

COURSES FOR M.PHIL/Ph.D. IN PHARMACEUTICAL SCIENCES

PHARM-501

CREDIT HOURS 2

MATHEMATICS FOR PHARMACISTS

Functions and Graphs: Graphs plot and coordinates, power indices and exponents, Binomial theorem and Pascal's triangle, dealing with fractions, solving equations, manipulating units, The slope of curve.

Special Functions: Logarithms, The exponential function, Trigonometric functions and their properties.

Differential Calculus: Differentiation, proofs of derivatives of exponential and trigonometric functions, more complex differentiation, Higher derivatives, definitions, uses of second derivatives, finding minima and maxima and inflexions, Differentials, Graphical representation of functions involving more than two variables.

Integral Calculus: Introduction, indefinite integration, Examples of indefinite integrals, definite integration, method of integration, numerical integration.

RECOMMENDED BOOKS

- 1: Tebbutt P, (1994), "Basic mathematics for chemist" John Wiley and Sons, NY.
- 2: Yusuf SM, (1970), "Mathematical operations" Ilmi Kitab Khana, Lahore.

PHARM-502

CREDIT HOURS 2

STATISTICS FOR PHARMACISTS

Introduction, Application of statistics in pharmaceutical and biological sciences.

frequency distribution, graphical representation of data., measures of central tendency and variation, sampling, various sampling techniques, estimation of parameters (method of least squares), testing of hypothesis and significance,. Z-test, t-test and F-test, ANOVA. Regression and correlation,

Lab. Work STATISTICS FOR PHARMACISTS CREDIT HOURS 1

Analysis of various problems using "MINITAB" a statistical package.

Recommended Books

- 1: Samuels, M L, (1991) "Statistics For The Life Sci." Dellen Publishing Co., San Francisco.
- 2: Mendenhall, W and Beaver, R.J (1994). Introduction to probability and statistics" 9th Ed. Duxbury Press Belmont (USA).

PHARM-503

CREDIT HOURS 2

COMPUTER FOR PHARMACIST

MS-Word, Grapher, Harvard-graphic, Chem-Window, Excell, Malium, internet Basic language.

Recommended Books

- 1: Miller M. Using Window 98 (1998). Que Corp. 201 W 103rd St. Indianapolis In USA.
- 2: Computer To day, McGraw-Hill Co. NY, USA.

PHARM-701**CREDIT HOURS 3****PHARMACEUTICAL DOSAGE FORM**

Dosage forms design, product development, pilot plant scale up, pre-formulation.

Lab Work. PHARMACEUTICAL DOSAGE FORM CREDIT HOURS 1

Preparation of tablets using various formulations.

Preparation of capsules using various formulations

Preparation of liquid dosage-forms using various formulations

RECOMMENDED BOOKS

- 1: Cooper and Gunn's, (1994) "Dispensing for Pharmaceutical students" CBS pub. (USA).
- 2: Collet MD, (1990) "Pharmaceutical Dispensing" ELBS, Livingston.
- 3: Wholi DPS, (1993) 'Dry formulation manual' Eastern Publishers, UK.
- 4: Groves JM (1996) "Sterile Pharmaceutical Manufacturing" Inter Pharma Press , USA.

PHARM-702**CREDIT HOURS 3****PHARMACEUTICAL DISPENSING**

Good pharmacy practice in compounding dispensing, Formulation and dispensing of antibiotics, in dry suspension and capsules.

Compounding and dispensing of powder and oral unit dosage form (advantages, disadvantages of non-enclosed oral powder, bulk powder and its uses, divided powder and granules

Capsules and their various types,

Lozenges, pills and tablets.

Dispensing of ointments, creams, paste and jellies.

Incompatibilities: physical, chemicals and therapeutic incompatibilities and their prevention.

Lab. work PHARMACEUTICAL DISPENSING CREDIT HOURS 1

Dispensing and therapeutics incompatibilities in various dispensed formulations.

