



# NED UNIVERSITY

OF ENGINEERING AND TECHNOLOGY

PROSPECTUS FOR POSTGRADUATE PROGRAMME  
LEADING TO POSTGRADUATE DIPLOMA (PGD)

# 2016



FACULTY OF MECHANICAL AND MANUFACTURING ENGINEERING (MME)

<b>1. Brief History of the University</b>	<b>1</b>
<b>2. Administration</b>	<b>3</b>
<b>3. Department of Mechanical Engineering</b>	<b>4</b>
<b>3.1 Departmental Facilities</b>	<b>4</b>
<b>3.2 Principal Faculty for PGD</b>	<b>6</b>
<b>4. Academy of Continuing Engineering Education</b>	<b>8</b>
<b>5. Salient Features of PGD in Coal, Oil and Gas Power Generation</b>	<b>8</b>
<b>6. Courses, Syllabus, and Fee Structure</b>	<b>9</b>
<b>6.1 Courses and Syllabus</b>	<b>9</b>
<b>6.2 Fee Structure</b>	<b>12</b>
<b>7. Rules for Post Graduate Diploma (PGD) Programme</b>	<b>12</b>
<b>7.1 General</b>	<b>12</b>
<b>7.2 Scheme of Studies</b>	<b>13</b>
<b>7.3 Withdrawal and Admission Cancellation</b>	<b>13</b>
<b>7.4 Examination</b>	<b>14</b>
<b>7.5 Award of PGD</b>	<b>15</b>
<b>7.6 General Provision</b>	<b>15</b>



## 1. BRIEF HISTORY OF THE UNIVERSITY

The NED University of Engineering & Technology, Karachi was established in March 1977 under an Act of the Provincial Assembly of Sindh on up gradation of the former NED Government Engineering College, Karachi. From the historical point of view, therefore, the University is fairly young. However, the NED Government Engineering College which originally formed the nucleus of the University structure was set up in 1922 and was thus the oldest engineering institution of Pakistan. Initially starting from an enrolment of 50 students in Civil Engineering more than eight decades ago, the student population now in the three campuses (Main, City & LEJ) has gone up to around 8288 at undergraduate and graduate level.

This institution was initially founded as Prince of Wales Engineering College by the donation of the citizens of Karachi to commemorate the visit of the Prince of Wales in 1921. The College was renamed as NED Engineering College in 1924 in memory of Mr. Nadirshaw Edulji Dinshaw, a well-known philanthropist, whose heirs made substantial donation for its development at the time of his first death anniversary.

After the creation of Pakistan, the Government of the Province of Sindh took over the management of the College on October 17, 1947 and renamed it as NED Government Engineering College, Karachi.

The College remained affiliated to the following Universities before it was raised to the status of full-fledged University:

- (a) The University of Bombay (from inception to 1947)
- (b) The University of Sindh (from 1947 to 1951)
- (c) The University of Karachi (from 1951 to February 1977)

A comprehensive plan was prepared in 1964 to shift the College from the downtown area to a new 40-hectare site adjoining the University of Karachi. The project was executed with the World Bank assistance and the College was shifted to the new Campus in 1975.

The College was upgraded as additional campus of the University of Karachi in 1976 and finally raised to full-fledged Engineering University on March 1, 1977. Further development of the institution is continuing.

The main campus at present has adequate teaching and

laboratory facilities for graduate programmes leading to the degree of Bachelor of Engineering in seventeen disciplines viz Civil, Mechanical, Electrical, Computer & Information Systems, Textile, Electronic, Industrial & Manufacturing, Urban, Telecommunications, Petroleum, Automotive, Materials, Chemical, Polymer & Petrochemical, Metallurgical, Construction and Software along with four Bachelor of Science in Computer Science & Information Technology, Computational Finance, Industrial Chemistry and Applied Physics. Bachelors of Biomedical Engineering and Food Engineering programme are being offered at LEJ campus.

Additionally the University offers degree Programmes in Bachelor of Architecture which is being offered at City Campus.

Master of Engineering degrees are awarded in Civil, Urban and Infrastructure, Earthquake, Mechanical, Electrical, Computer Systems, Environmental, Electronic, Telecommunications, Industrial & Manufacturing, Textile, Chemical, Materials, Automotive and Bio-Medical.



