OF APPROVAL 24-05-2016	BATCH 2015-16

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Static's of Particles	Forces in a plane; Newton's First Law, Free body diagram; Forces in space (rectangular components); Equilibrium of a particle in space	-
2	Rigid Bodies	Equivalent systems of forces; Principle of transmissibility; Moment of a force; Couple; Virginians Theorem Centre of gravity of a three-dimensional body and centroid of a volume Moments of inertia, radius of gyration, parallel axis theorem.	-
3	Equilibrium of Rigid Bodies	Free-body diagram; Equilibrium in two and three dimensions; Reaction of supports and connections; Equilibrium of two-force and three-force bodies	-
4	Friction	Laws of dry friction; Angles of friction; Wedges; Square-threaded screws; Journal and thrust bearings; Belt friction	-
5	Analysis of Structures	Internal forces and Newton's Third Law; Simple and space trusses; Joints and sections; Frames and machines. Forces in cables	-
6	Kinematics of Particles	Rectilinear and curvilinear motion of particles; Components of velocity and acceleration; Motion relative to a frame in translation	-
7	Kinetics of Particles	Newton's Second Law; Dynamic equilibrium; Rectilinear and curvilinear motion; Work and	-

Course Profile

		energy; Kinetic energy of particle; Principle of Work and Energy; Conservation of energy; Impulse and momentum, Impulsive forces and conservation of momentum; Impact, direct and oblique; Conservation of angular momentum	
8	Kinematics of Rigid Bodies	General Plane motions; Absolute and relative velocity and acceleration	-
9	Plane Motion of Rigid Bodies	Forces and acceleration; Energy and momentum; Conservation of linear and angular momentum	-

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

Engineering Mechanics (statics) by R.C. Hibbeler, 9th & 14th edition

Engineering Mechanics (Dynamics) by R.C. Hibbeler, 9th & 14th edition

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
1.	Define different theoretical concepts related to Static & Dynamic equilibrium for particles & rigid bodies.	C-1	PLO 1 (Engineering Knowledge)
2.	Solve Problems related to force, moments & equilibrium in particles and / or rigid bodies.	C-3	PLO 2 (Problem Analysis)
3.	Solve Problems related to Kinematics & Kinetics of particles and/or rigid bodies.	C-3	PLO 2 (Problem Analysis)
4.	Observe the material properties, stress and strain conditions for various materials.	P1	PLO 4 (Investigation)

REMARKS (if any):

Recommended by : _____ 23/5/22

(Chairperson/Date)

Approved by _____

(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department : Industrial & Manufacturing Engineering
Programme : Bachelors degree in Industrial & Manufacturing Engineering

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
Basic Electricity and Electronic (EE-122)	☐ SPRING ☒ FALL	TH ☒3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ☐0
PREREQUISITE COURSE(S)	DATE OF APPROVAL 15-10-2021	BATCH 2021

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Fundamentals of Electric Circuits	Charge, current, voltage and power, voltage and current sources, Ohm's law.	
2	Voltage and current Laws	Node, path, loops and branches, Kirchhoff's Current Law, Kirchhoff's Voltage Law, The single loop circuits. The Single Node-Pair Circuits, Series and Parallel Connected Independent Sources, Resistors in Series and Parallel, Voltage and Current Division.	
3	Circuit Analysis Techniques.	Multi-Nodal Analysis, The Super Nodal, Mesh Analysis, The Super Mesh, Linearity and Superposition, Source Transformations, Thevenin and Norton Equivalent Circuits, Maximum Power Transfer, Delta-Wye Conversion. Capacitor, Inductor, Inductance and Capacitance Combination, The Source-Free RL Circuit, Properties of Exponential Response, the Source-Free RC Circuit.	
4	Introduction Machines	Induction Motors, Construction, Types, Rotating field theory, Principle of working, slip and its effect on motor current quantities,Overexcited and under-excited motor, power factor and power factor control. Starting of synchronous motor, parallel operation of alternators and sharing	

Course Profile

		of load, Working of alternator on infinite bus bars.	
5	**Introduction to Transformer**	Construction, Principle of working, emf equation, Transformation ratios, No load working and vector diagram, magnetizing current, Vector diagram on load.	
6	**One line Diagram**	Symbols of different components, understanding of one line diagram.	
7	**Basic Electronics**	P-N junction, diode and applications Transistor construction, operation and applications Fundamental concepts of Digital Electronics	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. Engineering Circuit Analysis by William Hayt ,8th edition,McGraw-Hill 2012
2. Fundamentals of Electric Circuits by Alexander,5th edition,McGtaw-Hill 2012
3. Principles of Electrical Engineering & Electronics by V.K .Mehta ,3rd edition,S.Chand Publishers-4.

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
CLO 1	To STATE, DEFINE, IDENTIFY, LIST different types of electric circuits and theorems.	C1	PLO1
CLO 2	To DESCRIBE, DISCUSS, EXPLAIN, GIVE EXAMPLLES of different concepts of One line diagrams, electrical machines and Basic Electronics.	C2	PLO1
CLO 3	To APPLY, DEMONSTRATE, ILLUSTRATE, SOLVE, USE various problems and concepts of electric circuits ,electrical machines and basic electronics.	C3	PLO2
CLO 4	To ANALYZE COMPARE, DIFFERENTIATE, DISCRIMINATE different types of problems related to basic electricity and electronics.	C4	PLO2

NED University of Engineering and Technology, Karachi.

Department : Industrial & Manufacturing Engineering
Programme : Bachelors degree in Industrial & Manufacturing Engineering

F/QSP 11/17/00

Course Profile

REMARKS (if any):

Recommended by : _____

:_____

(Chairperson/Date)

Approved by

(Dean/Date)

NED University of Engineering and Technology
Department of Mechanical Engineering
Program: Bachelors in Mechanical Engineering
Course Profile

COURSE CODE & TITLE	SEMESTER	CREDIT HOURS
ME-104 Workshop Practice	■ SPRING □ FALL	TH □3 □2 □1 ■0 PR □3 ■2 □1 □0

PREREQUISITE COURSE(S)	DATE OF COURSE CONTENT APPROVAL 24-5-2016	APPLIED FROM BATCH 2015-2016

COURSE CONTENTS

- Use of carpenter's tools, Exercise in preparing simple joints, Bench fitting practice, Exercise in marking and fittings, Use of measuring instruments.

- Smith's forge, Exercise in bending, Upsetting and swaging.

- Familiarizing the students with the following processes:

  1. Soldering and brazing, Welding, Heat treatment, Molding, and casting.

  2. Simple machine shop processes, such as turning, shaping, Milling and sheet metal work.

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
	At the end of the course, the student will be able to:		
1	Practice metal working using equipment and tools as per the provided guidelines	P3	PLO – 4
2	Practice metal working using equipment and tools as per the provided guidelines	P3	PLO – 4
3	Adopt safety protocols as per the Health Safety and Environment (HSE) guidelines	A4	PLO - 6

REMARKS (if any):

Recommended by: _____ 23/5/22
(Chairperson/Date)

Approved by: _____
(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing Engineering
Programme BE

F/QSP 11/17/00

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
Pakistan Studies HS-105	☐SPRING ☑ FALL	TH ☐3 ☑2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ☑0
PREREQUISITE COURSE(S)	DATE OF APPROVAL 24-5-2016	BATCH 2021 2015-2016

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Historical and Ideological Perspective of Pakistan Movement(Chapter 1) Sub-Topics Mr. Jinnah and demand for Pakistan Two-Nation Theory Factors leading to creation of Pakistan	Comprehending Mr. Jinnah's contribution to Pakistan Movement Understanding the rationale behind creation of Pakistan Determining the political, socio-economic themes and issues that ultimately resulted in creation of Pakistan	
2	Land of Pakistan(chapter2) Sub-Topics Geophysical conditions & natural resources Geopolitical and strategic importance of Pakistan	Creating an understanding of Pakistan's physical geography and administrative divisions. Exploring that how nature has been generous in providing Pakistan with natural resources Interpreting the geographic location of Pakistan in terms of geopolitics and strategic considerations	
3	Constitutional process in Pakistan(Chapter 3) Sub-topics Early efforts to make a Constitution(1947-1956)	Analyzing the issues that made Pakistan to frame a constitution after 9 years	
4	Constitution of 1956, 1962	Examining the broad features of these constitutions	
5	Political crisis of 1971	Taking lesson from History, What it means to be a Federation The analysis of disintegration of Pakistan in 1971	
6	Constitution of 1973	A significant Document which binds the country after the breakup of Pakistan, establishes parliamentary supremacy and provides for Fundamental Rights of People	
7	Contemporary Issues in	Understanding the different phases of Pakistan's	

Course Profile

	Pakistan(chapter4) Sub-topics A brief Survey of Pakistan's economy The Current Economic Situation of Pakistan: Problems & Issues	economy Making an analysis of the current economic scenario	
8	Environmental Issues	Becoming aware of climatic changes and environmental degradation in national and international context.	
9	Pakistan's Foreign Policy(chapter5) Sub topics Evolution of foreign policy 1947 to present Pakistan's Foreign Policy(chapter5) Sub topics Evolution of foreign policy 1947 to present	Understanding the factors and developments that determined Pakistan's foreign policy in early years and later on Understanding the factors and developments that determined Pakistan's foreign policy in early years and later on	
10	Relations with immediate neighbors	Focusing on two rather difficult neighbors India and Afghanistan	
11	Relations with super powers	Interpreting the relationship of Pakistan with China, United States of America and Russian Federation	
12	Relations with the Muslim world	Appraisal of special bonds with the Muslim world and revisiting the issues that confront the Muslim world	
13	Social Issues Education	The performance of Education sector in Pakistan	
14	Human Rights(chapter6) Sub-topics conceptual foundations, constitutional provisions	Creating an understanding about human rights from Islamic and western perspective.	
15	International Treaties and obligations on human rights	Viewing human rights in the background of 2nd World War and creation of United Nations	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. Author, Hector Bolitho, Jinnah Creator of Pakistan, OUP Karachi,1954
2. S. Akbar. Ahmed. , Jinnah, Pakistan and Islamic Identity ,OUP, 1997
3. Hamid.A. Khan, Political and Constitutional History of Pakistan, OUP Karachi,2001
4. S. Akbar. Zaidi, Issues in Pakistan's Economy, OUP, Karachi,1999
5. Dr. Maleeha Lodhi, Pakistan beyond the crisis state, OUP,Karachi, 2011

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing Engineering
Programme BE

Course Profile

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME			
Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
1	**Understand** the historical and ideological perspectives of Pakistan and their implications for individuals and professionals in societal contexts.	C2	Engineer and Society
2	**Explain** the strategic implications of international conventions and treaties applicable to Pakistan at the national and international level	C2	Lifelong Learning

REMARKS (if any):

Recommended by : _____ 23/5/22.

(Chairperson/Date)

Approved by _____

(Dean/Date)

NED University of Engineering and Technology, Karachi.
Department of Industrial & Manufacturing Engineering

Programme :BE IM

F/QSP 11/17/00

Course Profile

COURSE CODE& TITLE		SEMESTER	CREDIT HOURS
PH-122 (Applied Physics)		■ SPRING □ FALL	TH ■3 □2 □1 □0 PR □3 □2 ■1 □0
PREREQUISITE COURSE(S) NIL		COURSE CONTENT DATE OF APPROVAL 24-5-2016	BATCH 2015-2016

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Introduction	Scientific notation and significant figures Types of errors in experimental measurements Units in different systems Graphical Techniques (Log, semi-log and other non-linear graphs)	
2	Vectors	Review of vectors, Vector derivatives. Line and surface Integrals. Gradient of a scalar	
3	Mechanics	The limits of Mechanics Coordinate systems. Motion under constant acceleration, Newton laws and their applications Galilean invariance Uniform circular motion Frictional forces Work and Energy Potential Energy. Energy conservation Energy and our Environment Angular momentum	
4	Electrostatics & Magnetism	Coulombs Law Electrostatic potential energy of discrete charges Continuous charge distribution Gauss's Law. Electric field around conductors Dielectrics Dual trace oscilloscope with demonstration Magnetic fields. Magnetic force on current Hall effect. Biot-Savart Law Ampere's Law Fields of rings and coils. Magnetic dipole Diamagnetism, Para magnetism and Ferromagnetism	
5	Semiconductor Physics	Energy levels in a semiconductor. Hole concept. Intrinsic and Extrinsic regions Law of Mass Action P-N junction Transistor Simple circuits	
6	Waves and Oscillations	Free oscillation of systems with one and more degrees of freedom Solution for Modes Classical wave equation Transverse modes for continuous string Standing waves Dispersion relation for waves LC network and coupled pendulums Plasma oscillations	
7	Optics and Lasers	Harmonic traveling waves in one dimension .Near and far fields Two-slit interference Huygens Principle Single-slit diffraction Resolving power of optical instruments Diffraction Grating Lasers. Population inversion Resonant cavities Quantum efficiency He-Ne, Ruby and CO_2 lasers Doppler effect and sonic boom.	

| 9 | Modern Physics | Planck's explanations of Black Body Radiation, Bohr's atomic model, Photoelectric Effect, Compton Effect, Atomic Spectra, Reduced Mass, Principle of uncertainty, DE Broglie wave Atomic Nucleus and Properties of Nucleus, Radioactive Dating, Nuclear Reactions and Nuclear Reactor, Nuclear Fusion | Haliday resnick volume 2 |

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)
1. D. Halliday, R. Resnick and Krane, "Physics", John Wiley & Sons, volume 1, 11th ed. 2020.
2. D. Halliday, R. Resnick and Krane, "Physics", John Wiley & Sons, volume 2, 11th ed. 2020.
3. R. A. Serway and J. W. Jewett, "Physics for Scientists and Engineers", Golden Sunburst Series, 10th ed. 2019.
4. Electronic Devices, Thomas L. Floyd, Pearson, 2019.

