COURSE TITLE: INDUSTRIAL CHEMISTRY II  
COURSE NUMBER: CHEM 3112  
CREDIT HOURS: 3  
CONTACT HOURS: 3 LEC. HRS/WEEK  
PREREQUISITE: CHEM 3111  
**Course Description**

Basic organic industrial processes (coal petroleum, main petrochemicals, basic organic products, plastics, rubber and fibers; sugar; oils and fats, detergents, paper; foodstuff, pharmaceuticals, agrochemicals; dye stuff,; leather).

**Learning Outcomes**

By the end of this course students should be able to:

* discuss the processing of coal and petroleum into value added products
* describe the industrial organic synthesis and manufacture and properties of plastics, rubber, fibers
* highlight the chemistry of oils, fats, soaps, detergents, pharmaceuticals, dyestuffs and insecticides Sucrose, Paper, Leather and Food processing Industries

Course outline:

1. Coal and Petroleum Processing  
   1.1. Origin of coal and its ranking  
   1.2. Carbonisation of coal  
   1.3. Gasification of coal  
   1.4. Hydrogenation of coal  
   1.5. Petroleum – origin, Classification and mining  
   1.6. Distillation of petroleum  
   1.7. Rating of Petrol and Diesel  
   1.8. Cracking, Alkylation, Hydrotreating and Reforming
2. Main Petrochemicals  
   2.1. Introduction to petrochemicals  
   2.2. Chemical conversions for manufacture of petrochemicals  
   2.3. Petrochemicals from Methane, Ethylene, Propylene, Butylenes and BTX  
   2.4. Manufacture of Acetylene, Ethylene oxide, Acrylonitile, Dimethyl terephthalate
3. Basic Organic Products  
   3.1. Introduction to Industrial organic synthesis  
   3.2. Manufacture of Methanol and Isopropanol  
   3.3. Manufacture of Formaldehyde and Acetaldehyde  
   3.4. Manufacture of Acetic acid  
   3.5. Manufacture of Acetone  
   3.6. Manufacture of Phenol and Styrene
4. Plastics, Rubber and Fibers  
   4.1. Introduction to polymers  
   4.2. Nomenclature of polymers  
   4.3. Addition and condensation polymerization  
   4.4. Methods of Polymerisation  
   4.5. Effect of polymer structure on properties  
   4.6. Plastics-Properties and classification  
   4.7. Moulding constituents of plastics  
   4.8. Moulding of plastics into articles  
   4.9. Preparation, properties and uses of PE, PVC and Bakelite  
   4.10. Rubber – properties  
   4.11. Natural and synthetic rubber
5. Sucrose Industry  
   5.1. Manufacture of cane sugar  
   5.2. Manufacture of sucrose from Beet Root  
   5.3. Testing of sugar
6. Oils, Fats and Detergents  
   6.1. Introduction to oils and fats  
   6.2. Properties of oils and fats  
   6.3. Classification of oils  
   6.4. Manufacture of vegetable oils  
   6.5. Animal fats and oils  
   6.6. Analysis of oils and fats  
   6.7. Hydrogenation of oils  
   6.8. Manufacture of soap  
   6.9. Introduction to detergents
7. Paper Industry  
   7.1. Manufacture of pulp by mechanical and chemical process  
   7.2. Refining of pulp  
   7.3. Manufacture of paper
8. Chemical foodstuff processing  
   8.1. Introduction to fermentation  
   8.2. Alcohol Beverages  
   8.3. Manufacture of Beer, Spirit and wines.
9. Pharmaceuticals  
   9.1. Sulfonamide drugs  
   9.2. Antimalarial, antibacterial and antiviral agents  
   9.3. Antibiotics
10. Chemicals for agriculture  
    10.1. Introduction to Insecticides  
    10.2. DDT, BHC and Parathion  
    10.3. Fungicides – Baygon and 2,4,6-Trichloro Phenol  
    10.4. Herbicides–2,4-D and 2,4,5–T  
    10.5. Pesticides pollution
11. Dyestuff  
    11.1. Introduction to dyes  
    11.2. Colour and constitution  
    11.3. Methods of dyeing  
    11.4. Classification of dyes
12. Leather Industry  
    12.1. Animals skin  
    12.2. Preparation of skin for tanning  
    12.3. Vegetable tanning  
    12.4. Chrome tanning  
    12.5. Leather finishing

Reference materials:  
1. P.C. Jain and M. Jain, Engineering Chemistry by; Dhanpatrai & sons, Eleventh Edition,  
1996.  
2. B.K. Sharma, Industrial Chemistry, Goel publishing house; Eleventh Edition, 2004.  
3. J.N. Delgado and W.A. Remers, Text book of organic medicinal and pharmaceutical  
chemistry