Master of Engineering Management (MEM) programme is also being offered in seven areas of specialization, viz Construction Management, Water Resources Management, Transportation Infrastructure Management, Environmental Management, Energy Management, Quality Management and Industrial Management by the Departments of Civil, Urban & Infrastructure, Environmental, Electrical, Industrial & Manufacturing and Textile Engineering under respective faculties.

The University also offers seven Master of Science (MS) programmes each in Computer Science & Information Technology, Information Security, Disaster Science & Management, Applied Physics, Industrial Chemistry, Applied Mathematics, and Applied Linguistics. Apart from that Master of Urban & Regional Planning and Master of Architecture are also conducted by the Department of Architecture & Planning.





## 2. ADMINISTRATION & ACADEMIC SUPPORT

### Vice-Chancellor

Prof. Dr. M. Afzal Haque  
B.E.(Mech);Ph.D.(UK)

### Deputy Registrar (Academic)

Syed Arshad Hassan  
B.A.; M.A. (Islamic History)

### Dean Faculty of Civil Engineering and Architecture, Dean (CEA)

Prof. Sarosh Hashmat Lodi  
B.E. (Civil) NED; M.S. Oregon State  
University, USA;  
Ph.D. Heriot-Watt University, UK.

### Dean Faculty of Mechanical & Manufacturing Engineering, Dean (MME)

Prof. Dr. Muhammad Tufail  
B.E. (Mech); M.Sc. (UK); Ph.D.(UK);  
Mem, ASME; Asso.Mem. IMechE; Mem.  
ASM; Mem. PEC

### Dean Faculty of Electrical & Computer Engineering, Dean (ECE)

Prof. Dr. Saad Ahmed Qazi  
Ph.D (DSP)(UK);M.Sc (DSP);B.E.(Elect.)

### Dean Faculty of Chemical & Process Engineering, Dean (CPE)

Prof. Dr. Muhammad Tufail  
B.E.(Mech); M.Sc.(UK); Ph.D.(UK);  
Mem, ASME; Asso.Mem. I MechE; Mem.  
ASM; Mem.PEC

### Dean Faculty of Bio-Medical Engineering, Dean (BME)

Prof. Sarosh Hashmat Lodi  
B.E.(Civil) NED;M.S. Oregon State  
University, USA; Ph.D. Heriot-Watt  
University, UK.

### Dean Faculty of Information, Sciences & Humanities, Dean (ISH)

Prof. Dr. Muhammad Tufail  
B.E.(Mech); M.Sc.(UK); Ph.D.(UK);  
Mem, ASME; Asso. Mem.I MechE;  
Mem.ASM; Mem, PEC

### Registrar (Acting)

Mr. Ghazanfar Hussain  
M.Phil / Ph.D in Progress (UoK);  
M.Sc. (Physical Chemistry) (UoK) (Gold  
Medal)





### 3. DEPARTMENT OF MECHANICAL ENGINEERING

The Department of Mechanical Engineering was established in 1937 at the former NED Government Engineering College campus. Currently both undergraduate and post-graduate programmes are offered by the department. The undergraduate programme is based on four years instructional education at the main campus of the University leading to the degree of Bachelor of Engineering (Mechanical). Theoretical instruction is reinforced with adequate laboratory and computational work. The programme is aimed at preparing students to shoulder their professional responsibilities and enable them to pursue higher studies and research in Mechanical Engineering related fields.

The department also offers Master of Engineering degree with specialization in Energy Systems, Design, Mechatronics and Renewable Energy and Master of Engineering Management (MEM) degree in Energy and Plant Management. Ph.D. programme which was initially available only for the faculty members is now open for anyone who has a research interest and desire to upgrade qualification

#### 3.1 Departmental Facilities

The Department of Mechanical Engineering has various laboratories and workshops. Post-graduate laboratories in the areas of Solar Energy, Desalination, Acoustics and Vibrations, Materials Engineering, Hydrogen Energy and Energy Conservation exist in the department and are open for students desirous of carrying out experimental research in these fields. In addition to the above laboratories the department has free access to all the facilities provided by the High Performance Computation Centre such

as parallel computing and access to more than 40 licensed software.

Steam Generation & Steam Turbines Laboratory has a fully functional electric boiler capable of producing steam at 10 bars and 54 kg/h. This steam can be utilized in any experimental rig designed to operate using steam. The boiler is shell-type with two electric resistances requiring 36 kW during operation. A water treatment bench is used for feedwater treatment for boiler but it can also be used as a stand-alone setup for related experiments.