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
1	DISCUSS principle of physics; and explain the concept of classical and modern physics to solve related problems	C 2	PLO-1
2	USE the concept of classical physics for engineering problems	C3	PLO-2
3	APPLY the concept of Modern physics to solve physical problem	C 3	PLO-2
4	PRACTICE of operating equipment/tools to understand principles of physics under supervision	P 3	PLO-1

REMARKS *Suggested PLO's

Recommended by: _____ 23/5/22 _____

(Chairperson/Date)

Approved by: _____

(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department of Industrial Manufacturing
Programme BE

F/QSP 11/17/00

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
Functional English (HS 111)	■ SPRING □ FALL	TH □3 ■2 □1 □0 PR □3 □2 □1 ■0

PREREQUISITE COURSE(S)	DATE OF APPROVAL	BATCH
None	24-5-2016	2015-2016

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Introduction to Functional English	Significance of the course and students diagnostic test	
2	Vocabulary Development	Practice in vocabulary development Inferring meaning from context, word formation, idiomatic expression	
3	Listening Skill	Types of listening: active, critical, selective, etc. Problems in listening and coping strategies Listening skills and sub skills	
4	Reading Skill and Strategies	Strategies used in reading texts: skimming and scanning Summarizing Inference	
5	Note Taking	Techniques for taking notes from lectures, from books (Lecture) Note taking in different forms paragraphs, points, figures, processes, tables, graphs etc. (Worksheets)	
6	Speaking Skill	Importance of speaking and techniques to effective communication. Types of speaking: persuasive, informative, etc.	
7	Writing Skill	Process of Writing with practice in pre writing strategies, in revising, and in, editing for grammar Writing well- structured and effective essays, and letters using proper writing mechanics.	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. 1. Michael McCarthy, Felicity O'Dell, English Vocabulary in Use: Upper-Intermediate, Cambridge University Press
2. Lynch, Study Listening, Cambridge University Press

NED University of Engineering and Technology, Karachi.

Department of Industrial Manufacturing

Programme BE

Course Profile

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)
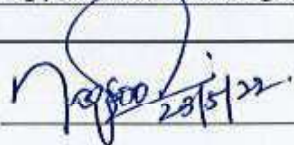
1. 1. Michael McCarthy, Felicity O'Dell, English Vocabulary in Use: Upper-Intermediate, Cambridge University Press
2. Lynch, Study Listening, Cambridge University Press
3. Andriod Doff, Christopher Jones, Language in Use: Intermediate Classroom Book, Cambridge University Press
4. Wood, Julia T. (2012) Communication in Our Lives. Wadsworth, Cengage Learning.
5. Young, M. (2002) The Technical Writer's Handbook: Writing With Style and Clarity. University Science Books.
6. Warburton, N. (2006). The Basics of Essay Writing. London: Routledge.
7. Savage A., & Mackey D. (2010) Read This. Cambridge.

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
1	**Demonstrate** effective presentation skills in academic settings.	A3	Communication
2	**Comprehend** explicit and implicit information through reading and listening strategies.	C2	Communication
3	**Compose** drafts of various academic genres using writing processes and strategies.	C6	Communication

REMARKS (if any):

Recommended by : _____ 23/5/22

(Chairperson/Date)

Approved by: _____

(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department Industrial & Manufacturing Engineering
Programme B.E

F/QSP 11/17/00

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
ME-111 Engineering Drawing	☑ SPRING ☐ FALL	TH ☐3 ☑2 ☐1 ☐0 PR ☐3 ☐2 ☑1 ☐0

PREREQUISITE COURSE(S) None	DATE OF APPROVAL 24-5-2016	BATCH 2015-2016

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Drawing Instrument and their uses	Drawing Equipment and the use of equipment.	-
2	Geometrical Construction and Curves used in Engineering Practice	Basic drafting techniques and standards, Geometrical curves including plane curves; Cycloid, Hypocycloid and the Involute	-
3	Orthographic Projections	Multi view projection and drawing using first and third angle projection methods	-
4	Development of Surfaces	Development of prisms, pyramids, cylinders and cones	-
5	Sections of solids	Sections of solids and machine components	-
6	Isometric Views	Types of pictorial views and drawing isometric view	-
7	Working Drawings	Dimensioning techniques, size and geometric tolerance and their symbols, types of fits	-
8	Intersection of Solids	Construction of curves from intersection of solids such as cones, cylinders, prisms and pyramids	-
9	Machine Components	Sketching of temporary and permanent fasteners like bolts, nuts and rivets, shaft couplings, connecting rod, bearings, pulleys, locking devices; Types of thread	-
10	Assembly Drawing	Types of working drawing, construction of views of the assembled objects / components.	-

NED University of Engineering and Technology, Karachi.

Department Industrial & Manufacturing Engineering
Programme B.E

Course Profile

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)
1. Engineering Drawing by ND Bhatt
2. First Year Engineering Drawing by A C Parkinson

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
1.	Explain basic concepts of engineering drawing as an important form of conveying technical information	C2	PLO-1 Engineering knowledge
2	Illustrate 2D/3D drawings for effective visual communication	C3	PLO-10 Communication
3	Practice drawing orthographic projection, sectional views, and isometric views of different mechanical parts	P3	PLO-1 Engineering knowledge
4	Practice acquired engineering drawing skills to develop drawings using relevant software	P3	PLO-5 Modern Tool Usage
5	Demonstrate the engineering drawing skills to illustrate the standard views of geometries and components used in the mechanical systems	P4	PLO-12 Lifelong Learning

REMARKS (if any):

Recommended by : _____23/5/22_____

(Chairperson/Date)

Approved by: _____

(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing Engineering
(Undergraduate Program)

Course Profile

COURSE CODE& TITLE IM-101 Computer Applications in Engineering	SEMESTER ☑ SPRING ☐ FALL	CREDIT HOURS TH ☐3 ☑2 ☐1 ☐0 PR ☐3 ☐2 ☑1 ☐0
PREREQUISITE COURSE(S)	DATE OF APPROVAL 26-05-2016	BATCH 2015-16

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
01	Computer Programming Basics	General terminologies, Computing application software, General and scientific programming languages, Computer programming methods Compilation and interpretation	
02	Programming environment	Workspace, Files and file management, Data types, Display options, Accuracy and Precision, Scripts	
03	Functions and Graphs	Solving and plotting functions: Trigonometry, Complex numbers, Logarithm. Polynomials. Partial function expansion, Vector Array, Matrix Array Developing algorithms and using builtin functions of scientific software packages for solving mathematical problems in Matrix algebra, Calculus and Computational geometry	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

"MATLAB Programming for Engineers", Stephen J. Chapman, 6th, Brooks/Cole Publishing Co,2020.
"Introduction to MATLAB for Engineers", William Palm , 3rd, McGraw-Hill, 2010.
Reference Books

" MATLAB: a practical introduction to programming and problem solving ", Stormy Attaway , 3rd, Elsevier, B/H,Butterworth-Heinemann,2013.

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing Engineering
(Undergraduate Program)
Course Profile

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME			
Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
1.	"Acquire (V) fundamental concepts of programming along with problem solving techniques.	C-1	Lifelong Learning
2.	"Use (V) fundamentals programming techniques (S) to develop the simple algorithm for the solution (C) of mathematical problems	C-3	Problem Analysis
3.	Develop (V) programs to resolve the standard numerical problems (S) using the MATLAB Software (C)	C-5	Engineering Knowledge
	"Apply (V) the skill of performing numerical computations, generate graphs, and solve numerical problems (S) using the MATLAB Software (C)	C-3	Modern Tool Usage

REMARKS (if any):

Recommended by : _Naq 18/4/22._
by:_____

(Chairperson/Date)

Approved_____

(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department of Industrial and manufacturing Engineering
Programme: Bachelor of Engineering

F/QSP 11/17/00

Course Profile

COURSE CODE& TITLE	SEMESTER ☑ SPRING ☐ FALL	CREDIT HOURS TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
IM-105 Thermofluids	DATE OF APPROVAL	BATCH
PREREQUISITE COURSE(S)	26-05-2016	2015-16

COURSE CONTENTS:

S. NO	Topic	Contents	Remarks (if any)
1	Thermodynamics	Basic concepts, Different forms of energy, energy conservation, laws of thermodynamics, Entropy, Two phase systems, Phase diagrams, Steam Tables.	
2	Thermodynamics Cycles	Cycle work, Thermal efficiency and heat rate, Carnot cycle, Stirling cycle, Otto cycle, Diesel cycle	
3	Fluid Mechanics	Basic concepts, Fluid pressure, Interconnected vessels, Force calculations (walls, flat and curved surfaces), Stability of a floating body, Inviscid and viscous flow, Continuity, Euler's and Bernoulli's equations, Laminar and turbulent Flow, Measurements of pressure and flow rate, Dimensional Analysis.	
4	Heat Transfer	Fundamentals of conduction, convection and radiation heat transfer	

REMARKS (if any):

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)
1. Applied Thermodynamics and Engineering by T.D Eastop and a.McConkey 5th Edition
2. Thermodynamics: An Engineering Approach 5th Edition by Yunus A. Cengel Dr. , Michael A. Boles

F/QSP 11/17/00

NED University of Engineering and Technology, Karachi.
Department of Industrial and manufacturing Engineering
Programme: Bachelor of Engineering
Course Profile

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

SR. NO	CLOs	TAXONOMY LEVEL	PROGRAMME LEARNING OUTCOME (PLO)
	At the end of the course, the student will be able to:		
1	Describe (v) the fundamentals principles of thermodynamics and characteristics of working fluids based on the standard published data.	C-2	PLO 1 (Engineering knowledge)
2	Investigate (V) the standard thermodynamics and fluid mechanics analytical models to determine the working fluid, energy and other relevant parameters related to the basic mechanical systems	C-4	PLO 4 (Investigation)
3	Demonstrate (V) the hazardous and safe working fluid in standard mechanical systems for the green environment and its sustainability	C-3	PLO 7 (Env. & Sustainability)

REMARKS (if any):

Recommended by : _____ 23/5/22

(Chairperson/Date)

Approved by : _____

(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department **Industrial and Manufacturing Engineering**
Programme **Bachelors of Engineering**

F/QSP 11/17/00

Course Profile

COURSE CODE& TITLE		SEMESTER	CREDIT HOURS
IM-208 Materials Engineering		☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) Nil		DATE OF APPROVAL 24-05-2016	BATCH 2015-16

COURSE CONTENTS`

S. No.	Topic	Contents	Remarks (if any)
1	**Introduction to Materials Engineering:**	Types of materials, sources of materials, material science and engineering crystalline & amorphous materials, application of materials	
2	**Metallic Materials:**	Pure metals and alloys, nature and properties of metals and alloys, major properties of metallic materials	
3	**Metallic Materials:**	single crystal and poly-Crystalline metals, crystal defects and the mechanisms of deformation and fracture, plastic flow in poly-crystalline materials, structure-property,	
4	**Metallic Materials:**	relationships, macro & micro examinations, structural aspects of solidification & solid phase transformations in binary systems, ferrous and non-ferrous metals, various heat treatments, TTT-diagram.	
5	**Ceramics, Glasses, Rubbers & Refractory Materials:**	Compositions, properties, structures of various non-metallic materials, application of ceramics, glasses, rubber & refractory materials, methods of manufacture.	
6	**Polymers:**	Polymerization, Structural feature of Polymers, Thermoplastic Polymers	
7	**Polymers:**	Thermo-setting Polymers, Additives, major mechanical properties	
8	**Composites:**	introduction to composite materials; types of composite materials,	
9	**Composites:**	method of fabrication of composite materials, property averaging, major mechanical properties	
10	**Environmental Degradation:**	Metal degradation by atmospheric, aqueous & galvanic corrosion; stress corrosion cracking methods of corrosion	

Course Profile

		corrosion cracking methods of corrosion prevention, behaviors of metal at elevated temperature pyrometers oxidation, scaling and creep. Chemical degradation of ceramics & polymers, radiation damage, surface improvement against degradation.	

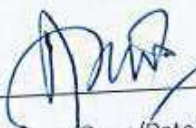**TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)**
1. William Callister, Materials Science and Engineering An Introduction , 9th Ed, Wiley, 2014

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
	At the end of the course, the student will be able to:		
1	Discuss basic properties of various materials using standard definitions.	Application (Cognitive domain)	1
2	Demonstrate descriptively and graphically the composition, phases and common structures present in engineering materials.	Application (Cognitive domain)	6
3	Select the suitable material from the standard classes of materials for real-world applications	Understand (Cognitive domain)	7

REMARKS (if any):

Recommended by : _____ 23/5/22

(Chairperson/Date)

Approved by : _____

(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department of Industrial and Manufacturing Engineering
Programme BE IM

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
IM-209 Mechanics of Materials	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0
		PR ☐3 ☐2 ■1 ☐0

PREREQUISITE COURSE(S)	DATE OF APPROVAL	BATCH
ME-101 Engineering Mechanics	24-05-2016	2015-16

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Stress-Strain Relations	Stress, Deformation, strain, elastic, stress strain behavior of materials, Poisson's ratio, General stress method, Thermal stress and strain Statically indeterminate System Volume changes, constrained materials, Beams and frames (double integration method, superposition method, Virtual work).	
2	Bending Stresses	Simple bending theory, , shear stresses in bending, bending slope and deflection asymmetrical bending, bending of initially curved bars	
3	Theory of Torsion	Torsion of thin walled cylinder, Torsion of a solid circular shaft, Hollow shaft, Torsion of rectangular and non-circular sections, Helical Springs.	
4	Theory of Columns and Pressure vessels	Long columns, struts. columns with initial curvature, Stresses and strains In pressure vessels	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. Mechanics Of Materials R. C. Hibbeler

Reference Book:

2. Mechanics of Materials James M.Gere barry J Goodno

NED University of Engineering and Technology, Karachi.