RECOMMENDED BOOKS

- 1: Cooper and Gunn's, (1994) "Dispensing for Pharmaceutical students" CBS pub. (USA).
- 2: Collet MD, (1990) "Pharmaceutical Dispensing" ELBS, Livingston, (UK).
- 3: Wholi DPS, (1993) "Dry formulation manual" Eastern Publishers. (UK)
- 4: Groves JM (1996) "Sterile Pharmaceutical Manufacturing" Inter Pharma Press , USA.

PHARM-703**CREDIT HOURS 3****VALIDATION OF QUALITY ASSURANCE****Recommended Books:**

- 1: Ahmad, T. and Khalid, R. (1985). Proceeding of International symposium of Policies, management and quality assurance of pharmaceuticals. Ministry of Health, Govt. of Pakistan. Islamabad.
- 2: Bryant R, (1989) "The pharmaceutical quality control hand book" Aster Pub. Corp. Eugene. USA
- 3: Pakisatn Pharmacopoes, (1973)
- 4: British Pharmacopoes (1993).
- 5: USP (1996).

PHARM-704**CREDIT HOURS 3****VALIDATION OF PRODUCTION****Recommended Books:**

- 1: Ahmad, T. and Khalid, R. (1985). Proceeding of International symposium of Policies, management and quality assurance of pharmaceuticals. Ministry of Health, Govt. of Pakistan. Islamabad.
- 2: Bryant R, (1989) "The pharmaceutical quality control hand book" Aster Pub. Corp. Eugene. USA
- 3: Pakisatn Pharmacopoes, (1973)
- 4: British Pharmacopoes (1993).
- 5: USP (1996).

PHARM-705**CREDIT HOURS 2****VALIDATION OF POLICIES**

Recommended Books:

- 1: Ahmad, T. and Khalid, R. (1985). Proceeding of International symposium of Policies, management and quality assurance of pharmaceuticals. Ministry of Health, Govt. of Pakistan. Islamabad.
- 2: Bryant R, (1989) "The pharmaceutical quality control hand book" Aster Pub. Corp. Eugene. USA

PHARM-706**CREDIT HOURS 3****PACKAGING MATERIAL**

Requirements, Effect of various packing materials on efficacy and safety of various pharmaceutical dosage-form, specifications of various packing material use in injectables, tablets, capsules, syrups, dry-syrups and suspensions.

Recommended Books:

- 1: Cooper and Gunn's, (1994) "Dispensing for Pharmaceutical students" CBS pub. (USA).
- 2: Collet MD, (1990) "Pharmaceutical Dispensing" ELBS, Livingston .
- 3: Wholi DPS, (1993) 'Dry formulation manual' Eastern Publishers. U.K.
- 4: Groves JM (1996) "Sterile Pharmaceutical Manufacturing" Inter Pharma Press , USA.

PHARM-707**CREDIT HOURS 3****PHARMACEUTICAL EXCIPIENTS (BINDERS, DILUENTS, PRESERVATIVES, GLIDANT AND COLOURANTS)**

Specification of various excipients used in injectables, tablets, capsules, syrups, dry-syrups and suspensions.

Recommended Books:

- 1: Cooper and Gunn's, (1994) "Dispensing for Pharmaceutical students" CBS pub. (USA).
- 2: Collet MD, (1990) "Pharmaceutical Dispensing" ELBS, Livingston .
- 3: Wholi DPS, (1993) 'Dry formulation manual' Eastern Publishers. U.K.
- 4: Groves JM (1996) "Sterile Pharmaceutical Manufacturing" Inter Pharma Press , USA.

PHARM-708**CREDIT HOURS 3****PHARMACY AND THERAPEUTICS**

Basic principles, clinical pharmacokinetics, patient education and chronic disease monitoring, fluid and electrolyte therapy, acid base balance, general nutrition, parenteral and enteral nutrition, drug abuse, alcoholism, critical case, transplantation.

RECOMMENDED BOOKS

- 1: Herfindal ET, Gourley RD and Hart LL (1992), "Clinical Pharmacy and Therapeutics" Williams and Wilkins, USA.
- 2: Smith GDG and Aronson JK, (1994) "Oxford Text Book of Clinical Pharmacy and Therapy" Oxford University Press, UK
- 3: Sneider W, (1986) "Drug development: from Lab. to Clinic" John Wiley & Sons, NY.
- 4: Burley DM and Binns TB, (1985) "Pharmaceutical medicine" Edward Arnold, London.