Heat Transfer laboratory is equipped with Linear and Radial Heat Conductors which are used to find out thermal conductivities of various materials in plane wall (Cartesian) and radial directions. Combined Convection and Radiation equipment is used for the analysis of combined effects at varying surface temperatures and air velocities past the surface and allows the combined effects of radiation and convection to be compared with theoretical values. Extended Surface Heat Exchanger is used to study temperature distribution and fin heat transfer rate. Transient heat transfer analysis can be performed using Unsteady State Heat Transfer equipment.

Pressure drop and correlation of friction factors can be investigated using Fluid Friction Pipes Test Bench in Fluid Mechanics Lab. Characteristic curves for various types of pumps can be analyzed against various parameters including RPM, torque and efficiency using Multi Pump Testing Rig. Hydrostatic Pressure Test Bench can be used to determine differential pressure measurements of several fluids.



Acoustics and Vibration Laboratory is fortified with state-of-the-art acoustics, vibration diagnostics, monitoring and analysis equipment. The laboratory has two plane Hard Bearing Dynamic Balancing Machine for rotors. This machine has its utilization in industrial projects as well as in post graduate research. Rotors, weighing from 20 kg to 3200 kg, can be mounted at approximately 5000 rpm and are balanced either by mass addition or mass removal. Extraction of modal parameters by utilizing the Vibration Exciter System (Shaker machine) is also available. It is equipped with Synthesizer Function Generator with complete random and periodic function generator. Response is captured through magnetic accelerometers / strain gauges which can further processed to obtain Frequency Response Functions (FRFs) in FFT analyzer. This equipment can also be utilized for prediction of low frequency eigen modes.

The facility to extract modal parameters through local excitations is also available by employing Impact Hammer facility. An Operating Deflection Shape (ODS) can be plotted on software after the FFT of acquired data. Both Rigid and Flexible modes can be identified through this technique. Compliance, Mobility, Dynamic Stiffness, Impedance and Dynamic Mass of elastic bodies can be predicted through it. Acoustics of any room, office, job floor and workshops etc. can be predicted, quantified, monitored and corrective measures can be made to acceptable dB levels by utilizing Sound Level meters. This equipment is given with data logger on which data can be stored and processed to make sound spectrum according to ISO 9001 standards. It can also be used to generate white noise spectrum.

Precision Vibration level meter can be utilized to predict and monitor vibration levels in g readings of any machine, generator and rotary parts. It has built in data logger for storage and post processing of data.

Several other equipment related to Renewable energy including flat-plate collectors, heat pipes, parabolic concentrators with tracking systems, weather station, pyranometers, tilt adjustment assemblies, PV panels, Thermoelectric generator (TEG) modules are present. Similarly, wind turbine design facilities are also available.

The Department is involved in various coal related projects some of which include coal gasification for Thar coal reserves, technical and economic feasibility of converting an oil fired boiler to coal, clean coal combustion, and coal fired high pressure boiler.

Besides, the department is equipped with a Computational Laboratory that has approximately 40 PCs. All computers are connected through LAN to two HP-Compaq servers with high-speed network support and a separate user profile with full security for each user. Internet access is also available on all computers. Several licensed software like ANSYS, ProE, Solid Edge, Unigraphics, FLUENT, Matlab and AutoCAD are available for use by students.



### 3.1 Principal Faculty for the Programme

The Department of Mechanical Engineering has qualified, well trained and versatile faculty to run Post Graduate Diploma (PGD) Programme in Coal, Oil and Gas Power Generation. The faculty comprises of comprehensively experienced senior faculty members and young faculty members who are talented, energetic and eager to apply themselves in this growing field. Following is a list of faculty members:

#### Chairman

Prof. Dr. Mubashir Ali Siddiqui B.E (Mech); M.S (USA); Ph.D (USA)

#### Professors

1. Prof. Dr. Anjum Khalid B.E (Mech); M.Sc (UK);  
Ph.D (NED)
2. Prof. Dr. –Ing. Naseem Uddin  
(On Ex-Pakistan Leave) B.E (Mech); M.Engg (Mech);  
Ph.D (Germany)
3. Prof. Dr. Nasiruddin Shaikh  
(On Ex-Pakistan Leave) B.E (Mech); M.Engg (Mech);  
Ph.D (Canada)
4. Prof. Dr. Mubashir Ali Siddiqui B.E (Mech); M.S (USA); Ph.D (USA)