Department of Industrial and Manufacturing Engineering
Programme BE IM

Course Profile

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
1	Describe(V) the fundamental knowledge of basic mechanical properties of engineering materials(S) using the analytical and graphical techniques(C)	C-2	PLO1 **Engineering Knowledge**
2	Analyze (V) the effect of forces on different geometrical parameters (C) of machine elements of machine such as beams, columns, pressure vessels etc. according to the available standard(S)	C-4	PLO2 **Problem Analysis**
3	Use the methods to estimate(V) the Tensile, compressive, shearing, bending stresses	C-3	PLO 3 Design/Development of Solutions

REMARKS (if any):

Recommended by : _____ 18/4/22

(Chairperson/Date)

Approved by _____ 19-04-22

(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing Engineering
Programme of Undergraduate

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
IM-203, Manufacturing Processes	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S)	DATE OF APPROVAL 24-05-2016	BATCH 2015-16

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Sand Casting	Introduction; Sand casting procedures; Patter making; Material types and construction of patterns; Pattern allowances; Moulding process; Moulding materials; Tools and equipment; Testing of sand; Moulding machines; Core making; Types of cores; Core making machines; Shell moulding; Plaster moulding; Centrifugal casting; Trimming and finishing of castings; Seasoning of castings; Inspection of castings.	
2	Die Casting	Pressure die casting; Vacuum die casting; Gravity die casting; Die casting machines; Hot chamber and Cold Chamber methods; Die casting alloys; Die design, construction, and material; Die casting.	
3	Welding Processes	Classification of welding processes; Oxyacetylene welding, oxygen torch cutting, and flame straightening; Arc welding; Shielded arc welding, Gas tungsten arc welding, Gas metal arc welding, Flux-cored arc welding, submerged arc welding, plasma arc welding, stud welding, spot welding, Seam welding, Projection welding; Other welding processes: Forge welding, Roll welding, Friction welding, explosion welding, Thermit welding, Electron beam welding, Laser welding and cutting; Brazing and Soldering.	
4	Fabrication of Plastics	Casting; Blow moulding; Compression moulding; Transfer moulding; Cold moulding; Injection moulding; Reaction injection moulding; Vacuum forming; Welding of plastics	
5	Machining Processes and Machine Tools	Machine tools using single point tools: Description, functions and operation performed on lathe, shaper, Planner, and boring machines; work holding devices. Machine tools using multiple cutting edge tools: Description, functions, and operations performed on drilling, milling, gear cutting, and broaching machines. Machine tools using abrasive wheels; description and functions of various types of grinding machines; wheel dressing, and wheel balancing; Honing, lapping, and super finishing operations; thread manufacturing. Non-traditional machining processes such as EDM, ECM, & ultrasonic machining.	
6	Machining parameters	Determination of machining time and material removal rate for various machining operations Cutting tools for manufacturing: Cutting tool material characteristics;	

NED University of Engineering and Technology, Karachi.
Department of Industrial & Manufacturing Engineering
Programme of Undergraduate

F/QSP 11/17/00

Course Profile

| 6 | Machining parameters | Determination of machining time and material removal rate for various machining operations Cutting tools for manufacturing: Cutting tool material characteristics; Cutting tool materials, tool steels, HSS, Cubic Boron Nitrides; Tool Geometry, Tool life, Tool wear, and machinability; Taylor's Tool life model, sharpening and Reconditioning of cutting tools; Basic concept and design of jigs and fixtures. | |

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. Manufacturing Processes for Engineering Materials, by Serope Kalpakjian and Steven Schmidt, Prentice Hall, 5th Edition
2. Manufacturing Engineering Processes by L. Alting. Marcel Dekker
3. Material & Processes in Manufacturing by Paul De Garmo, Black and Kohser, Prentice Hall
4. Materials and Designs: The art and science of material selection in product design by M. F. Ashby and K. Johnson, Butterworth and Hienmann.
5. Fundamentals of Modern Manufacturing: Materials, processes and systems by M. P. Groover, John Wiley

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
1	Describe (V) the various discrete manufacturing processes (S) used in the majority of global industry (C)	C2 Comprehension	PLO 1 (Engineering Knowledge)
2	Select (V) the suitable process and apply the optimal parameter based on the manufacturing standards (S) for the manufacturing of goods and products(C).	C4 Analyze	PLO 4 (Investigation)
3	Apply (V) the various manufacturing processes (S) to assess societal, health & safety, legal and cultural issues and the consequent responsibilities relevant to manufacturing engineering.	C3 Application	PLO 6 (The Engineer & Society)

REMARKS (if any):

Recommended by: _Naseem 18/4/22_

(Chairperson/Date)

(Dean/Date)

Approved by: _19/04/22_

NED University of Engineering and Technology, Karachi.
Department of Industrial & Manufacturing
Second Year Engineering
Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
MT-252, Introduction to Probability & Statistics	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) N/A	**DATE OF APPROVAL** 24-05-2016	**BATCH** 2015-16

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1.	Statistics	Introduction, Types of data & variables, Presentation to data, Tabulation, Frequency distribution, Graphical representation, Simple & multiple bar diagrams, Pie-diagram, Histogram, Frequency polygon, Frequency curves & their types, Measures of central tendency and dispersion: Statistical averages, Median, Mode, Percentiles, Quartiles, Range, moments, Skewness & kurtosis, Quartile deviation, Mean deviation, Standard deviation, Variance & its coefficient, Practical significance in related problems.	
2.	Probability	Basic concepts, permutation & combination, definitions of probability, laws of probability, conditional probability, Bayes' rule, related problems in practical significance.	
3.	Random Variable	Introduction, Discrete & continuous random variables, Random sequences and transformations, Probability mass function, Probability density function, Distribution function, Mathematical expectations, Moment generating function (M.G.F.).	
4.	Probability Distributions	Introduction, Discrete probability distributions: Binomial, Poisson, Hyper geometric & Negative binomial distributions, Continuous probability distribution: Uniform, Exponential, Gamma & Normal distributions & their practical significance.	

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing
Second Year Engineering

Course Profile

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. Probability & Statistics for Engineers & Scientists, 9th Edition
   (Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye)
   ISBN: 978-0-321-62911-1, Publisher: Prentice Hall

2. Applied Statistic and Probability for Engineers, 4th Edition
   (Douglas C. Montgomery, George C. Runger)
   ISBN-13: 978-0-471-74589-1, Publisher: Wiley

REFERENCE BOOKS:

1. Introduction to Statistics, 3rd Edition
   (Ronald E. Walpole)
   ISBN: 0-02-977650-3, Publisher: Macmillan Publishing Co., Inc (New York)

2. Engineering Statistics, 5th Edition
   (Douglas C. Montgomery, George C. Runger, Norma Faris Hubele)
   ISBN: 978-0-470-64607-6, Publisher: Wiley

3. Fundamentals of Quality Control and Improvement, 4th Edition
   (Amitava Mitra)
   ISBN: 978-1-118-70514-8, Publisher: Wiley

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing
Second Year Engineering

F/QSP 11/17/00

Course Profile

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME:

(Revised 21-04-2022)

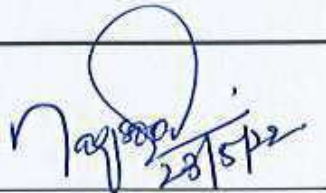| Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
1.	*Discuss* the fundamental concepts in Probability and Statistics	*C2*	Engineering Knowledge 1
2.	*Identify* the rules and algorithms of Probability and Statistics	*C1*	Problem Analysis 2
3.	*Perform* statistical analysis on data through computer software.	*P3*	Problem Analysis 2

REMARKS (if any):

COURSE DESCRIPTION (PURPOSE OF COURSE):

This is an introductory course for second year of engineering. In this course the students will be able to learn the basics of statistics including data gathering, organizing, analysis, presentation and interpretation. This course is specially designed for students to be able to apply Probability and Statistical Techniques in Research and Industrial Environment.

1. *Total No. of Periods =*
2. *Use of Statistical Software.*
3. *Case Studies/Assignment Report (Problem based learning.*
4. *If any, Speaker Guest Session*

Recommended by : _____

(Chairperson/Date)

Approved by : _____

(Dean/Date)

NED University of Engineering and Technology, Karachi.
Department of Industrial & Manufacturing
Programme BE
Course Profile

COURSE CODE& TITLE		SEMESTER		CREDIT HOURS
Islamic Studies HS-205		☑ SPRING ☐ FALL		TH ☐3 ☑2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ☑0
PREREQUISITE COURSE(S)		DATE OF APPROVAL 24-05-16		BATCH 2015-16

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Basic Islamic Believes:	**Basic Islamic Believes: Tauheed:** Al-Ambiya-22, Al-Baqarah-163-164 **Prophet-hood:** Al-Imran-79, Al-Hashr-7, Al-Maidah-3 **Here-after:** Al-Hajj-5, Al-Baqarah-48 & two Ahadiths	
2	Basic Islamic Practices:	Al-Mu'minun-1-11 and two Hadith (regarding Pilars of Islam)	
3	Amr-Bil-Ma'roof Wa-Nahi Anil Munkar The Concept of Good and Evil	Importance and necessity of Da'wat-e-Deen, Al-Imran-104 & 110 ; Method of Da'wat-e-Deen, Al-Nehl-125, & two *Ahadiths*	
4	Unity of Ummah	Al-Imran-103, Al-Hujurat-10, Al-Imran-64, Al-An'am-108 and Two *Ahadiths*	
5	Kasb-e-Halal	Taha-81, Al-A'raf-32-33, Al-Baqarah-188 and Two *Ahadiths*	
6	Haqooq-ul-Ibad	**Protection of life:** Al-Maidah-32; **Right of Property:** Al-Nisa-29 **Right of Respect & Dignity:** Al-Hujurat-11-12; **Freedom of Expression:** Al-Baqarah-256 **Right of Equality:** Al-Hujurat-13	
		Economic Security: Al-Ma'arij-24-25; **Employment Opportunity on Merit:** Al-Nisa-58; **Access and right to Justice:** Al-Nisa-135 **Excerpts:** Last Sermon of Hajj at Arafat: Translation and the important points of the Sermon	
7	Women Rights	Al-Nehl-97, Al-Ahzab-35, Al-Nisa-07	
8	Seerat un Nabi: Life of the Prophet(S.A.W.)	Birth, Life at Makkah. Declaration of Prophethood, preaching	

		& its difficulties migration to Madina. Brotherhood (Mawakhat) & Madina charter. The Holy War of the prophet (Ghazwat-e-Nabawi) Hujjat-ul- Wida.	
9	Islamic Culture & Civilization	Impacts of Islamic civilization on the sub-continent The civilization of sub-continent before Islam . The Political, Social & Moral impacts of Islamic Civilization on sub-continent. Academic, Intellectual, Social & Cultural Impacts of Islam on the World	

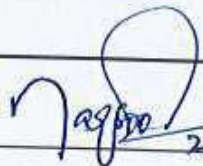**TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)**
1. Author, Book Name, Edition, Publisher, Year
2. Author, case study name, publisher, year

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

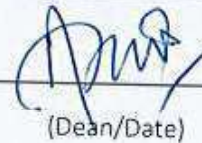| Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
	At the end of the course, the student will be able to:		
01	Explain the given Quranic verses and Hadiths to their tangible meaning and message.	C2	Ethics
02	Describe the basic concepts of Shariah, the features of Seerat-un-Nabi (SAW), and the impact of Islam on our society.	C2	Ethics

REMARKS (if any):

Recommended by : _____ 23/5/22
(Chairperson/Date)

Approved by : _____
(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing
Programme BE

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
Linear Algebra & Ordinary Differential Equations (MT-225)	☑ SPRING ☐ FALL	TH ☑3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ☐0
PREREQUISITE COURSE(S) Calculus (MT-111)	**DATE OF APPROVAL** 24-05-2016	**BATCH** 2015-16

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Linear Algebra	Linearity and linear dependence of vectors, basis, dimension of a vector space, field matrix and type of matrices (singular, non- singular, symmetric, non-symmetric, upper, lower, diagonal tri-diagonal matrix)	
2	Linear Algebra	Rank of a matrix using row operations and special method, echelon and reduced echelon forms of a matrix, determination of consistency of a system of linear equation using rank, transitions matrix,	
3	Linear Algebra	Basic concept of tensors, eigen value and eigen vectors of a matrix, Diagonolization, Cayley-Hamiton theorem. Applications of linear algebra in Engineering.	
4	Euclidean spaces and transformation	Geometric representation of vector, norm of vector, Euclidean inner product, projections and orthogonal projections, Euclidean n spaces n properties Cauchy-Schwarz inequality, Euclidean transformations, apply geometric transformations to plane figure, composition of transformations.	
5	1st order differential equations	Basic concept; Formation of differential equations and solution of differential equations by direct integration and by separating the variables.	
6	1st order differential equations	Homogeneous equations and equations reducible to homogeneous from; Linear differential equations of the order and equations reducible to the linear form;	

		trajectories;	
7	1st order differential equations	Application in relevant Engineering.	
8	Higher order differential equations	Special types of IInd order differential equations with constant coefficients and their solutions; The operator D; Inverse operator 1/D; Solution of differential by operator D methods; Special cases	
9	Higher order differential equations	Cauchy's differential equations; Simultaneous differential equations; simple application of differential equations in relevant Engineering.	
10	Laplace integral and transformation	Definition, Laplace transforms of some elementary functions, first translation or shifting theorem, second translation or shifting theorem, change of scale property, Laplace transform of the nth order derivative, initial and final value theorem Laplace transform of integrals, Laplace transform of functions $t^n F(t)$ and $F(t)/t$, Laplace transform of periodic function, evaluation of integrals, definition of inverse Laplace transform and inverse transforms, convolution theorem, solutions of ordinary differential using Laplace transform.	

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing
Programme BE

Course Profile
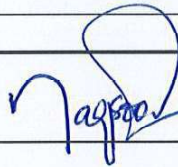
TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)	
1. Elementary Linear Algebra	Howard Anton 10th Edition
2. Advance Engineering Mathematics	Erwin Kreyszig 7th Edition
3. Differential Equation	G. zill 7th Edition

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
	At the end of the course, the student will be able to:		
1	**Describe** formation of differential equations and system of linear equations to explain physical situations.	C2	1
2	**Apply** appropriate methods to solve differential equations and system of linear equations of relevant engineering problems.	C3	2

REMARKS (if any):

Recommended by : _____28/5/22_____

(Chairperson/Date)

Approved by :_____

(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department Industrial and Manufacturing Engineering

Programme Bachelors of Engineering

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
MF-303 Applied Economics for Engineers	☑ SPRING ☐ FALL	TH ☑3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ✓0
PREREQUISITE COURSE(S) MT-114 Calculus	**DATE OF APPROVAL** 24-5-2016	**BATCH** 2015-2016

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	*Introduction:*	Engineering economy defined, measures of financial effectiveness, non-monetary factors and multiple objectives, principles of engineering economy.	
2	*Cost Concepts & Analysis:*	Sunk & opportunity costs, fixed, variable, and incremental costs, recurring & nonrecurring costs, direct, indirect, and overhead costs, standard costs, breakeven analysis, unit cost of production, cost-benefit analysis, feasibility studies, value analysis in designing & purchasing.	
3	*Time Value of Money & Comparing Alternatives:*	Simple interest, compound interest, cash flow diagrams, interest formulas, nominal versus effective interest rate, continuous compounding. Present economy, selection among machines, materials, processes, and designs, payback period method, present worth method, uniform annual cost method, rate of return method alternatives having identical lives, alternatives having different lives.	
4	*Depreciation & Depletion:*	Purpose of depreciation, economic life, what can be depreciated? Types of depreciation	
5	*Industrial Relations:*	Labour problems, labour organizations, prevention & settlement of disputes.	
6	*Production Concepts and Mathematical Models:*	Manufacturing lead time, production rate, capacity, utilization, availability, work in process, WIP and TIP ratios.	