PHARM-709**CREDIT HOURS 3****QUALITY CONTROL OF FINISHED DOSAGE-FORM**

Quality Control of Solid dosage form (Tablets, capsules, dry-syrup, powder)
 QC and QA, Process and dosage form, control of tablets, capsules, dry syrup
 and powder, statistical interpretation of results. Official and unofficial test for
 the products.

**Lab.Work of QUALITY CONTROL OF
FINISHED DOSAGE-FORM****CREDIT HOURS 1**

Various quality control test and analysis for various dosage-forms

RECOMMENDED BOOKS

- 1: Braun RE, (1987) "Introduction to instrumental analysis" McGraw Hill Book Co. NY.
- 2: Bryant R, (1989) "The pharmaceutical quality control hand book" Aster Pub. Corp. Eugene. USA.
- 3: Pakisatn Pharmacopoes, (1973)
- 4: British Pharmacopoes (1993).
- 5: USP (1996).
- 6: Chapman JR, (1986) " Practical organic Mass Spectroscopy" John-Wiley & Sons. NY

PHARM-710**CREDIT HOURS 3****METABOLIC PATHWAY-I**

- 1: Integration of Metabolism: strategy of metabolism, recurring motifs in metabolic regulation, major metabolic pathways and control sites, key functions, metabolic properties of the major organ, hormonal regulation of fuel metabolism. Synthesis, storage, release, and degradation of neurotransmitters (dopamine, adrenaline, nor-adrenaline and acetylcholine).

RECOMMENDED BOOKS:

- 1: Stryer L., (1988) "Biochemistry" W.H. Freeman and Co. NY.
- 2: Murray KR, Granner KD, Mayes PA and Rodwell VW (1988) "Harper's Biochemistry" Appleton & Lange, Norwalk., USA.

PHARM-711**CREDIT HOURS 3****METABOLIC PATHWAY-II**

A: membrane lipids, phospholipids, plasmalogens, gangliosides,

B: steroid-Hormones: hormones of adrenal cortex and sex hormones.

C: secondary messengers and metabolites of arachidonic acids.

RECOMMENDED BOOKS:

- 1: Stryer L., (1988) "Biochemistry" W.H. Freeman and Co. NY.
- 2: Murray KR, Granner KD, Mayes PA and Rodwell VW (1988) "Harper's Biochemistry" Appleton & Lange, Norwalk., USA.

PHARM-712**CREDIT HOURS 3****ELECTROCHEMISTRY in Pharmacy**

Electrochemistry and pH: Electrolytic cells, Faraday's Laws, conductimetric titrations, potentiometry, Nernst equation, types of electrodes, acid/base theory, titration curve, Redox system, polarography, amperometric titrations.

RECOMMENDED BOOKS

- 1: Braun RE, (1987) "Introduction to instrumental analysis" McGraw Hill Book Co. NY.
- 2: Bryant R, (1989) "The pharmaceutical quality control hand book" Aster Pub. Corp. Eugene. USA
- 3: Pakisatn Pharmacopoes, (1973)
- 4: British Pharmacopoes (1993).
- 5: USP (1996).
- 6: Chapman JR, (1986) "Practical organic Mass Spectroscopy" John-Wiley & Sons. NY.

PHARM-713**CREDIT HOURS 3****CLINICAL DISORDERS AND THEIR MANAGEMENT-I**

Diseases of cardiovascular, respiratory, genitourinary and digestive system. blood, musculoskeletal system, nervous system including psychiatric disorders, gynecological disorders.,

RECOMMENDED BOOKS

- 1: Herfindal ET, Gourley RD and Hart LL, (1992) "Clinical Pharmacy and Therapeutics" Williams and Wilkins, USA.
- 2: Smith GDG and Aronson JK, (1994) "Oxford Text Book of Clinical Pharmacy and Therapy" Oxford University Press, UK
- 3: Sneader W, (1986) "Drug development: from Lab. to Clinic" John Wiley & Sons, NY.
- 4: Burley DM and Binns TB, (1985) "Pharmaceutical medicine" Edward Arnold, London.