#### Associate Professors

1. Dr. Muhammad Shakaib B.E (Mech); M.Sc. (Mech);  
Ph.D (NED)
2. Mr. S. M. Rizwan Azeem B.E (Mech); M.Sc (Engg) (UK)

#### Assistant Professors

1. Dr. Maaz Akhtar B.E (Mech.); M.Engg. (Mfg.); Ph.D (Oman)  
(Mechatronics), (UK); Ph.D (UK)
2. Dr. Rashid Khan B.E. (Mech); M.Sc. (Germany);  
Ph.D (Oman)
3. Dr. S. Murtaza Mehdi B.E (Mech); M.Engg (Mech); Ph.D (Korea)
4. Mr. Muhammad Akhlaque B.Sc.; B.E (Mech); M.Sc. (Env)
5. Mr. Muhammad Kamal Pasha B.E (Mech); M.Sc. (Env)
6. Mr. Imran Sikandar B.E (Mech); MSME (USA);  
Member ASME
7. Mr. Danish Haneef B.E. (Mech); M.Engg (Mech)  
(On higher studies abroad) `
8. Mr. Umair Najeeb Mughal B.E. (Mech); M.Engg (Mech)  
(On higher studies abroad)
9. Mr. M. Ehtesham ul Haque B.E (Mech); MSME (USA)  
(On higher studies abroad)





10. Mr. Muhammad Waseem  
(On higher studies abroad) B.E (Mech); M.Engg (Mfg)
11. Mr. Muhammad Uzair  
(On higher studies abroad) B.E (Mech); M.Engg (Mech)
12. Mr. Masood Ahmed Khan B.E (Mech); M.Sc. (Comp. Sc.);  
M.Engg (Mfg)
13. Mr. Saeed Ahmed  
(On higher studies abroad) B.E (Mech); M.Engg (Mfg)
14. Mr. Muhammad Faisal Alam B.E (Mech); M.Engg (Mfg)  
(On higher studies abroad)
15. Mr. Naveed ur Rehman B.E (Mech); M.Engg (Mech);  
Ph.D (in progress)
16. Mr. Tariq Jamil B.E (Mech); M.Engg (Mech)  
(On higher studies abroad)
17. Ms. Erum Khan B.E (Mech); M.Engg (Mech)
18. Mr. Kashif Noor B.E (Mech); M.Engg (Mech)
19. Ms. Mahrukh B.E (Mech); M.Engg (Mech)  
(On higher studies abroad)
20. Mr. Mumtaz Hussain Qureshi B.E. (Mech); M.Engg (Mech)
21. Mr. S. Ahmad Raza B.E (Mech); M.Engg (Mech)
22. Mr. Muhammad Muzamil B.E (Materials); M.Engg (Mech)
23. Mr. Saqib Sharif B.E (Materials); M.Engg (Mech)

#### Lecturers

1. Mr. Usman Allauddin B.E (Mech); M.Engg (Mech)  
(On higher studies abroad)
2. Mr. Muhammad Azam B.E (Mech); M.Engg (Mfg.)
3. Mr. Umair Bin Asim B.E (Aerospace); M.Engg (Mech)  
(On higher studies abroad)

In addition to regular faculty members qualified personnel in other departments and in the city may be engaged for post-graduate teaching.

Applications in response to advertisement for PGD shall be duly completed and submitted, personally or by registered post to:

**The Chairman**  
**Mechanical Engineering Department**  
**NED University of Engineering & Technology**  
**Karachi 75270, Pakistan**  
**Ph. No: +92-21-99261261-8 Ext: 2206**  
**Fax No: +92-21-99261255**  
**E-mail: [cmec@neduet.edu.pk](mailto:cmec@neduet.edu.pk)**





#### 4. ACADEMY FOR CONTINUING ENGINEERING EDUCATION

NED University has established an academy for engineering professionals to enhance their skills in the relevant field and to keep abreast with the latest development. The objective is met by offering certificate course and post graduate diplomas through continuous study programmes of various durations. The salient features of the academy are:

- Enable engineers remain updated with the recent development in their related discipline through short duration teaching/training programmes which focus mainly on the application aspects of engineering.
- Improvement of knowledge in latest engineering technologies.
- Offer programmes based on expertise of available visiting foreign faculty.
- Provide courses in engineering management to acquaint engineers with requisite managerial positions regarding which they have yet little or no knowledge.
- Provide opportunities for the lower tier in Engineering Profession to improve their qualifications to Pakistan Engineering Council registration level.
- Offer conversion course to existing personnel in various fields and strata of engineering and also enable engineers to get working knowledge of allied disciplines.
- Offer postgraduate diplomas in specific technologies which could subsequently be improved and structured to the level of postgraduate degrees.
- Offer structured programmes in conventional disciplines for engineers who are unable to find time to seek

admission in formal Masters Degree programme but can acquire necessary credit hours over longer periods by attending several such programmes in service.

#### 5. SALIENT FEATURES OF PGD IN COAL, OIL AND GAS POWER GENERATION

Fossil fuels such as coal, oil and gas are the available indigenous and inexpensive energy resource in Pakistan. These fuels have the potential not only to ensure self-sufficiency in energy sector but also to turn Pakistan into a power exporting country. In Pakistan several upcoming and under construction coal and gas power plants are expected to contribute in power generation.

Given the urgent need for technical human resource in upcoming power production projects and to prevent shortage of individuals with relevant expertise, a PGD in the related field will be invaluable. The programme is intended for individuals who have a B.E. in Mechanical Engineering or a related field (Engineering or Science). Courses have been designed to train student the key concepts related to exploitation of coal, oil and gas and power generation, design of fossil fuel power plant, details of main components and operating principles. It is expected that students acquiring this PGD will utilize their knowledge in our emerging industry. Features of the programme are to provide understanding of the:

- (i) Thermodynamic principles of heat, work, and energy in the power generation system
- (ii) Major equipment and subsystems in a power plant
- (iii) Combustion mechanism and mathematical modeling of power systems



(iv) Effects of fossil fuel usage on human health and environment

## 6. COURSES, SYLLABUS AND FEE STRUCTURE

### 6.1 Courses and Syllabus

Following is a list of compulsory and elective courses:

Course Code	Course Title	Credit Hours
<b>COMPULSORY COURSES</b>		
ME 578	Chemical Thermodynamics	3
ME 584	Combustion Technology	3
ME 585	Fossil fuel Power Plants	3
<b>ELECTIVE COURSES</b>		
ME 579	Plant Maintenance	3
ME 580	Coal Gasification	3
ME 586	Heat and Mass Transfer	3
ME 587	Environmental Impacts	3
ME 588	Exploration Techniques	3
ME 589	Reserves Estimation Methods	3

#### ME 578 Chemical Thermodynamics

Review of First and Second Laws of Thermodynamics; Entropy Calculations; Maxwell Relations, Development of Equation of State; Thermodynamics of Phase Equilibria; Gibbs Deuham Equation; Chemical Potential; Activity Coefficient; Fugacity and Fugacity Coefficient; Excess Gibbs Free Energy; Phase Equilibrium at low to moderate pressure; Ideal and Non-Ideal Solutions; Residual and Excess property relation; Property changes of mixing; Heat Effects of Mixing; VLE with Cubic Equation of state; Chemical Reaction equilibrium; Gibbs Free Energy Change and Equilibrium Constant; Evaluation of Equilibrium and conversions; The Phase Rule and Duhem Theorem for Reaction Systems.

#### ME 579 Plant Maintenance

Maintenance philosophy, maintenance procedures and maintenance planning, including the use of computerized maintenance management systems; condition monitoring using vibration and

temperature measurement, and oil analysis; preventive and pro-active maintenance; reliability centered maintenance. Inventory management.

Boiler systems: Operation and maintenance of water treatment units, flue gas systems and steam piping; boiler maintenance issues and safety, Handling and disposal of ash.

Maintenance of other equipment: Shaft alignment; rotor balancing; bearings; couplings; gears and gearboxes; compressors; control valves; conveyors; fans, blowers and fluidizers; dust collectors; pumps; steam traps.

Operating procedures, manuals and instructions including piping and instrumentation diagrams and heat balance diagrams. Coal measurement and consumption monitoring.