TEXTBOOKS (Book Name, Authors, Edition, Publisher, Year)

Text book(s)

1. "Engineering Economy" Sullivan, Elin wicks, Patrick Koelling (17th edition, Pearson 2018)

Reference Book(s)

1. "Engineering Economic Analysis" Donald G. Newnan, Ted G. Eschenbach, Jerome P. Lavelle (14th edition, Oxford University Press 2019)

2. "Fundamentals of Engineering Economics" Chan S Park (4th edition, Pearson 2020)

NED University of Engineering and Technology, Karachi.
Department **Industrial and Manufacturing Engineering**
Programme **Bachelors of Engineering**

F/QSP 11/17/00

Course Profile

1. "Engineering Economic Analysis" Donald G. Newnan, Ted G. Eschenbach, Jerome P. Lavelle (14th edition, Oxford University Press 2019)
2. "Fundamentals of Engineering Economics" Chan S Park (4th edition, Pearson 2020)

COURSE LEARNING OUTCOME (CLO) AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME (PLO)

SR. NO	(CLOs)	TAXONOMY LEVEL	PROGRAMME LEARNING OUTCOME (PLO)
At the end of the course, the student will be able to:			
1	Comprehend and explain basic principles of economics and engineering economics, important cost types, and engineering economics analysis method(s) (NPV, IRR, Profitability Index, Payback period, benefit-cost ratio, etc.) descriptively.	C-2	PLO1
2	Apply engineering economics principles and analysis method(s) to solve real world problems. Also use computer tools such as Excel spreadsheets for analysis.	C-3	PLO2
3	Explain ethical dimensions in engineering decision making process.	C-2	PLO8

REMARKS (if any):

Recommended by: _____ 28/5/22
(Chairperson/Date)

Approved by: _____
(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing Engineering

Programme Bachelors of Engineering (BE)

Course Profile

F/QSP 11/17/00

COURSE CODE& TITLE IM-211 Machine Design	SEMESTER ■ SPRING O FALL	CREDIT HOURS TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) NIL	DATE OF APPROVAL 24-05-2016	BATCH 2015-2016

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Principle of Design	General procedure for design, Mechanical properties of materials, Stresses in machine elements, Stress concentration, Composite sections, Theories of failure including fatigue failure.	
2	Design of Machine elements	Shafts, Shaft materials, Shaft operating under combined loading, Critical speed, Introduction to flexible shafting, Connecting rods, Crankshafts, Bearings, Bearing materials, Design of journal and roller bearing. Theory, and method of lubrication, Gyroscopes (principle, operation, and applications), Balancing of reciprocating and Rotating masses.	
3	Design of Drive Units and Assemblies	Gear (terminologies, classification and design), Design of gear boxes/trains, Belt and chain drives, Design of chain including drag chain conveyors and belt conveyors, Brakes, Clutches; Friction and mechanical type of clutches, Linkages, Cams, Joint (knuckle, Cotter and universal), Couplings (universal, flanged and flexible). Spring, Design of leaf springs.	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. R. Budynas, K. Nisbett, "Shigley's Mechanical Engineering Design", 10th, McGraw-Hill, 2014
2. R.S. Khurmi, J. K. Gupta, "Textbook of Machine Design" 14th, S Chand and Co., 2005

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing Engineering
Programme Bachelors of Engineering (BE)

Course Profile

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
	At the end of the course, the student will be able to:		
1	*Describe and explain* (V) the *fundamental machine elements* (S) *used in the common mechanical systems* (C).	C-1	1
2	*Apply* (V) the concepts of engineering mechanics (S) to propose a suitable design and/or select commonly used machine elements (C).	C-3	3
3	*Apply* (V) the *principals and fundamentals of machine design* (S) to recognize the specifications and geometric parameters of machine elements *used in the common mechanical systems* (C).	C-4	4
4	*Apply* (V) the fundamentals of Project Management used for the *designing* (S))of the machine elements.	C-3	11

REMARKS (if any):

Recommended by: _____ 23/5/22

(Chairperson/Date)

Approved by: _____

(Dean/Date)

NED University of Engineering and Technology
Department of Industrial and Manufacturing Engineering
BE in Industrial and Manufacturing Engineering
Course Profile

F/QSP 11/17/00

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
IM-212 Computer Aided Engineering Design	■ SPRING ☐ FALL	TH ☐3 ■2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) ME-111	**DATE OF COURSE CONTENT APPROVAL** 26-05-2016	**APPLIED FROM BATCH** 2015-16

COURSE CONTENTS

S.No.	Topic	Contents	Remarks (if any)
1	Introduction to CAD	CAD applications in Engineering, Mechanical product design, CAD, CAM and CAE integration, Components of CAD, CAM and CAE Concepts of Graphics Programming Coordinate transformations, Projections Geometric Modeling Systems Modeling Methods, Set operations Constructed solid geometry, Boundary representation Representation of Curves & Surfaces Types of representations, Analytic, manipulation of curves and surfaces	
2	CAD/CAM Data Exchange	Data types and exchange methods, Neutral data exchange format: IGES, STEP Reverse Engg. &Rapid Prototyping/Manufacturing3D scanning and its types, Surface fitting on cloud data rapid prototyping and manufacturing.	

Book:

1. Kunwoo Lee, "Principles of CAD/CAM/CAE Systems", 1st ed., Addison Wesley, 1999.
2. Ibrahim Zeid, "CAD/CAM Theory and Practice", 1st ed., McGraw-Hill Inc, 2004.
3. Kuang-Hua Chang, "Product Design Modeling using CAD/CAE", Elsevier, 2014.

NED University of Engineering and Technology
Department of Industrial and Manufacturing Engineering
BE in Industrial and Manufacturing Engineering
Course Profile

F/QSP 11/17/00

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
	At the end of the course, the student will be able to:		
1.	*Describe* the fundamentals of Computer-aided design and its linkages to the computer-aided manufacturing and engineering related to the mechanical engineering designs	Cognitive 2 (Understanding)	1 (Engineering Knowledge)
2.	*Analyzing* the given problem and applying the analytical modeling techniques to develop the standard geometry	Cognitive 4 (Analyzing)	2 (Problem Analysis)
3.	*Reproduce* the accurate CAD model of standard mechanical components using the CAD Software	Psychomotor 3 (Guided-Response)	3 (Design and Development)
4.	*Prepares* (in a team) a CAD model of complex engineering product, including new innovative features to resolve the household and industrial problems using the CAD application software	Affective 4 (Organize)	9 (Individual and Team Work)

REMARKS (if any):

Recommended by: _____23/5/22_____

CID-Date

Approved by: _____

Dean-Date

NED University of Engineering and Technology, Karachi.
Department of Industrial & Manufacturing Engineering
Programme BE IM
Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
IM-213 Metrology & Quality Control	■ SPRING O FALL	TH ■3 □2 □1 □0 PR □3 □2 ■1 □0
PREREQUISITE COURSE(S) NIL	**DATE OF APPROVAL** 24-05-2016	**BATCH** 2015-16

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Introduction	History and Philosophy of Metrology, Metrology and the need for Reliable Measurement. Metrology Classifications.	
2	Standardization	Standardization Organizations and their Standards related to metrology, International Classification for metrology Standards, Interchangeability.	
3	Measurements	Common Gauges & Measurement Instruments, Special Gauges and application, Gauge Selection and handling and use, Surface Plate Tools and Techniques, Specialized Inspection Equipment, Calibration. Surface Texture.	
4	Measurement System Analysis	Process Variability, Variability in Measurement Process, Evaluating Measurement System Performance.	
5	Quality Control	Statistical Methods in Metrology, Defining Quality & its Philosophies, defining SPC/SQC and its Tools/Techniques.	
6	Quality Control Tools	Flow Chart, Check Sheet, Histogram, Pareto Chart, Scatter Diagram, Cause and Effect Diagram, Variable & Attribute Control Charts.	
7	Acceptance Sampling	OC Curve, Consumer & Producer Risks, AQL & LTPD, Sampling Errors, Acceptance Sampling for Continuous Production, Acceptance by Variables, Single, Double, & Sequential Sampling.	
8	Process Capability	Cp/Cpk	
9	Reliability	Introduction, Life History Curve, TaguchiLoss Function.	

NED University of Engineering and Technology, Karachi.
Department of Industrial & Manufacturing Engineering
Programme BE IM
Course Profile

F/QSP 11/17/00

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. Fundamentals of Dimensional Metrology by Connie Dotson, Roger Harlow, Richard L. Thompson, Thomson Delmar.
2. Fundamentals of Quality Control and Improvement by Amtava Mitra, Prentice Hall.

Reference Book:

1. The Certified Quality Inspector by H. Fred Walker, Ahmad K. Elshennawy, Bhisham C. Gupta, and Mary McShane Vaughn, ASQ Quality Press.
   1. . Introduction to Statistical Quality Control by Douglas C. Montgomery, JohnWiley & Sons, Inc

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
	At the end of the course, the student will be able to:		
1	*Demonstrate* **(V) the principals of measurements and quality control in context with the *ANSI, ISO and other relevant standards* (S) used in the industry (C).**	C-3	1
2	*Adopt (V)* the use of *standard measuring instruments and gages of different types* (S) to *conduct the measurements of simple products (C)*	A-3	10
3	*Practice (V)* the *basic quality tools* (S) to prepare graphical and descriptive analysis of measurement data using the *statistical software (C)*.	P-3	2

REMARKS (if any):

Recommended by : _____ 18/4/22

Approved by _____ 19/04/22

(Chairperson/Date)   (Dean/Date)

NED University of Engineering and Technology, Karachi.

Department of Industrial and Manufacturing Engineering
Programme: Bachelor of Engineering

F/QSP 11/17/00

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
HS-304 Business Communication & Ethics	☐ SPRING ☑ FALL	TH ☑3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ☑0
PREREQUISITE COURSE(S)	DATE OF APPROVAL 24-05-2016	BATCH 2015-16

COURSE CONTENTS:

S. No	Topic	Contents	Remarks
1	Communication Skills	Definitions and Conditions, Modes: verbal, non-verbal, vocal, non-vocal, sender, Receiver, en-coding, decoding, noise, context, emotional maturity, relationships, etc, Language, perception, Non-verbal, body language, physical appearance, cultural differences etc, Personal and interpersonal skills/ perceptions, Communication dilemmas and problems, Public Speaking – speaking situation, persuasion, Making presentations, Interviews.	
2	Business Writing	Formal / Business letters, e-mails: a) job applications and resumes / CV, b) enquiries, c) complaints / adjustments, d) orders, e) quotations, f) banking etc. Memos: layout, language, style. Meeting management: notice, agenda, conducting/participating, writing minutes. Contracts and agreements (basic theoretical knowledge and comprehension), Research / scientific reports: types, structure, layout / presentation, writing process etc, Tenders (basic theoretical knowledge and comprehension).	
3	Engineering / Business Ethics	Need and objectives for code of ethics and its importance, Types of ethics, involvement and impact in daily life, Problems / conflicts / dilemmas in application (case studies), Sexual Harassment / discrimination in the workplace: a) why it occurs, b) myths regarding sexual harassment, c) how to deal with it, d) gender equality e) respect etc. Codes of conduct: Code of Pakistan Engineering Council, Code for Gender Justice, Brief study of other codes of conduct.	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)
1. Lesikar & Pettit, Report writing for Business, McGrow Hill.
2. Burton & Dimbleby, Teaching Communication, Routledge.

NED University of Engineering and Technology, Karachi.

Department of Industrial and Manufacturing Engineering
Programme: Bachelor of Engineering

F/QSP 11/17/00

Course Profile

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

SR. NO	CLOs	TAXONOMY LEVEL	PROGRAMME LEARNING OUTCOME (PLO)
1	**Demonstrate** effective oral communication and interpersonal skills in simulated professional and business situations.	A3	Communication
2	**Compose** effective business messages for various purposes and audiences.	C6	Communication
3	**Apply** principles, theories, and codes of ethics in situations related to professional practice.	C3	Ethics

REMARKS (if any):

Recommended by : _____
(Chairperson/Date)

Approved by : _____
(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department Industrial and Manufacturing Engineering

Programme B.E

Course Profile

COURSE CODE& TITLE	SEMESTER ☐SPRING ■FALL	CREDIT HOURS TH ☑3 ☐2 ☐1 ☐0
IM – 303 Production Management		PR ☐3 ☐2 ☑1 ☐0
PREREQUISITE COURSE(S) NIL	DATE OF APPROVAL 24-05-2016	BATCH 2015-16

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Production Management & Systems	Introduction to production Management; System concept; Functions of management; Managerial decision making; Models as decision aids.	
2	Plant Location & Plant Layout	Selection of region; Selection of community; Site selection; Location factor dependence; Sources of assistance; Plant location trends; Quantitative analysis; Plant layout; Product & process layout analysis and comparison; Material handling considerations in layout.	
3	Production Planning & Control	Formalized production planning; Production planning methods; Master scheduling; MRP; MRP inputs, MRP outputs; Product structures; Types of MRP; Capacity planning and control; Production control systems; Job shop scheduling; Production control charts; Scheduling techniques; Purchasing and procurement.	
4	Planning & control Techniques	Inventory control; types of inventory; Inventory costs; Independent versus dependent demand; EOQ/EPQ models; Types of control systems; Selective inventory control; Inventory system development; Project planning; CPM/PERT; lean manufacturing techniques.	
5	Cost Estimating	Element of cost; Material cost, direct and indirect labor cost and Overhead cost structure; Prime cost, Factory cost,	

		Methods of estimation; Economics of tooling.	
6	Maintenance	Types of maintenance; Breakdown maintenance; Preventive maintenance; Individual versus group replacement; Internal versus external maintenance	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. Jay Heizer and Barry Render, Operations Management, Prentice Hall; 11th edition (2013).
2. Scott Webster, Principles of Supply Chain Management, Dynamic Ideas; 2nd Edition, (2009). (Reference Book)

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
	At the end of the course, the student will be able to:		
1.	Explain (V) the fundamentals of production management applied in the engineering environment (C) as recommended in the best practices (S)	C-2 (Comprehension)	PLO 1 (Engineering knowledge)
2.	Differentiate (V) and apply standards of Production Management (S) to increase the industrial productivity (C)	C-4 (Analysis)	PLO 4 (Investigation)
3.	Apply (V) the basics of Production Management and project management strategies to resolve the industrial problems (C) according to the techniques defined in the best practices (S).	C-3 (Application)	PLO 11 (Project Management)
4.	Practice (V) the Production Management techniques (S) individually or in groups in industrial environment (C)	P-3	PLO 9 (Individual and Team)

REMARKS (if any):

Recommended by : _____

(Chairperson/Date)

Approved by: _____

(Dean/Date)

NED University of Engineering and Technology, Karachi.
Department Industrial and manufacturing Engineering
Programme B.E

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
MT-333: Advanced Calculus & Fourier Analysis	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0
PREREQUISITE COURSE(S) MT-114 Calculus	**DATE OF APPROVAL** 24-05-2016	**BATCH** 2015-16

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	**Partial Differential Equations**	Basic concepts and formation of partial differential equations; Linear homogeneous partial differential equations and relations to ordinary differential equations; Solution of first order linear and special types of second and higher order differential equations; D' Alembert's solution of the wave equation and two dimensional wave equations; Lagrange's solution; Various standard forms.	
2	**Fourier Series**	Periodic functions and expansion of periodic functions in Fourier series and Fourier coefficients; Expansion of function with arbitrary periods. Odd and even functions and their Fourier series; Half range expansions of Fourier series, " OFT and FFT, Fourier Spectrum".	
3	**Advanced Calculus**	Define a stationary point of a function of several variables. Define local maximum and saddle point for a function of two variables the stationary points of a several variables. Obtain higher partial derivatives of simple functions of two or more variables. Iterated integrals, double and triple integrations with applications (area, centoroid, moment of inertia, surface area, and volume). Use multiple integrals in solutions of engineering problems.	
4	Vector Calculus	Vector differential operator. Directional derivative, gradient, divergence, curl of	