PHARM-714**CREDIT HOURS 3****HORMONES AND AUTO-COIDS AND THEIR ANTAGONISTS**

RECOMMENDED BOOKS

- 1: Spector R, (1986) "The scientific basis of clinical pharmacology; principles and examples" Little Brown and Co. Boston. USA.
- 2: Graham-Smith DG and Aronson JK, (1985) "Oxford Text Book of clinical pharmacology and drug therapy" Oxford Univ. Press, UK.
- 3: Ruther RL, (1990) "Pharmacology: drug action and reactions" Little Brown and Co. Boston. USA .
- 4: Gillies HC , Roger HJ, Spector RG and Traunce JR, (1989) "A text book of clinical pharmacology" Edward Arnold, London .

PHARM-715**CREDIT HOURS 3****PHYSIOLOGY OF CARDIOVASCULAR RESPIRATORY/
URINARY and DIGESTIVE SYSTEMS****GENITO****RECOMMENDED BOOKS:**

- 1: Stryer L., (1988) "Biochemistry" W.H. Freeman and Co. NY.
- 2: Murray KR, Granner KD, Mayes PA and Rodwell VW (1988) "Harper's Biochemistry" Appleton & Lange , Norwalk., USA.

PHARM-716**CREDIT HOURS 3****PHYSIOLOGY OF NERVOUS SYSTEM****i: CENTRAL NERVOUS SYSTEM**

Cerebrum, Cerebellum, Hypothalamus, Basal Ganglia, Cranial Nerves, Brain Stem,

ii: PERIPHERAL NERVOUS SYSTEM

Autonomic Nervous System, Neuron, Motor end plate

iii: SPECIAL SENSES**Recommended Books**

- 1: Gyuton AGC (1996), Text Book of Physiology, 9th.Ed., W B Saunders Co. UK.
- 2: Samson w. (1994), Applied physiology, 8th. Ed., W.H. Freeman and Co. NY

PHARM-717**CREDIT HOURS 3****PHARMACOLOGY OF NERVOUS SYSTEM**

- i) Basic concept
- ii) Drugs acting on CNS

- iii) Drugs acting on autonomic nervous system

RECOMMENDED BOOKS

- 1: Spector R, (1986) "The scientific basis of clinical pharmacology; principles and examples" Little Brown and Co. Boston. USA.
- 2: Graham-Smith DG and Aronson JK, (1985) "Oxford Text Book of clinical pharmacology and drug therapy" Oxford Univ. Press, UK.
- 3: Ruther RL, (1990) "Pharmacology: drug action and reactions" Little Brown and Co. Boston. USA. .
- 4: Gillies HC , Roger HJ, Spector RG and Traunce JR, (1989) "A text book of clinical pharmacology" Edward Arnold, London .

PHARM-718

CREDIT HOURS 3

ADVANCE PHARMACOLOGY

drug absorption and bioavailability, bioequivalence, drug metabolism, pharmacogenetics, effect of disease on drug kinetics, drug in pregnancy, lactation, neonates, pediatric and elderly patients. introduction of new drugs, clinical trials and adverse reaction, surveillance, drug-drug interactions.

RECOMMENDED BOOKS

- 1: Spector R, (1986) "The scientific basis of clinical pharmacology; principles and examples" Little Brown and Co. Boston. USA..
- 2: Graham-Smith DG and Aronson JK, (1985) "Oxford Text Book of clinical pharmacology and drug therapy" Oxford Univ. Press, UK.
- 3: Ruther RL, (1990) "Pharmacology: drug action and reactions" Little Brown and Co. Boston. USA.
- 4: Gillies HC , Roger HJ, Spector RG and Traunce JR, (1989) "A text book of clinical pharmacology" Edward Arnold, London .