#### ME 580 Coal Gasification

Gasification fundamentals, thermodynamics and kinetics of gasification, reactor theory and reactor design. Coal types and their characteristics. Gasification processes and gasifiers (moving bed processes, fluid bed processes, entrained flow processes, miscellaneous gasification processes). Practical Issues; Effect of pressure, coal sizing and drying, reactor design, types of gasifiers, synthesis gas cooling, particulate removal, process measurement, trace compounds in synthesis gas; underground coal gasification, injection and production wells, process control and modeling; applications; auxiliary technologies; oxygen supply, acid gas removal, CO Shift, sulphur recovery. Economics, environmental and safety Issues.

#### ME 584 Combustion Technology

Principles of combustion, Thermochemistry, Chemical Equilibrium, Chemical kinetics, Adiabatic Flame temperature, Stoichiometric combustion, Lean and rich



mixtures, Mixture ratios.

Heat transfer modes: Conduction, Convection, and Radiation, Steady state and transient heat conduction, Lumped heat capacity method, Radiation; Luminous and non-Luminous radiation, Radiation from flame and hot gases.

Phase change: Boiling and Condensation.

Combustion calculations, Proximate analysis, Ultimate analysis, Stoichiometric calculations, Heating values, Wall losses, Qualitative and Quantitative analysis of fuel conversion and its efficiencies.

Diffusion flames, laminar flames, Flame impingement, Flame Configuration and Operating conditions, Empirical Heat Transfer correlations, Flame velocity and its stability.

Governing equations for mass, momentum, energy including chemical reaction, Influence of turbulence, mixing and heat exchange on combustion.

Coal firing, Fuel bed combustion, Burners, Open flame and Radiant burners, Mechanical stokers; pulverized coal system, equipment, crushers, cyclone furnaces, fluidized bed combustion, pressurized fluidized bed combustion, Spray combustion.

### **ME 585 Fossil Fuel Power Plants**

Introduction to power plant design and applications of different types of engines. Otto, Diesel, Stirling and Ericsson cycles.

Characteristics, performance and combustion processes in spark ignition and compression ignition engines; combustion abnormalities.

Steam power plants and their components. Rankine cycle and its modifications. Feedwater treatment, storage and pumping. Steam generators for various fuel types; combustion chambers; fuel systems.

Steam turbines and their design. Condensers and cooling water systems; cooling towers. Introduction to power plant control and instrumentation. Boiler and plant safety; government regulations concerning use of boilers.

Gas turbine plants and their components. Design of compressors and turbines. Combustion systems and factors affecting combustion chamber design and performance, Off-design operation of gas turbines.

Combined cycle power plants; integrated gasification combined cycles.

By-products of power plant operation, environmental impact assessment (EIA) and emission standards.

### **ME 586 Heat and Mass Transfer**

Conduction: Review of analytical methods in heat conduction, numerical methods for steady and unsteady state problems. Numerical methods for solution of steady and unsteady state conduction problems, Lumped capacitance method

Convection: Analysis of isothermal and non-isothermal boundary layers. Exact and approximate solution of laminar and turbulent flow, variable property and high speed effect, Boiling and Condensation

Radiation Heat Transfer: Radiation properties; black body radiation, shape factor of radiations, network analogy, and solar radiation



Heat Exchanger, Types of Heat exchangers, Analysis

Diffusive and convective mass transfer; Fick's Law; Prediction of Diffusion Coefficients, Convective Mass Transport, correlations for mass transfer coefficients, Film Theory

Gas-Liquid Mass Transfer with Chemical Reaction, Analogies with Heat Transfer

### **ME 587 Environmental Impacts**

Refining of fossil fuels, Thermal pollution and its ecological effects, Properties of the atmosphere, Air quality standards, Air pollutants and their sources: carbon monoxide, sulfur oxides, particulates, hydrocarbon, nitrogen oxides, Acid rain, Automobile emission-control devices, Global warming, Ozone depletion

Environmental threats, Ambient air pollution, Greenhouse effect, Attribution of environmental damage to energy utilization, Environmental benefits of energy, Sustainability metrics, Systems analysis approaches, international environmental agreements and conventions.

Coal resources and consumption, effects of usage on human health, impacts of mining including underground mining, surface mining and underground coal gasification. Transport of carbon dioxide, carbon dioxide storage, geologic, ocean and terrestrial storages, mineral carbonation.

### **ME 588 Exploration Techniques**

Field Techniques and remote sensing: Geological mapping; outcrop mapping; global positioning system (GPS); satellite imagery; airborne imagery.