NED University of Engineering and Technology, Karachi.
Department Industrial and manufacturing Engineering
Programme B.E

Course Profile

F/QSP 11/17/00

		with applications (Solenoid, conservative, etc). Vector Integrations. Evaluate line integrals along simple paths. Apply line integrals to calculate work done. Apply Green's theorem in the plane to simple examples. Evaluate surface integrals over simple surface. Use the Jacobian to transform a problem a new coordinate system. Apply Gauss' divergence theorem to simple problems. Apply Stokes' theorem to simple examples.	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. Advanced Engineering Mathematics, Erwin kreyszig, Seven Edition
2. Elementary Linear Algebra, Howard Anton, Seventh edition
3. Introduction to Differential Equation, J. Farlaw, Fifth edition
4. Differential Equation, G. Zill, Eighth edition

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

CLO	Description	Mapping with PLOs	Taxonomy-Cognitive (Maximum Level)
1.	Describe formation of partial differential equation and calculus to explain physical situations	1	C2
2.	APPLY appropriate methods to solve partial differential equations in relevant engineering problems.	2	C3
3.	Use Fourier series in relevant engineering problems.	2	C3

REMARKS (if any):

Recommended by : _____23/5/22____

(Chairperson/Date)

Approved by: _____

(Dean/Date)

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
IM-312 APPLIED THERMOFLUIDS	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) THERMOFLUIDS (IM-105)	**DATE OF APPROVAL** 24-05-2016	**BATCH** 2015-16

COURSE CONTENTS:

S. No.	Topic	Contents	Remarks (if any)
1	Refrigeration cycles	Reserved Carnot cycle, vapor compression cycle, vapor absorption cycle, multi-pressure systems.	
2	Application of Refrigeration	Domestic refrigerator, water cooler, cold storage, ice making plant, dairy industries, heat pump.	
3	General theory of two and three dimensional flow	Fluid element kinematics, Irrotational flow, Relation between Irrotational flow and viscosity, Circulation, Potential flow, Stream and velocity potential functions, Uniform flow, Source and sink flow, Vortex, Doublet, Lift and drag forces, Differential analysis of fluid flow: Continuity and momentum equation.	
4	Boundary layer theory	Laminar boundary layer, turbulent boundary layer, Boundary layer control, Airfoil cascades	
5	Computational fluids dynamics	Introduction, Numerical operations for differentiation and integration, governing equations of CFD, Programming procedure, Simple exercise problem,	
6	Thermo fluid applications in manufacturing processes	Heat transfer in metal machining, Heat transfer in metal forming, Heat transfer in alloy solidification, Binary phase diagrams and kinetics of phase transformation.	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. Fluid mechanics: Fundamentals and Applications by Yunus Cengel, John Cimbala, 4th Edition 2016.
2. Thermodynamics An engineering approach by Yunus Cengel. 8th edition , 2006

NED University of Engineering and Technology, Karachi.
Department of Industrial and manufacturing Engineering
Programme: Bachelor of Engineering
Course Profile

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
	At the end of the course, the student will be able to:		
1	Demonstrate (V) the application of thermo fluids in standard mechanical systems (S) widely used in the industry (C)	C-3	PLO 1 (engineering knowledge)
2	Analyze (V) the change in characteristics of working fluids used in the industry (C) based on the published data and standards (S).	C-4	PLO 2 (Problem Analysis)
3	Differentiate (V) the hazardous and safe working fluids used in the industry (C) according to standard classification (S)	C-4	PLO 7 (Environment and Sustainability)

REMARKS (if any):

Recommended by : _____ 18/4/22

(Chairperson/Date)

Approved by : _____ 19/04/22

(Dean/Date)

NED University of Engineering and Technology
Department of Industrial and Manufacturing Engineering
BE in Industrial and Manufacturing Engineering

Course Profile

.COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
IM-310 Tool Design	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0

PREREQUISITE COURSE(S)	DATE OF COURSE CONTENT APPROVAL	APPLIED FROM BATCH
IM-203 Manufacturing Processes	24-05-2016	2015-16

COURSE CONTENTS

S.No.	Topic	Contents	Remarks (if any)
1.	Jigs and Fixtures	Basic Design principles and Classification Materials for jig and fixture development Lathe, Milling and broaching fixtures Detailed discussion of jigs for drilling and drilling related operations Consideration for mounting jigs and fixtures on machine tools. Inspection Jigs and Fixtures Analysis of operation with design example	
2.	Locating and Clamping Methods	Principles of Location Pins, plugs, dowels and nests Conical Locating, adjustable locators. Clamping principles, design of various clamps with typical applications. Pneumatic and Hydraulic clamping.	
3.	Design of Cutting Tools	Design of tools for cutting operations Single point tools for lathe and boring operations. Multiple point tools for milling and drilling operations.	
4	Design of Dies and Moulds	Terminology of Press-Working operations Mechanical, Hydraulic and Pneumatic presses Materials for press tools Design of Piercing, Blanking and Shearing dies. Design of Bending, Forming and Drawing dies. Design of Moulds for plastic and Rubber Parts Pressure, Die Casting, Injection and Blow Moulding.	

Books:
1. Cyril Donaldson, George H. LeCain, V. C. Goold, Joyjeet Ghose, Tool Design, 5th Ed., McGraw Hill, USA, 2017.
2. John D. Nee, Fundamental of Tool Design, 6th Ed., SME, USA, 2010.
3. K. Venkataraman, Design of Jigs, Fixtures and Press Tools, John Wiley & Sons Ltd, 2016.

NED University of Engineering and Technology
Department of Industrial and Manufacturing Engineering
BE in Industrial and Manufacturing Engineering

F/QSP 11/17/00

Course Profile

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
	At the end of the course, the student will be able to:		
1.	*Graphically and descriptively comprehend the fundamental designs of four major types (cutting tools, dies, jigs and fixtures) of manufacturing tools*	C-2 (understanding)	1 (Engineering Knowledge)
2.	*Parametrically design and develop the manufacturing tools for the given complex engineering problem as per defined standards*	C-5 (Design)	3 (Design of Solution)
3.	*Discover the types of manufacturing tools and identify the improvements in their design and materials for the healthy and sage use*	C-3 (Applying)	6 (Engineer and Society)
4.	*Apply the modern tool usage over the design and innovation of complex engineering project*	C3 (Analyzing)	5 (Modern Tool Usage)

REMARKS (if any):

Recommended by: _____ 22/5/22.

Approved by: _____

NED University of Engineering and Technology, Karachi
Industrial & Manufacturing Engineering
Bachelor of Engineering

F/QSP 11/17/00

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
IM-308 Operations Research	☑ SPRING ☐ FALL	TH ☑3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☑1 ☐0
PREREQUISITE COURSE(S)	DATE OF APPROVAL 24-05-2016	BATCH 2015-16

COURSE CONTENTS

S.No	Topic	Contents	Remarks (if any)
1	Linear Programming	Historical development of Operations Research, Formulation of Model, Linear programming: Graphical Analysis and Solution, Simplex Method of Solution, Equality constraints, Inequality constraints, Big M method, Duality theory, Primal and Dual problems, & Sensitivity Analysis.	
2	Special Types of LP Problems	The transportation problem, North-west corner rule, Vogel's approximation method, Russell's method, Transshipment problem, Assignment problem.	
3	Queuing Theory	Basic Queuing process, Assumptions for analysis, Queuing discipline and characteristics, Service mechanism, The birth and death process, Steady-state measures of performance, Single-server models, Multiple-server models, Machine servicing model.	
4	Dynamic programming	Recursive nature of computations in DP, Forward and backward recursion, Selected DP applications.	
5	Simulation	Introduction to simulation and its application in manufacturing.	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. H. A. Taha, "Operations Research – An Introduction", Pearson, 10th Edition, 2016.
2. F. S. Hillier, G. J. Lieberman, "Introduction to Operations Research", McGraw-Hill, 10th Edition, 2015.

NED University of Engineering and Technology, Karachi.

Department _Industrial and Manufacturing____

Programme _Bachelors of Engineering in Industrial and Manufacturing

F/QSP 11/17/00

Course Profile

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
1	Systematically convert a real world problem into a standard mathematical form.	C2 – Understand	2 – Problem Analysis
2	Mathematically solve problems using standard solution techniques.	C3 – Apply	1 – Engineering Knowledge
3	Demonstrate the use of decision making software to optimize mathematical problems.	P3 – Apply	5 – Modern Tool Usage

REMARKS (if any):

Recommended by : _____
(Chairperson/Date)

Approved by :_____
(Dean/Date)

Course Profile

COURSE CODE & TITLE	SEMESTER		CREDIT HOURS
	■ SPRING □ FALL		TH ■3 □2 □1 □0
IM-307 Advanced Manufacturing Processes			PR □3 □2 ■1 □0
PREREQUISITE COURSE(S)	DATE OF APPROVAL		BATCH
IM-203 Manufacturing Processes	24-05-2016		2015-16

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Mechanics of Orthogonal Metal Cutting	Chip formation; Thin-zone models for analysis; Shear angle relationships; Role of friction in metal cutting; Prediction of forces; Velocity relationships; Force and stress relationships.	
2	Tool Life & Tool Wear	Forms of wear in metal cutting, Tool life criteria, Variables affecting tool life, Taylor's tool life equation, Generalized tool life equation, Methods of tool life testing data. Economics of Metal Cutting: Application of minimum cost per piece, maximum production rate, and maximum profit rate criteria in turning operations.	
3	Metal Forming	Stress tensor, equilibrium equations, stress transformation equations, plane stress, Mohr's circle for stress transformation. Strain: plane strain, strain tensor, strain transformation equations, isotropic elasticity, strain energy. Bulk forming, sheet forming, Yield criteria, Plastic work, Plastic instability, Effective stress, Effective strain, Flow rules for plastic stress-strain relations.	
4	Work Hardening	Tensile test, Mechanical properties, Nominal & true stress-strain curves, Work hardening expression, Behavior after necking, Direct compression, Bulge test, Plane-strain compression test.	
5	Bulk Forming Analysis	Idea work method, efficiency factors, extrusion and rod drawing. force balance or slab analysis, deformation zone geometry, sheet drawing, flat rolling, direct compression in plane strain, sheet bending, and formability.	
6	Hot & Cold Working of Metals	Advantages and limitations of Hot working and Cold working processes; Methods of Forging; Hammer forging; Die forging; Drop, Press and Upset forging; Construction of drop forging hammers; Forging defects and their causes.	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. Manufacturing Engineering & Technology by Kalpakjian & Schmid Prentice Hall.
2. Metal Forming Mechanics and Metallurgy by W.F. Hosford. R. M. Caddell, Cambridge University Press.
3. Fundamentals of Metal Machining and Machine Tools by G. Boothroyd, McGrawHill Inc.
4. Materials and Processes in Manufacturing by DeGarmo.

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing Engineering
Programme of Undergraduate

Course Profile

Reference Book (s)

1. Fundamental of Modern Manufacturing by Mikell Groover.

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
	At the end of the course, the student will be able to:		
1	Describe comprehensively (V) the fundamentals and principals of metal forming and metal machining under different conditions (C) and in various processes (S)	Comprehension (C-2)	Engineering Knowledge (PLO-1)
2	Examine (V) the process and analyse the optimal parameter based on the manufacturing standards (S) for the manufacturing of goods and products.	Analysis (C-4)	Investigation (PLO-4)
3	Apply (V) the solution of metal machining and forming processes (S) problem in environmental context, Solve (V) the environmental issues related to metal machining and forming processes (S) and demonstrate (V) knowledge of sustainable development.	Application (C-3)	Environment & Sustainability (PLO-7)

REMARKS (if any):

Recommended by: _____ 18/4/22

(Chairperson/Date)

(Dean/Date)

Approved by: 19/04/22

NED University of Engineering and Technology, Karachi.

Department Industrial and Manufacturing Engineering

Course Profile

F/QSP 11/17/00

COURSE CODE& TITLE IM-408 Automation and Robotics	SEMESTER ☑ SPRING ☐FALL	CREDIT HOURS TH ☑3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☑1 ☐0
PREREQUISITE COURSE(S) EE-122 Basic Electricity & Electronics	DATE OF APPROVAL 24-05-2016	BATCH 2015-16

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Production Operations & Automation Strategies:	Automation defined; Types of automation; Reasons for automation; Arguments for & against automation. Manufacturing industries; Types of production; Functions in manufacturing; Organization & information processing in manufacturing; Plant layout; Production concepts & mathematical models; CIM,FMS/FMC, Automation strategies	
2	Automotive Type Automation	Automated flow lines; Methods of work-part transport; Transfer mechanism; Buffer storage; Control functions; Automation for machining operations; Design & fabrication considerations.	
3	Analysis of Automated Flow Lines & Line Balancing:	General terminology & analysis, Analysis of transfer lines without storage, Partial automation. The assembly process, Assembly systems, Manual assembly lines, The line balancing problem; Methods of line balancing,Largest candidate rule, Kilbridge & Wester's method, Ranked positional weights method.	
4	Automatic Control Systems and Components:	Basic elements of automatic control system, Levels of automation, Analysis of regulated and servo control systems, Sensors, Actuators, Data conversion, Mechanical components of automation.	
5	Robotics Technology & Applications	Robot anatomy, Robot Configurations, Accuracy & Repeatability, Robot specifications, End effectors, Kinematics and Dynamics of a 2-link Manipulator, Characteristics of Robot applications, Robot cell design, Types of Robot applications.	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)
1. M.P.Groover, Automation, Production Systems and Computer Integrated Manufacturing, Third Edition
2. John J. Criag Introduction to Robotics: Mechanics and Control, Third Edition.

