

Department of Petrochemical Engineering

List of Courses for Major Degree

Refinery Engineering

S. N.	Sem.	Name of the course	Name of equivalent NPTEL course	NPTEL Sem. (Even/Odd)	Instructor's Name	Duration (weeks)	Credits
1	V	Chemical Technology	Chemical Technology	Video	Prof. I.D. Mall IIT Roorkee	12	4
2	VI	Petroleum ¹ Refinery Engineering	--	--	--	12	4
3	VI	Heterogeneous Catalysis and Catalytic Processes	Heterogeneous Catalysis and Catalytic Processes	Video	Dr. K.K. Pant , I.I.T Delhi	12	4
4	VII	Lubricant, Waxes and Specialty Chemicals ²	--	--	--	12	4
5	VII	Natural Gas Engineering	Natural Gas Engineering	Video	Prof. Pankaj Tiwari IIT Guwahati	08	4

^{1,2} The proposed courses are of specialized type. Therefore mapping and level of content match are difficult. Hence for these courses study material and digital content will have to be developed separately.

Chemical Technology

Unit I

Introduction, Coal Chemicals

Unit II

Paper and Pulp, Soap and detergent

Unit III

Fermentation, Petroleum Refinery

Unit IV

Petrochemicals, Polymers

Unit V

Dye and Pesticides

Text/ References

1. Shrew R.N. and Brink J.A., Chemical Process Industries, McGraw Hill
2. Chemical Technology, I, II, III and IV Indian Institute of Technology, Madras
3. Dryden, Charles E., Outlines of Chemical Technology, affiliated East-West Press Pvt. Ltd.
New Delhi

Petroleum Refinery Engineering

Unit I & II

Multicomponent distillation, calculation of number of stages in distillation, key component concept

Unit III & IV

Flash distillation, dew point and bubble point calculation, concentration and temperature profile in distillation.

Unit V

Comparative study of multicomponent and refinery distillation.

Text/References:

1. B.D. Smith : Design of equilibrium stage processes
2. Vanwinkle ; Distillation

Heterogeneous Catalysis and Catalytic Processes

Unit I

Introduction to basic concept of green catalysis, Solids and bases as catalyst, application of catalyst functionality concept or control

Unit II

Kinetics and reaction on surfaces application of functionality concept for control, Steps in Catalytic reactions

Unit III

Selection, design and preparation of catalyst, Characterization of catalyst, Catalyst deactivation kinetics

Unit IV

Zeolite Catalyst: preparation, characterization and applications, Environmental catalysis and its application

Unit V

Commercial Catalytic reactors, industrially important catalyst and processes

Text/ References

W.D. Breck , Zeolite Molecular sieve structure , chemistry and use, John Wiley & Sons ,NY,1974

Lubricants, Waxes and Specialty Chemicals

Unit I

Lubricating oils, Specifications, characteristics, production, lube specialties, additives.

Unit II

Refining of lubricating oil - solvent, chemical and hydrogenation method, dewaxing DE asphaltting etc. Re-refining of lubricating oil, Asphalt and asphalt specialties, Air blowing and emulsification techniques.

Unit III

Waxes - Introduction, History of waxes and their applications, definitions, Classification- Natural, partially synthetic and fully synthetic wax.

Unit IV

Petroleum wax: Macro-crystalline wax (Paraffin wax), Microcrystalline wax (Micro waxes), Division into product classes of paraffin wax. Production of microwaxes, candles.

Unit V

Process for the manufacture of specialty chemicals such as synthetic lubricants, pore point depressant.

Process for manufacture of flow additive, oil field additives, Naphthaticacid , anti-oxidants and other performance chemicals.

Reference Book:

1. Peter H. Spitz; Petrochemicals 'The Rise of an Industry'
2. Wiley Critical Content Petroleum Technology- Vol-2, Wiley Interscience Publication.

Natural Gas Engineering

Week 1 : Introduction to Natural Gas

Week 2 : Properties of Natural Gas and Reservoir

Week 3 : Natural Gas Production –I

Week 4 : Natural Gas Production –II

Week 5 : Natural Gas Processing –I

Week 6 : Natural Gas Processing -II

Week 7: Natural Gas : Measurement and Transportation

Week 8 : Unconventional production of Natural Gas