Exploratory drilling: Percussive drilling; rotary drilling; core drills; core barrels; retrieving cores; drilling fluids; techniques to maintain hole opening;

Wireline core drilling; core drills for special purposes; airflush core drilling; layouts of exploratory drilling sites; limitations of core drilling for exploration.

Indirect methods: Borehole logging; deviation of boreholes; earth's resistivity surveying; gravitational method; seismic method; magnetic surveying.

### **ME 589 Reserves Estimation Methods**

Reasons for reserves estimation, classification of reserves, Methods to estimate reserves: statistical, volumetric and performance methods, Log-normal distribution of reserves, Sources and analysis of data, equation to estimate oil and gas initially in place, sources of data: petro physical, fluid and volumetric data

Reservoir conditions: pressure, temperature, regional correlations, Reservoir heterogeneity, Primary recovery efficiency, volumetric mapping

Material balance equation, Reconciliation of material balance and volumetric methods, Standard procedures for coal, oil and gas reserve estimation, Volumetric gas reservoir, Nonretro and retro gases

Usage of geological maps, Reporting of reserves, overburden, depth of seam, seam thickness, Classification of resources and reserves; in situ and recoverable reserves; losses; proven, indicated and inferred reserves

Performance / decline trend analysis, Production declines: hyperbolic, harmonic and exponential declines



## 6.2 FEE STRUCTURE

Following are the University fees for Post Graduate Diploma programme:

### 1- Fee Payable at the time of admission to the Programme

(i) Admission /Re-admission Fee	Rs. 3500
(ii) Enrolment Fee, if applicable	Rs. 1500
(iii) Security Deposit	Rs. 5100
(iv) Internet Fee	Rs. 600
(v) Documents Verification Fee	Rs. 1200

### 2- Fee Payable in each Semester

(i) Tuition & Examination Fee per Course	Rs. 14000
(ii) Library Fee	Rs. 800
(iii) Registration Fee / Semester	Rs. 1000
(iv) Late Fee, if applicable	Rs. 1000
(v) Equivalence Fee; if applicable	Rs. 800

## 7. RULES FOR POSTGRADUATE DIPLOMA (PGD) PROGRAMME

### 7.1 General

#### 7.1.1 Title

These rules may be called the NED University of Engineering & Technology Rules for Post Graduate Diploma in the Faculty of Mechanical and Manufacturing Engineering.

#### 7.1.2 Commencement

These rules shall come into force with immediate effect.

#### 7.1.3 Nature of the Diploma

Successful completion of the programme shall lead to the Post Graduate Diploma (PGD) in the relevant field.

#### 7.1.4 Number of Seats

With the approval of the concerned Dean, the Department shall specify number of seats for the PGD.

### 7.1.5 Criteria and Procedure for Admission

- (i) Candidates must be citizen / resident of Pakistan and possess Bachelor degree in Mechanical or Allied Disciplines or Masters of Science Degree in relevant field (Chemistry, Physics) or equivalent in minimum first division or CGPA 2.4/4.0.
- (ii) To be enrolled in Post Graduate day time/evening programme leading to PGD, the candidate must have attained a high degree of scholarship in his/her undergraduate study in the relevant field and must have demonstrated promise of success in advanced study.
- (iii) Application for admission to PGD studies shall be made prescribed form, and sent to the Chairman of concerned Department, either by hand or by registered post. Any application received after the closing date may not be considered. Application and documents once received shall not be returned.



- (iv) The admission shall be granted on the basis of merit. Merit of successful candidates shall be decided on the basis of admission test, Bachelors / Masters examination results and interview.
- (v) Names of selected candidates shall be displayed on departmental notice board.
- (vi) The selected candidates shall be required to report to the Chairman, Department of Mechanical Engineering for verification of their documents, then payment of prescribed fees and complete registration/enrolment documents within the prescribed date as notified.
- (i) A student shall be required to study three compulsory courses and three elective courses as outlined.
- (viii) The course of study for semester shall be as offered by the Department.
- (ix) A student should get registered in course(s) before the commencement of the semester.
- (x) A student may be allowed to change a course within two weeks after the date of commencement of the classes by the Chairman. No refund of course fee shall be made.
- (xi) The students shall have to enroll in the programme either for studies during day time and/or during evening whichever is offered by the Department.