NED University of Engineering and Technology, Karachi.
Department Industrial and Manufacturing Engineering
Course Profile

F/QSP 11/17/00

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

SR. NO	CLOs	TAXONOMY DOMAIN/LEVEL	PROGRAMME LEARNING OUTCOME (PLO)
1	**DISCUSS** the basic ideas and strategies of automation, production concepts and robotics.	C2	Engineering Knowledge
2	**Analyse** the operations of manual and automated production lines.	C3	Problem Analysis
3	**DEMONSTRATE** the ability to program and develop Robotic and other automatic systems for manufacturing operations **using the basic skills** of sensors, actuators and controllers.	P3	Design/Development of Solutions

REMARKS (if any):

CLO3	Assessment of psychomotor (Skills) would be conducted through rubrics. Psychomotor Assessment would be performed 4 times throughout the semester during the practical sessions.
CLO1, CLO3	Mini Design Project is assigned as **Open Ended Lab.**

Recommended by : _____14-4-2022____

(Chairperson/Date)

Approved by : _____19/04/22____

(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing Engineering

Programme B.E

Course Profile

F/QSP 11/17/00

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
	■ SPRING ☐ FALL	TH ☐3 ■2 ☐1 ☐0
IM-411: Methods Engineering		PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S)	DATE OF APPROVAL	BATCH
NIL	24-05-2016	2015-16

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Work Study	Introduction to work study, Techniques of work study and their relationship, Basic procedure of work study.	
2	Method Study:	Definition; Objectives; Procedure; Process chart symbols; Outline process chart; Flow process charts; Multiple activity chart; Two handed chart; Critical Examination; Case studies & Application.	
3	Work Measurement:	Definition; Objectives; Techniques of work measurement; Stop watch time study; Timing methods; Performance rating; Standard timing; Allowance factors. Work sampling; Confidence level; Determination of sample size; Making random observations; Scope of work sampling. Predetermined time standards; Definition; Advantages and criticisms; Motion classification; TMU; Use of PTS systems. Introduction to project management.	
4	Methods and movements at the workplace:	General considerations, The principles of motion economy, Classification of movements, Re-organization of a workplace by means of a two-handed process chart, Micro-motion study, Simo chart, Use of films in methods analysis, The development of improved methods.	
5	Ergonomics:	Human and working environment Interaction, lighting, illumination design, noise and vibration, temperature, dust, humidity, comfort level. Machine controls and displays of dials, Scope of Ergonomics and its practice in Pakistan.	

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing Engineering
Programme B.E

Course Profile

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)
1. Introduction to Work Study 4th edition by International Labour Office.
2. Operations Management by Render Heizer. (Reference Book).-

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
	At the end of the course, the student will be able to:		
1.	*Apply (V) the principles of basic work study based on standard defined by ILO or other equivalent standards (S) to industrial environment (C).*	C-2	PLO 1 (Engineering Knowledge)
2.	*Differentiate (V) and apply standards of work methods, measurements, motion study and work sampling technique (S) to increase the industrial productivity (C)*	C-4	PLO 6 (Engineer and Society)
3.	*Apply (V) the basics of work study and project management strategies to resolve the industrial problems (C) according to the techniques defined in the best practices (S).*	C-3	PLO 11 (Project Management)
4.	*Practice (V) the methods engineering techniques (S) individually or in groups in industrial environment (C)*	P-3	PLO 9 (Individual and Team work)

REMARKS (if any):

Recommended by : _____
(Chairperson/Date)

Approved by: _____
(Dean/Date)

NED University of Engineering & Technology, Karachi
Industrial & Manufacturing Engineering
Bachelor of Engineering
Course Profile

COURSE CODE &TITLE	SEMESTER	CREDIT HOURS
IM-320; Modeling & Simulation	■ SPRING □ FALL	TH □3 ■2 □1 □0 PR □3 □2 ■1 □0

PREREQUISITE COURSE(S)	DATE OF APPROVAL	BATCH
MT-252; Introduction to Probability & Statistics	24-05-2016	2015-16

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1.	Introduction	Modelling & Simulation – Need and Significance of Simulation; Computer Simulation; Randomness in Simulation; Types of Simulation; Simulation Process.	
2.	Spreadsheet Simulation	Simulation in a Spreadsheet Environment; Useful Spreadsheet Functions; Numerical Examples of Spreadsheet Simulation.	
3.	Simulation Using Software	The Software Environment, Simple Monte-Carlo Simulation.	
4.	Modelling Simple Discrete Event Dynamic System (DEDS)	Drive-Through Pharmacy; Implementation of Model in Software Environment; Introduction to Arrival Process; Resources; Processes; Defining Run Parameters; Analysing results.	
5.	Modelling Queuing & Inventory System	Introduction, Single Line Queuing System, Simulating Single Queues in the Software, Networks of Queueing Station – Station, Route and Sequence Modules in the Software, Modelling and (Q,R) Inventory Control Policy.	

TEXTBOOKS (Book Name, Authors, Edition, Publisher, Year)

1. "Simulation Modelling and Arena", Manuel D. Rossetti, 2nd Ed., John Wiley & Sons, 2016.
2. "Process Simulation using WITNESS", R. Al-Aomar, E. J. Williams, O. M. Ulgen, John Wiley & Sons, 2015.
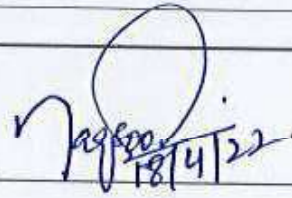3. "Simulation Modelling Handbook – A Practical Approach", Christopher A. Chung, CRC Press, 2004.

NED University of Engineering & Technology, Karachi
Industrial & Manufacturing Engineering
Bachelor of Engineering
Course Profile

F/QSP 11/17/00

COURSE LEARNING OUTCOMES AND THEIR MAPPING WITH PROGRAMME LEARNING OUTCOMES			
S. No.	CLOs	Taxonomy Level	PLOs
At the end of the course, the student will be able to:			
1.	Comprehend and explain the elementary concepts of modelling and its role to solve problems in Industrial Engineering.	C2	PLO1
2.	Interpret models and system simulations and analyse parametrically to arrive at a feasible decision using the principles of modelling and simulation.	C4	PLO2
3.	Demonstrate the modelling and simulation of given scenario or process of industrial engineering using spreadsheet and simulation software.	P3	PLO5

REMARKS (if any):

Recommended by: _____18/4/22_____
(Chairperson/Date)

Approved by: _____19/04/22_____
(Dean/Date)

NED University of Engineering and Technology, Karachi.
DEPARTMENT OF INDUSTRIAL & MANUFACTURING ENGINEERING
Programme BE

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
IM 405 Finite Element Analysis	☐ SPRING ☑ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S) IM-209 Mechanics of Materials	DATE OF APPROVAL 24-05-2016	BATCH 2015-16

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Introduction	The early use of Finite Elements, matrix forces method, matrix stiffness method, interim period, variational principles and Finite Elements, recent developments.	
2	Variational Formulation and Approximation	Boundary and Initial-Value problems, gradient and divergence theorems, functional, variational symbol. Variational formulation of boundary-value problem, Variational Method of Approximation, Ritz method, method of weighted residuals, time-dependent problems.	
3	Finite Element Analysis of One-dimensional Problems	Basic Steps in FEA; Modeling, Discretization, Connectivity of Elements, Imposition of Boundary Conditions, Solutions & Post Processing; Applications to Heat Transfer, Fluid Mechanics, & solid Mechanics Problems.	
4	Finite Element Error Analysis	Approximation Errors, Various Measures of Errors, Convergence of Solutions, Accuracy of Solutions.	
5	Numerical Integration & Computer Implementation	Isoparametric Formulations, Numerical Integration, Natural Coordinates, Computer Implementation (Pre-processor, Processor, and Post-processor)	
6	Interpolating Functions, Numerical Integration & Modeling Considerations	Interpolating Techniques; Triangular, Rectangular, & Serendipity Elements; Coordinate Transformation; Integration on a Master Element; Modeling, Mesh Generation, Load Representation.	
7	Plane Elasticity	Assumptions of Plane Elasticity; Basic Equations, Weak Formulations; Principle of Virtual Displacement in Matrix Form; Finite Element Model, Matrix & Weak Form Model; Evaluation of Integrals	

NED University of Engineering and Technology, Karachi.
DEPARTMENT OF INDUSTRIAL & MANUFACTURING ENGINEERING
Programme BE

F/QSP 11/17/00

Course Profile

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)
TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. Finite Element Analysis
   Theory and Application with Ansys, Saeed Moavini
2. A First Course in finite element method by Daryl L.Logan (4th Edition)

Reference books:

1. Fundamentals of Finite element Analysis By David V.Hutton
2. An introduction to Fem by J.N.Reddy (3rd Edition)
3. Finite element Methods in Engineering by Singiresu S.Rao(4th Edition)

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
	At the end of the course, the student will be able to:		
1	*Analyze* basic engineering problems by applying the knowledge of approximation to understand the basic concepts of the finite element method.	C-4	1
2	*Apply* FEM techniques on complex engineering problems, design an engineering system or components ,analyze and interpret the results.	C-3	2
3	*Construct* the FEM model, perform analysis to solve a range of solid mechanics and other engineering problems using the FEA Software.	P-3	5

REMARKS (if any):

Recommended by : _____

(Chairperson/Date)

Approved by : _____

(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department: Industrial and Manufacturing Engineering

Programme: B.E

F/QSP 11/17/00

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
IM-402 Computer Aided Manufacturing	☐ SPRING ☑ FALL	TH ☑3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☑1 ☐0

PREREQUISITE COURSE(S)	DATE OF APPROVAL	BATCH
IM-212 Computer Aided Engineering Design.	24-05-2016	2015-16

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Conventional Numerical Control	Introduction, principles of Numerical Control, Hardware for Numerical Control, NC positioning systems, NC motion control systems, applications of numerical control, economics and justification.	
2	NC Part Programming	Manual part programming, computer assisted part programming, Lathe CAM Designer, Mill CAM, NC programming with interactive graphics.	
3	Computer Controls in NC	Problems with conventional NC, NC controller of technology, computer numerical control, direct numerical control, adaptive control machining systems, trends and new developments in NC.	
4	Group Technology and Process Planning	Part families, methods for developing part families; parts classification and coding, Hierarchical code, Attribute code, Hybrid code, introduction to various available classification and coding systems, Selecting a coding system, production flow analysis, benefits of group technology, machining cells. The role of process planning in CAD / CAM integration, Approaches to process planning: Manual approach, Variant approach, Generative approach: introduction to various process planning systems.	
5	Programmable Logic Controllers (PLC's)	Functions of controllers, control devices, Programmable Logic Controllers: relay device components, switch, relay, counters, timers, relay logic, Programmable Controller Architecture: processor, memory, input /output, power supply, peripherals, Programming a Programmable Logic Controller: ladder diagram, ladder logic, timers and counters, programming examples.	
6	Design for Manufacturing (DFM)	The meaning of DFM, schemes for DFM, axiomatic design, DFM guidelines, design for assembly, Taguchi method for Robust design, manufacturing process design rules, failure mode and effects analysis	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. Zhuming Bi, Xiaoqin Wang, **Computer Aided Design and Manufacturing**, First Edition, Wiley-ASME Press Series, February 2020

2. Mikell P. Groover, **Automation, Production Systems, and Computer-Integrated Manufacturing**, Third Edition, Pearson, 2018

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
	At the end of the course, the student will be able to:		
1.	**EXPLAIN** the basics of numerical control (NC) technology along with CNC, DNC and adaptive control machining systems. **DEMONSTRATE** different part programing techniques.	C2	Modern Tool usage
2.	**MAKE** NC programs for industrial parts using manual and computer assisted techniques and run these programs on CNC machines.	P3	Design/ Development of Solutions
3.	**ILLUSTRATE** the various methods/guidelines used in design for manufacturing (DFM) and process planning.	C3	Engineering Knowledge
4.	**APPLY** the knowledge of Manufacturing processes, **CAD & CAM** to prepare process plans, CNC part programming, machining simulations, documentation for industrial part.	C3	Individual & team work

REMARKS (if any):

CLO2	Assessment of psychomotor (Skills) would be conducted through rubrics. Psychomotor Assessment would be performed 4 times throughout the semester during the practical sessions.
CLO2	Mini Design Project is taken as **complex Engineering Problem**.

NED University of Engineering and Technology, Karachi.

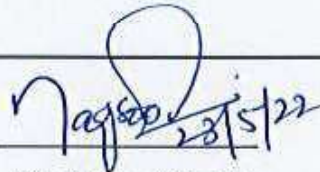Department: <u>Industrial and Manufacturing Engineering</u>

Programme: <u>B.E</u>

Course Profile

Recommended by : _____

(Chairperson/Date)

Approved by : _____

(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing

Programme BE

F/QSP 11/17/00

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
MG-450 Principles of Supply Chain Management	☐ SPRING ☑ FALL	TH ☑3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ☑0
PREREQUISITE COURSE(S) Production Management IM-303	**DATE OF APPROVAL** 24-05-2016	**BATCH** 2015-16

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	*Intro to logistics and Supply Chain Management*	Vision, Mission, Aim and Objectives Strategy Formulation, Strategic Management, Business Strategy, Competitive Strategy, SWOT Analysis PESTLE Analysis, Product Life Cycle Management Evolution of SC, Total System Concept, Integration and its complexities	Lecture slides, case study • Kellogg's – Using Aims & Objectives to Create Strategies • London 2012 – Achieving the Vision • Virgin Trains – Implementing New Vision • Barclay's – Supporting New Business Start-ups • Building Societies Association – Working Within the Business Cycles
2	*Internal and External Supply Chain*	SC Drivers & Bullwhip Effect: Driver's Role in SC, Beer-Game Layout, Information Distortion in Reality Achieving Strategic Fit: Market Segmentation, Alternatives, Value Chain Understanding Customer, SC with performance framework and Obstacles in achieving strategic fit.	• Kellogg's – Extending Product Life Cycle
3	*Operations Issues and Supply Chain Modelling*	Manufacturing Supply Chain: Focus Area for Industry Cooperation, Case Analysis in Manufacturing sector Business Process Management and its tools, Process Modeling Tools NPD Process Management, NPD Performance Management	• Kellogg's - Supply Chain from Manufacturing to Shelf
4	Inventory Management	Collaboration: Industrial Challenges, Current Technologies, Collaboration & its benefits Spectrum of Collaboration: Path to Successful Collaboration, Evolution of Collaboration, Define the Appropriate Degrees of Collaboration (i.e., Segment), Forecast, Global Optimization. Financial Measures of Performance: ROE, ROA, ART, INVT, PPET and C2C. Forecasting: Forecasting in Practice, CPFR,	• Kellogg's - New products from market research.