PHARM-719

CREDIT HOURS 4

NATURAL PRODUCTS-I

Chemistry, reactions, synthesis, biosynthesis, pharmaceutical and pharmacological uses of the followings:

Alkaloids: Introduction, Ephedrine, Papverine, Atropine, Quinine, Colchicine, Narcotic drugs (Introduction only) Morphine, Mescaline, Heroin, LSD, Cannabinoids, Terpenes: Citral, Menthol, Camphor, Santonin.

Lab.Work of NATURAL PRODUCTS-I**CREDIT HOURS 1**

Extraction and isolation of various active constituents from natural products.

Recommended Books

- 1: Finar,I.L., (1994) "Organic Chemistry Vol-I, The Fundamental Principals" English Language Book Society/Longman, Essex, England.
- 2: Finar,I.L., (1994) "Organic Chemistry Vol-II, Stereochemistry and the Chemistry of Natural Products" English Language Book Society/Longman, Essex, England
- 3: Wolf,M.E. (1992) "Burger's Medicinal Chemistry. Vol-I, II and III" John Wiley and Sons, Chichester, England.

PHARM-720**CREDIT HOURS 3****PHARMACOGNOSY of Alkaloidal and Glycosidal Drugs**

- 1: Steroids, source, Chemistry and therapeutic application.
- 2: General study of metabolic pathways in the biosynthesis of the followings:
 - i: Cardiac glycosides
 - ii: pyridine, piperidine and indol alkaloids

Recommended Books:

- 1: Tyler E, Brady RL and Robbers EJ, (1988), Pharmacognosy, (9th Ed), Lea & Febiga, Philadelphia.
- 2: Trease GE and Evan WC, (1992), Pharmacognosy (12th Ed), ELBS, UK.

PHARM-721**CREDIT HOURS 3****ADVANCE PHARMACOGNOSY**

- 1: Pharmaceutical products from animal sources.
- 2:
 - i: Antibiotics screening and commercial production, modes, mechanism and bases of toxicity.
 - ii: Pharmacognostic studies of some important medicinal and poisonous plants from Pakistan.
- 3: Hallucinogenic, allergenic, teratogenic and other toxic plants.

Recommended Books:

- 1: Tyler E, Brady RL and Robbers EJ, (1988), Pharmacognosy, (9th Ed), Lea & Febiga, Philadelphia.
- 2: Trease GE and Evan WC, (1992), Pharmacognosy (12th Ed), ELBS, UK.

PHARM-722**CREDIT HOURS 1**

SMALL LABORATORY PROJECT WORK

PHARM-723 **CREDIT HOURS** 1

SEMINAR

PHARM-724 **CREDIT HOURS** 3

SPECIAL TOPIC IN EXPERIMENTAL PHARMACOLOGY

PHARM-725 **CREDIT HOURS** 3

STEREOCHEMISTRY IN PHARMACY

PHARM-726 **CREDIT HOURS** 3

GENERAL MICROBIOLOGY

PHARM-727 **CREDIT HOURS** 3

MICROBIOLOGY OF PHARMACEUTICALS

PHARM-801 **CREDIT HOURS** 3

KINETIC PRINCIPLES AND STABILITY TESTING

Order of reactions, therapeutics consideration, influence of different factors on the stability of pharmaceutical products, stability testing.
Safety and efficacy of thermolabile and photosensitive drugs.

Lab. Work

KINETIC PRINCIPLES AND STABILITY TESTING CREDIT HOURS 1

To study the stability of various preparations.

RECOMMENDED BOOKS

- 1: Cooper and Gunn's, (1994) "Dispensing for Pharmaceutical students" CBS pub. (USA).
- 2: Collet MD, (1990) "Pharmaceutical Dispensing" ELBS, Livingston .
- 3: Wholi DPS, (1993) 'Dry formulation manual" Eastern Publishers. U.K.
- 4: Groves JM (1996) "Sterile Pharmaceutical Manufacturing" Inter Pharma Press , USA.