### **7.1.6 Medium of Instruction**

Medium of instructions shall be English. Foreign applicants shall be required to satisfy the department of his/her English language proficiency before registration. The Department of Humanities shall conduct the required test on the request of the department.

### **7.2 Scheme of Studies**

- (i) The programme shall be of eighteen (18) credit hours.
- (ii) The minimum period of study shall be two semesters (one year), and a maximum of two years shall be allowed for successful completion of PGD.
- (iii) There shall be two semesters in one calendar year namely Spring and Fall.
- (iv) Each semester shall have at least sixteen weeks instruction time followed by examinations.
- (v) The student enrolled shall be required to complete a minimum of 18 credit hours of instructional course work.
- (vi) A candidate shall be allowed to take a maximum load of 09 credit hours per semester.

### **7.3 Withdrawal and Admission Cancellation**

#### **7.3.1 Semester Withdrawal**

Permission to withdraw from any semester may be given under exceptional circumstances by concerned Chairperson and shall be notified accordingly. Intimations to the department should be made within one month of the start of the semester. However, the fees paid shall not be refunded. The student may be readmitted provided the period of absence and study combined does not exceed maximum permissible period of two years.

#### **7.3.2 Programme Withdrawal**

A student, who is unable to continue his studies due to unavoidable circumstances should file an application for withdrawal from the programme. This application is essential for readmission in programme.

#### **7.3.3 Cancellation of Admission**

The admission of a student enrolled in the programme shall be cancelled under the



following circumstances:

- i) If a student does not attend the classes without any official withdrawal;
- ii) If a student is involved in any serious in-discipline;
- iii) If a student fails to make up the deficiency in course; and
- iv) If a student fails to register in a semester.

### 7.3.4 Re-Admission in the Programme

A student who has officially withdrawn from the programme may apply for re-admission, if the period of absence is not more than one year. For absence of more than one year, the student shall have to apply for fresh admission. A student whose admission has been cancelled shall have to apply for fresh admission.

## 7.4 Examination

### 7.4.1 Conduct of Examination

There shall be a final examination conducted at the end of each semester for each course, conducted by Examinations Department.

Maximum marks in the course shall be 100, distributed as 40 for sessional work and 60 for final exam.

### 7.4.2 Class Attendance

The student shall be expected to attend the course classes regularly. A candidate with less than 75 percent attendance in any course shall not be allowed to take final examination in that course.

### 7.4.3 Academic Performance

Academic performance shall be determined on the basis of:

- (i) Grade Point Average (GPA) to be calculated for the courses completed in any

semester or for some selected courses completed in more than one semester

- (ii) Cumulative Grade Point Average (CGPA) to be calculated for all courses completed upto any semester or on completion of eighteen credit hours. The minimum CGPA for qualifying for award of PGD shall be 2.75.

### 7.4.4 Grade Point Average

The following grades / grade points with the equivalent marks shall be awarded to the students on the basis of their performance in each course of study:

Grade	Grade Points	Marks	Remarks
A	4.0	88-100	-
A-	3.7	80-87	-
B+	3.4	75-79	-
B	3.0	70-74	-
B-	2.7	67-69	-
C+	2.4	64-66	-
C	2.0	60-63	-
C-	1.7	57-59	-
D+	1.4	54-56	-
D	1.0	50-53	-
F	0.0	Below 50	Fail
I	-	-	Incomplete
WU	-	-	Unofficial Withdrawal

### 7.4.5 Absence from Examination

Any student who fails to appear in the final examination of any course(s) having been allowed for the same shall be awarded grade I in that course(s). Such student shall be required to take examination the next time the course is offered. If the student fails to appear again, grade 'I' shall be changed to 'F'.

### 7.4.6 Change of Grade/Improvement

A student may repeat a course by registering in the same for grade improvement provided it is offered in that semester. Better grades will be considered for determining





GPA/CGPA. The student will be allowed to take alternate course(s) in lieu of elective courses in order to attain the grade point average 2.75. The student shall be given one year to makeup the deficiency.

#### **7.5 Award of PGD**

A student who has passed all courses with at least 2.75 CGPA and satisfactorily completed all the requirements shall be eligible for award of PGD.

#### **7.6 General Provision**

Regulations and rules of any other programme shall not be applicable to this programme unless otherwise specified by the authority.