		And Four Common Cases. Aggregate Planning Strategies: Chase, Flexibility and Level Strategies.	
5	Value of Information	Managing Supply: Managing Capacity and Managing Inventory. Managing Demand: Factors Influencing the Timing of a Promotion	• Jessops – Responding to changes in the market environment • Unison – Use of PEST Analysis • Network Rail – Using PESTEL to Design Effective Strategies
6	International Supply Chain Management	Warehouse: Types of Warehouses. Key Decision Making Points: Make or Buy, Push/Pull System, Feasibility, Time, Cost and Capability	• Aldi - Competitive advantage through efficiency
7	Coordinate product and supply chain management	Demand & Sales Management: Customer & Market, Existing Techniques, Supply Planning, Data usefulness Global Supply Chain: Trade Zones, Integrated Demand Planning, Managing the Boundaries Logistics & Inventory Management: Logistics Providers, Reverse Logistics, Inventory Systems, Controlling Types, Distribution System, Bottle Necks	• Nivea - Developing a marketing plan • Enterprise – Marketing & Product Strategies for Growth • Cold Supply Chain: Case Analysis – White Revolution
8	Information Technology for Supply Chain Management	Information Technology in Supply Chain: Use of Information, SC IT Map Placement and Analysis, ERP.	• ERP – SAP Introduction • SCOR® v11.0
9	Customer Value	Supplier Relationship: Phases of SSPC, Stakeholder Engagement, Governance, People & Skills & Systems Customer Relationship Management: Strategies and Ways to Improve	• Shell - Balancing stakeholder needs • Enterprise - The importance of customer service at Enterprise Rent-A-Car
10	Decision Support Systems for SCM	Performance Measurement: Capability & Performance Analysis, Efficiency vs Responsiveness, SCOR®	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. "Principles of Supply Chain Management: A Balanced Approach"; Joel D. Wisner, Keah-Choon Tan & G. Keong Leong, 5th edition, Cengage, 2019

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing
Programme BE

Course Profile

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
	At the end of the course, the student will be able to:		
1	Describe (V) the principles of Supply Chain Management applied in the engineering environment (C) as recommended in the best practices (S)	C-2	PLO 1 (Engineering knowledge)
2	Outline (V) the standard tools and techniques (S) of supply chain management to comply with the customer requirements (C).	C-3	PLO 3 (Design/ Development of Solutions)
3	Design (V) the optimal supply chain models for the given industrial problems (C) aligned with the best practices (S)	C-5	PLO 12 (Lifelong Learning)

REMARKS (if any): Assessment

- Problem Based Learning Assignment
- Quiz
- Mid-term
- Final exam

Recommended by : _____ 23/5/22 . Approved by : _____

(Chairperson/Date)   (Dean/Date)

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing Engineering
Programme B.E
Course Profile

F/QSP 11/17/00

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
MG – 481 Entrepreneurship	■SPRING O FALL	TH ■3 O2 O1 O0
		PR O3 O2 O1 ■0
PREREQUISITE COURSE(S)	DATE OF APPROVAL	BATCH
Production Management	28-02-2020	2021

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Understanding the Entrepreneurship Mind-Set:	The Revolutionary Impact of Entrepreneurship the Individual Entrepreneurship Mind-Set, Corporate Entrepreneurship Mind-Set. The Social and Ethical Perspectives of Entrepreneurship,	
2	Launching Entrepreneurial Ventures:	Creativity and Innovation, Methods to Initiate Ventures, Legal Challenges in Entrepreneurship, The Search for Entrepreneurship Capital,	
3	Formulation of Entrepreneurial Plan:	The Assessment Function with Opportunities, The Marketing Aspects of New Ventures, Financial Statements in New Ventures, Business Plan preparation for New Ventures,	
4	Strategic Perspectives in Entrepreneurship:	Strategic Growth in Entrepreneurship, Valuation Challenge in Entrepreneurship, Final Harvest of a New Venture	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. Bruce R. Barringer, R. Duane Ireland. Entrepreneurship: Successfully Launching New Ventures (6th Edition) Pearson; (2018)

Reference Book(s)

1. Diane M. Baldwin Esq., Frances B. Whiteside Introduction to Business Organizations (2nd Edition) Prentice Hall; (1999)
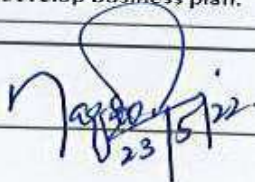
COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME REMARKS (if any):

At the end of the Course, Students will be able to:

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
CLO 1	Explain basic functions and importance of entrepreneurship	C 2	Life Long Learning
CLO 2	Value business ethics on entrepreneurial activities.	A3	Ethics
CLO 3	Demonstrate the entrepreneurial skills to develop business plan.	C3	Project Management

Recommended by : _____ 23/5/22

Approved by: _____

NED University of Engineering and Technology, Karachi.

Department of Industrial and Manufacturing Engineering
Programme: Bachelors of engineering

Course Profile

COURSE CODE& TITLE	SEMESTER ■ SPRING □ FALL	CREDIT HOURS TH □3 √2 □1 □0 PR □3 □2 √1 □0
IM-417 Health, Safety & Environment		
PREREQUISITE COURSE(S) None	DATE OF APPROVAL 24-05-2016	BATCH 2015-16

COURSE TOPICS;

Topic	Contents	Remarks
Safety Management	Understanding accident and hazard, Hazard control and loss control, Company policy and management responsibilities, Direct and indirect cost, Accident causes and their control, Principles and processes of lost control, Knowledge of existing safety codes and standards.	12
Hazards and Risk	Hazards and identification, Risk Assessment, Risk Control	06
Accident Prevention and Control	Fire safety, Electrical Safety, Safety in boilers and unfired pressure vessels and high pressure systems, Safety in material handling and storage, Safety in production operations	06
Industrial Hygiene and worker protection	Understanding industrial hygiene, Various hazards encountered in workplace, Types of personal protective equipment (PPE), Availability in market their design standards and selection criteria.	04
Process Safety Management	Development of facility operation and procedures, Analysis of process hazard, Permit to work systems, Hazard communication (Material Safety Data Sheet), Chemical inventory record, Accident reporting and investigation, OHSAS 18001:1999	11
Environment Management:	Environment pollution, Air emission management, Waste management, Waste water treatment and control, Soil and ground water protection, Introduction to Pakistan Environment Protection Act 1997 and National Environmental Quality Standards, Key elements of ISO 14000.	06
	Total No. of sessions	42

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. David G Goetsch, Occupational safety and health For Technologists, Engineers, and Managers, 9th edition, Pearson, 2019
2. Phil Hughes, Ed Ferrett, Introduction to health and safety at work, 7th edition, Elsevier Ltd, 2020

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)	Assessment Tool
	At the end of the course, the student will be able to:			
1	Define and Explain (V) the fundamentals of Health and safety based on OHSAS 18000 or other equivalent standards (S) applied in different workplace environment (C).	C-2	PLO 1 (Engineering Knowledge)	Quiz, Mid-term, Final exam
2	Apply (V) the ISO 14000 or equivalent standards (S) to the real-world problem (C)	C-3	PLO 7 (Environment and Sustainability)	Quiz Mid-term, Final exam
3	Comply (V) with the OHSAS 18000 or equivalent standard (S) to analyze the hazardous conditions and practices to implement effective hazard control strategies in workplace environment (C)	A-3	PLO 12 (Lifelong Learning)	Problem based learning/complex engineering Mini project and Presentations (via rubrics)
4	Exhibit (V) the proper use of safety instruments/equipment and Personal Protective Equipment (PPE) as per defined standard (S) in the workplace environment (C)	P-3	PLO 9 (Individual and Team work)	Psychomotor assessment via Rubrics in Labs, Work book completion,

REMARKS (if any):

CLO4	Assessment of psychomotor (Skills) would be conducted through rubrics attached with this course profile. Psychomotor Assessment would be performed 4 times throughout the semester during the practical sessions.

NED University of Engineering and Technology, Karachi.

Department of Industrial and Manufacturing Engineering
Programme: Bachelors of engineering

Course Profile

F/QSP 11/17/00

Recommended by : _____

(Chairperson/Date)

Approved by : _____

(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department of Industrial and Manufacturing Engineering
Programme B.E

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
MT – 441 Advance Mathematical Techniques	■ SPRING ☐ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☐1 ■0

PREREQUISITE COURSE(S) MT-333 Advanced Calculus & Fourier Analysis	DATE OF APPROVAL 24-05-2016	BATCH 2015-16

COURSE CONTENT

S. No.	Topic	Contents	Remarks (If any)
1	Complex Variable	Limit, continuity, zeros and poles of a complex function. Cauchy-Reimann equations, conformal transformation, contour integration.	
2	Error Analysis	Types of errors (relative, Absolute, inherent, round off, truncation), significant digits and numerical instability, flow chart. Use any Computational tools to Analysis the Numerical Solutions.	
3	Finite Difference	Functions of operators, difference operators and the derivative operators, identities. Linear homogeneous and non-homogeneous difference equations. Numerical Differentiation, Forward Difference Method, Backward Difference Method, Central Difference Method.	
4	Interpolation & Curve Fitting	Lagrange's, Newton, Hermit, Spline, least squares approximation. (Linear and non-linear curve). With numerical problem in engineering.	
5	Numerical Integration & Differentiation	Computation of integrals using simple Trapezoidal rule, th 3 1 Simpson's rule, th 8 1 Simpson's rule, Composite Simpson's and Trapezoidal rules, computation of solutions of differential equations using (Euler method, Euler modified method, Runge Kutta method of order 4).	
6	Improper Integrals	Definitions, Types of improper integral and their convergence.	
7	Elliptic Integrals	Introduction and identification of elementary elliptic integrals of first, second and third kinds. Simple applications.	

Course Profile

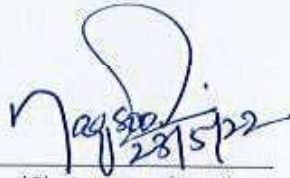| TEXTBOOKS (Book Name, Authors, edition, Publisher, Year) |
| --- |
| B1: Numerical Analysis, Richard L Burden, J. Douglas Faires, 9th, Richard Stratton, (2010) |
| B2: Numerical Methods for Engineering, Steven Chapra, 11th (1988) |
| B3: Applied Numerical Analysis, Curtis F. Gerald, 5th, Edison Wesley (2001) |
| B4: Advanced Engineering Mathematics, Peter V. O'Neil, Sixth Edition. (2007) |

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

CLO	Description	Mapping with PLOs	Taxonomy-Cognitive (Maximum Level)
1.	Discuss numerical differentiation, numerical integration, and complex variable.	2	C2
2.	Apply Elliptic integral and complex variable in relevant engineering problems.	1	C3
3.	Apply numerical differentiation and numerical integration in relevant engineering problems.	2	C3

Recommended by _____
(Chairperson/Date)

Approved by _____
(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing (IMD)
Programme: Final Year Engineering IMD

Course Profile

F/QSP 11/17/00

COURSE CODE& TITLE: IM-413, Plant Engineering	SEMESTER: ■ SPRING ☐ FALL	CREDIT HOURS: TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S): IM-312 Applied Thermo Fluid	DATE OF APPROVAL: 24-05-2016	BATCH: 2015-6

COURSE CONTENTS:

S. No.	Topic	Contents	Remarks (if any)
1.	Thermal Power Plants	Basic Principles and Cycles used; Steam Power Plants; Diesel Power Plants; Gas power Plants; Combined heat and Power Generation.	12 Sessions (Classes)
2.	Internal Combustion Engines	Basic Internal Engine Types: Spark ignition engines; Compression Ignition engines; Speed and load control; Supercharging. Idealized cycle and processes; Otto cycle; Diesel cycle. Fuels, High and Heavy Fuel Oil	10 Sessions
3.	Steam Generators and Turbines	Properties of Steam; Enthalpy and entropy diagram; Rankine Cycle; Steam Power Plant: Boilers; Feed water pump; Air Pre-heaters; Economizers; Super-heaters; Condensers. Boilers types: Fire tube and water tube designs. Steam turbines; Impulse and Reaction Turbines; Back Pressure and Extractive Turbines.	6+6 Sessions
4.	Air-Conditioning and Ventilation	Principles of Air-Conditioning; Comfort and Industrial Air-Conditioning; Refrigeration Equipment; Primary and Secondary Refrigerants; Ventilation Equipment. Psychometric Chart and its use; Calculation of the simple Air-Conditioning System. Temperature and Humidity Control; Pneumatic, Electric, and Hydraulic systems.	12 Sessions
5.	**Additional Topics:** Global Perspective of Energy-Recent and Future Trends, Renewable Energy, Electric and other Fuel Vehicles, Guest Speaker Session.		02 Sessions

Course Profile

TEXT BOOKS (Book Name, Authors, edition, Publisher, Year)

1. Applied Thermodynamics for Engineering Technologists, T. D. Eastop, A. McConkey, Latest edition i.e 5th, Pearson Education Ltd., 2009, ISBN: 978-81-7758-238-3

2. Air-Conditioning Principles and Systems, Edward G. Pita, Latest edition, , Prentice-Hall, 2003 ISBN-13: 978-0130928726

3. Refrigeration & Air-Conditioning, Wilbert F. Stoecker & Jerold W. Jones, , Latest edition i.e 2nd, McGraw-Hill, inc, ISBN-13: 978-0070665910

REFERENCE BOOKS:

4. Power Plant Technology, M. M. El-Wakil, latest edition, McGraw-Hill companies, inc,

5. Power Plant Engineering, P. K. Nag, Latest edition, McGraw Hill Higher Education, ISBN: 0-07-121110-1

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME:

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
1.	*Describe*; Thermodynamic Properties of Working Substances used in Thermodynamic Cycles, Basic Principles of Thermodynamics, Sources of Energy and Types of Power Plants, IC Engines, and HVAC Systems.	C2	PLO1 (Engineering Knowledge)
2.	*Apply*, Thermodynamic Principles in *carrying out* the performance calculations of Power Plants, IC Engines and HVAC (Cooling Load and Duct Designing and Ventilation).	C3	PLO4 (Investigation)
3.	*Analyze*; different types of Power Plants, IC Engines, and HVAC System manually and in the broadest context of technological change (Modern Tool), use of Software. *Outline*; in context to recognize the future needs; Global Perspective of Energy-Recent and Future Trends, Renewable Energy, Electric and other Fuel Vehicles.	C4	PLO12 (Long life Learning)

REMARKS (if any):

COURSE DESCRIPTION (PURPOSE OF COURSE):

The primary objective of this course is to provide engineering students a basic understanding of the fundamental concepts associated with various types of Power Plants and their essential components, IC Engines and its alternate sources, and further enhancing student's contextual Understanding, and Preliminary Design/Analysis of different types of Power Plants /Heating Ventilation & Air Conditioning Systems (HVAC).
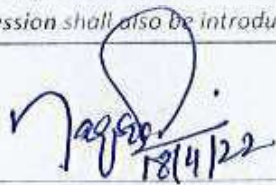
1. **Total No. of Sessions (Classes) = 48** (Teacher-1: 32 Sessions, Teacher-2: 16 Sessions)

2. **Assignment Report (Problem Based Learning)** shall be assigned by Teacher-1,..............................**CLO1**

   Complex Engineering Problem shall be assigned by Teacher-2,...**CLO2**

3. **Guest Speaker Session** shall also be introduced.

Recommended by : _____18/4/22_____

(Chairperson/Date)

Approved by : _____19/04/22_____

(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing Engineering

Programme B.E

Course Profile

F/QSP 11/17/00

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
IM-416 Management Information Systems	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■1 ☐0
PREREQUISITE COURSE(S)	**DATE OF APPROVAL** 24-05-2016	**BATCH** 2015-2016

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Introduction	Overview of System and Sub-systems, Information Systems, Relevance of Information Systems to organizational decision making, Information Systems and Manufacturing Environment Responsibilities of an Industrial Engineer from MRP to ERP and beyond.	
2	Tools and Technologies	Data Flow Diagrams, Functional Flow Diagrams, System Flow Charting, UML Diagrams, Bar Coding Technology, RFIDs, Formal Documentation and Presentation Formats.	
3	Information and Data Base Management Systems	Data Handling Procedures, Database; their Types and Design Issues including Modeling (ER Diagram etc.) and Normalization, Data Base Management Systems, Data Base Software, Client-server vs. Distributed Computing, Methods of Data Collection, System Development Life Cycle (SDLC), Feasibility Study Considerations, Effects and Usages of Internet in Manufacturing Industry.	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. Kenneth C. Laudon and Jane P. Laudon, Management Information Systems: Managing the Digital Firm, 16th Edition, Pearson, 2020

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
1	*Characterize* the role of information systems in contemporary organizations	C3	PLO 1
2	*Apply* the information technology tools and techniques according to the need of the organizations.	C2	PLO 5
3	*Design and analyze* an information system based upon the user requirements	C5	PLO 3

REMARKS (if any):

Recommended by : _____ 23/5/22

(Chairperson/Date)

Approved by: _____

(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing
Programme Undergraduate

F/QSP 11/17/00

Course Profile

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
IM-418 Condition Monitoring	☐ SPRING ■ FALL	TH ■3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☒1 ☐0

PREREQUISITE COURSE(S)	DATE OF APPROVAL	BATCH
Nill	2019	2019

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Mechanical Vibration Fundamentals	Harmonic motion, Single & multi degree of Freedom (dof), Free and forced vibration, Damped and un-damped vibration, Rotational unbalance, Foundation force and transmissibility, Transverse Vibration, Whirling of Shafts, Self-excited vibration	
2	Condition Monitoring Basics	Maintenance strategies, Condition based maintenance, Key features of Condition monitoring, When to use and how to implement condition monitoring	
3	Vibration Measurement & Control	Vibration measurement system, Transducers and instrumentation, Vibration monitoring, Spectral Analysis and Control	
4	Condition Monitoring Techniques	Monitoring of vibration, Wear-Debri Analysis, Oil and Lubricant analysis Oil/debris, Current, Conductivity, Insulation, Performance, Thermography, Acoustic and ultra-sonic emission, Corrosion and Visual & manual inspection	
5	Condition Monitoring Case Studies	Case studies related to static and rotating industrial equipment such as induction motors, Rotor dynamic pumps and reciprocating machines	
6			
7			
8			
9			
10			

NED University of Engineering and Technology, Karachi.

Department of <u>Industrial & Manufacturing</u>
Programme <u>Undergraduate</u>

Course Profile

F/QSP 11/17/00

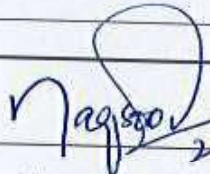**TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)**

1. B. K. N. Rao, Handbook of Condition Monitoring, First edition 1996, Elsevier

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
	At the end of the course, the student will be able to:		
1.	Explain the principals of vibrations associated with the Mechanical Systems.	C2	PLO1
2.	Distinguish and apply different standard maintenance strategies and condition monitoring techniques used in the industry.	C3	PLO2
3.	Differentiate the use of standard vibration monitoring and measurement systems used in the industry.	C4	PLO5
4.			

REMARKS (if any):

Recommended by : _____ 28/5/22.
(Chairperson/Date)

Approved by : _____
(Dean/Date)

NED University of Engineering and Technology, Karachi
Industrial & Manufacturing Engineering
Bachelor of Engineering

Course Profile

COURSE CODE& TITLE		SEMESTER		CREDIT HOURS
IM-419; Project Management		☐ SPRING ☑ FALL		TH ☑3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☑1 ☐0
PREREQUISITE COURSE(S)		**DATE OF APPROVAL** 24-5-2016		**BATCH** 2015-2016

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Project Management Framework:	Definition of Projects and Project Management, Projects versus Operations, Project Management versus Classical/Operations Management, Evolution of Project Management, Project Life Cycle and its differences with Product Life Cycle, Forms of Organizational Structures and their impact on Project Management, Project Management Methodology, Project Initiation and Project Charter, Project Planning Process, Types of Plans.	
2	Project Scope Management:	Scope Statement, Work Breakdown Structure, Work Packages.	
3	Project Scheduling:	Listing Activities, developing a Network, Types of Network Diagrams, Duration Estimation, CPM/PERT and their differences, Constructing the Critical Path, Critical Path Analysis, Gantt Charts, Project Schedule Compression Techniques, Project Crashing	
4	Project Budgeting:	Creating a Project Budget, Top-Down Budgeting, Bottom-Up Budgeting, Activity-Based Costing	
5	Project Execution, Monitoring and Closing:	Project Execution Process, Issues during Project Monitoring, Project Control, Project Closing Process, Lessons Learned.	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. Project Management: A Systems Approach to Planning, Scheduling, and Controlling; Harold Kerzner (11th Ed.); Wiley
2. Project Management Body of Knowledge (5th Ed.); Project Management Institute
3. The Wiley Guide to Managing Projects; Peter W. G. Morris & Jeffrey K. Pinto; Wiley

NED University of Engineering and Technology, Karachi

Industrial & Manufacturing Engineering
Bachelor of Engineering

F/QSP 11/17/00

Course Profile

COURSE LEARNING OUTCOMES AND THEIR MAPPING WITH PROGRAMME LEARNING OUTCOMES

S. No.	CLOs	Taxonomy level	PLOs
At the end of the course, the student will be able to:			
1.	Apply the fundamentals of project management, its framework, and tools, in a project environment.	C-3	PLO11
2.	Prepare project scope, essential project documents, estimate time and cost/budget.	C-3	PLO9
3.	Explain the ways to resolve conflicts while working in a project team.	C-3	PLO8
4.	Prepare project management plans and reports according to the PM standards using MS-Project to achieve project deliverables.	C-3	PLO5

REMARKS (if any):

Recommended by: _____

(Chairperson/Date)

Approved by: _____

(Dean/Date)

NED University of Engineering and Technology, Karachi.

Department of Industrial and Manufacturing
Programme Bachelors of Engineering in Industrial and Manufacturing

F/QSP 11/17/00

Course Profile

COURSE CODE & TITLE IM-420 Basis of Additive Manufacturing	SEMESTER ☐SPRING ■ FALL	CREDIT HOURS TH ■ 3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ■ 1 ☐0
PREREQUISITE COURSE(S) Manufacturing Processes (IM-203)	DATE OF APPROVAL 2021	BATCH 2020-21

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1	Introduction	Terms and definitions, historical evolution of AM, comparison of AM and traditional manufacturing processes, benefits, limitations and applications of AM.	
2	Development of AM Technologies	Computers, Computer Aided Design (CAD), other associated technologies, steps of AM, types of AM processes.	
3	Vat Photopolymerization Processes	Process description, machines, materials, applications, benefits and drawbacks.	
4	Powder Bed Fusion Processes	Process description, machines, materials, applications, benefits and drawbacks.	
5	Binder Jetting Processes	Process description, machines, materials, applications, benefits and drawbacks.	
6	Material Extrusion Processes	Process description, machines, materials, applications, benefits and drawbacks.	
7	Vacuum Casting	Process description, machines, materials, applications, benefits and drawbacks.	
8	Design for Additive Manufacturing	Design for Manufacturing and Assembly, Unique Capabilities of AM, Exploring Design Freedoms, CAD tools for AM, Open-source and low cost AM processes.	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. Andreas Gebhardt, Jan-Steffen Heotter, "Additive Manufacturing. 3D Printing for Prototyping and Manufacturing", Hanser Gardner Publications, 2016.

2. Olaf Diegel, Axel Nordin, Damien Motte, "A Practical Guide to Design for Additive Manufacturing", Springer, 2019

Course Profile

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
1	Understand the basic concepts related to additive manufacturing.	C2 – Understand	1 – Engineering Knowledge
2	Learn about the different techniques and materials used in additive manufacturing.	C3 – Apply	2 – Problem Analyses
3	Demonstrate the use of software tools used in additive manufacturing.	P3 – Apply	5 – Modern Tool Usage

REMARKS (if any):

Recommended by : _____23/5/22_____

(Chairperson/Date)

Approved by : _____

(Dean/Date)

NED University of Engineering and Technology
Department of Industrial and Manufacturing Engineering
BE in Industrial and Manufacturing Engineering
Course Profile

F/QSP 11/17/00

COURSE CODE& TITLE	SEMESTER	CREDIT HOURS
IM-421 Smart Manufacturing	☐ SPRING　■ FALL	TH ■3　☐2　☐1　☐0 PR ☐3　☐2　■1　☐0
PREREQUISITE COURSE(S)	**DATE OF COURSE CONTENT APPROVAL** 2021	**APPLIED FROM BATCH** 2020

COURSE CONTENTS

S.No.	Topic	Sub-Topic	Remarks (if any)
1.	Introduction of Smart Manufacturing	Emerging trends in manufacturing, globalization, advanced technologies in manufacturing, fourth industrial Revolution, Smart Factories.	
2.	Internet of Things (IoT)	Basics of IoT, Industrial Internet of things (IIoT), Industrial actuators, Industrial internet systems, Smart Devices	
3.	Augmented/Virtual Reality and Simulation	Introduction to virtual and augmented reality, applications, transformation of 3D models in virtual reality, hardware and software used for virtual and augmented reality.	
4	Artificial Intelligence (AI) and Cloud Computing	Data analytics, basic algorithms used in AI, Applications in manufacturing/inventory management/ machining etc. Machine Learning, Application Software, Data Center Networks, Data Security, Cloud Computing platforms, MS-Azure and Cloud Security.	
5	Cyber-Physical System (CPS)	Framework of smart factories, integrated smart systems, components of CPS, data analytics	

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
	At the end of the course, the student will be able to:		
1.	*Comprehend* the six major components of the smart manufacturing systems	C-2	PLO 1 (Engineering Knowledge)
2.	*Characterize* the different components and technologies of the smart manufacturing system according to their limitations and applications.	C-3	PLO 5 (Modern Tool Usage)
4.	*Outlines* the innovation and technological advancements possible in the design of existing Smart Manufacturing Systems	C-5	PLO 3 (Design and Development)

REMARKS (if any):

- Masoud Soroush Michael Baldea Thomas Edgar, "Smart Manufacturing concepts and methods", 1st Edition, Elsevier,2019

NED University of Engineering and Technology
Department of Industrial and Manufacturing Engineering
BE in Industrial and Manufacturing Engineering

Course Profile

F/QSP 11/17/00

Recommended by: _____

CID-Date

Approved by: _____

Dean-Date

NED University of Engineering and Technology, Karachi.

Department of Industrial & Manufacturing Engineering
Programme B.E

F/QSP 11/17/00

Course Profile

COURSE CODE& TITLE	SEMESTER ☐SPRING ☐ FALL	CREDIT HOURS TH ☒ 3 ☐2 ☐1 ☐0 PR ☐3 ☐2 ☒1 ☐0
IM – 422: Ergonomics in Workplace Design		
PREREQUISITE COURSE(S) MT-252: Introduction to Probability & Statistics	DATE OF APPROVAL 2021	BATCH 2020-21

COURSE CONTENTS

S. No.	Topic	Contents	Remarks (if any)
1.	Introduction of Ergonomics:	Ergonomics, Ergonomist, social value of Ergonomics, General and Individual Ergonomics,	
2.	Postures and Movement:	Biomechanical, Physiological, Anthropometric Background. Postures: Sitting, Standing Change of Posture, Hand and Arm Postures. Movement: .Lifting, Carrying, Pulling and Pushing	
3.	Information and Operation:	The user, **Information:** Visual, Hearing and Other senses. **Controls for Operation:** Fixed, Wireless, Remote and Hands-Free Controls.	
4.	Environmental Factors:	Noise, Noise Reduction at Source, Noise Reduction through Workplace Design and Work Organization, Hearing Conservation, Vibration, Preventing Vibration, Illumination, Light Intensity, Guidelines on Brightness Differences, Guidelines for the Colour of the Light, Guidelines for Improving Lighting, Thermal Comfort, Heat and Cold, Climate Control.	
5.	Anatomical position, reference planes:	Flexion, Extension, Pronation, Supination, Abduction, adduction, Reference Planes	
6.	Cumulative Trauma Disorders (CTD):	Musculoskeletal disorders, Back and its problem, Neck and its problem, CTDs in the upper extremities, Risks of CTDs, Prevention of CTDs, Treatment of CTDs	
7.	Workstation Design:	Workplace and Work space, principles of workstation design, Ergonomics principles for work space design,	

NED University of Engineering and Technology, Karachi.
Department of Industrial & Manufacturing Engineering
Programme B.E

F/QSP 11/17/00

Course Profile

		Anthropometric data in workplace design, Ergonomics guidelines for seated and standing jobs, **Work tool design,**	
	International ISO Standards on Ergonomics:	Ergonomics Standards, Standards on Posture and Movement, Standards on Information and Operation, Standards on Environmental Factors, Standards on Work Organization, Jobs and Tasks, Standards on the Ergonomics Approach, List of Standards.	

TEXTBOOKS (Book Name, Authors, edition, Publisher, Year)

1. Karl H.E. Kromer, Fitting the Human: Introduction to Ergonomics, Taylor & Francis, 2017.
2. Stephen Pheasent and Christine M. Haslegrave, Bodyspace, Anthropometry, Ergonomics and The Design of Workplace, Taylor & Francis, 2015. (Reference Books (s))

COURSE LEARNING OUTCOME AND ITS MAPPING WITH PROGRAMME LEARNING OUTCOME

Sr. No.	CLOs	Taxonomy level	Programme learning outcome (PLO)
At the end of the course, the student will be able to:			
1.	Apply (V) the principles of Ergonomics and Ergonomics Standards as defined by ISO or other equivalent standards (S) to industrial environment (C).	C-3 (Problem Analysis)	PLO 2 (Problem Analysis)
2.	Differentiate (V) and apply standard ergonomics techniques (S) in workplace design to increase the industrial productivity (C)	C-4 (Analysis)	PLO 4 (Investigation)
3.	Practice (V) the Ergonomics in workplace design techniques (S) individually or in groups in industrial environment (C)	P-3 (Individual and Team work)	PLO 9 (Individual and Team)

REMARKS (if any):

Recommended by : _____ 28/5/22

(Chairperson/Date)

Approved by : _____

(Dean/Date)