PHARM-802 **CREDIT HOURS** 3

DRUG STABILITY

- 1: Drug decomposition, stabilization and preservation, kinetics of complex reactions, accelerated storage test, expiry dates.
- 2: Effect of physical and chemical factors on drug stability

- 3: Thermal and photostability of pharmaceutical substances in solid and liquid dosage forms; photochemical interaction, photocatalysis and photosensitization of drugs, oxidative hydrolytic, addition racemization and epimerisation reactions using drugs as typical examples.

RECOMMENDED BOOKS:

- 1: Connors CA, Amidon GL and Stell VJ. (1986) "Chemical stability of Pharmaceuticals" Wiley-Interscience, NY
- 2: Lachman L (1992) "Theory and Practice of Industrial Pharmacy" (3rd Ed.), Lea and Febiger, Philadelphia
- 3: Cooper MS. (1973) "Pharmaceutical product stability: In QC in pharmaceutical Industry" Academic Press, NY.

PHARM-803

CREDIT HOURS 3

FORMULATION OF INJECTIONS

Vehicles, osmotic pressure of the solvents, calculation for iso-osmotic (with blood and tears), preservatives and stability of the medicaments.

Packing and labeling of sterile and dispensed preparation.

Sterilization, preservation and stabilization methods of eye drops.

Microbial aspect of sterilization process.

RECOMMENDED BOOKS

- 1: Cooper and Gunn's, (1994) "Dispensing for Pharmaceutical students" CBS pub. (USA).
- 2: Collet MD, (1990) "Pharmaceutical Dispensing" ELBS, Livingston, (UK).
- 3: Wholi DPS, (1993) 'Dry formulation manual' Eastern Publishers, (UK)
- 4: Groves JM (1996) "Sterile Pharmaceutical Manufacturing" Inter Pharma Press, USA

PHARM-804

CREDIT HOURS 4

SPECTROPHOTOMETRIC METHODS FOR PHARMACEUTICAL ANALYSIS

- 1: Qualitative and Quantitative Spectrometric methods for pharmaceutical and Biomedical analysis (U.V.-VISIBLE, IR, FLUOROMETRIC Methods)
Theory, Instrumentation, UV-Visb. -Derivative spectroscopy, Analytical applications, Bio-medical, multicomponent analysis. and pharmaceutical applications. FT-IR

RECOMMENDED BOOKS

- 1: Braun RE, (1987) "Introduction to instrumental analysis" McGraw Hill Book Co. NY.
- 2: Bryant R, (1989) "The pharmaceutical quality control hand book" Aster Pub. Corp. Eugene. USA
- 3: Pakisatn Pharmacopoes, (1973)

- 4: British Pharmacopoes (1993).
- 5: USP (1996).

PHARM-805**CREDIT HOURS 3****MASS SPECTROMETRY**

Mass spectrometry and its applications to qualitative and quantitative analysis of pharmaceuticals. Theory, Instrumentation, EI, NICI and FAB methods for the analysis of pharmaceutical and biomedical substances.

RECOMMENDED BOOKS

- 1: Braun RE, (1987) "Introduction to instrumental analysis" McGraw Hill Book Co. NY.
- 2: Bryant R, (1989) "The pharmaceutical quality control hand book" Aster Pub. Corp. Eugene. USA.
- 3: Pakisatn Pharmacopoes, (1973)
- 4: British Pharmacopoes (1993).
- 5: USP (1996).
- 6: Chapman JR, (1986) " Practical organic Mass Spectroscopy" John-Wiley & Sons. NY

ADVANCED INSTRUMENTAL TECHNIQUES

PHARM-806

CREDIT HOURS 3

NMR, Atomic Absorption Spectrophotometry, Flame Photometry, Theory, instrumentation and pharmaceutical applications.

RECOMMENDED BOOKS

- 1: Braun RE, (1987) "Introduction to instrumental analysis" McGraw Hill Book Co. NY.
- 2: Bryant R, (1989) "The pharmaceutical quality control hand book" Aster Pub. Corp. Eugene USA.
- 3: Pakistan Pharmacopoes, (1973)
- 4: British Pharmacopoes (1993).
- 5: USP (1996).

PHARM-807**CREDIT HOURS 3****DRUG METABOLISM:**

- i Pathways of drug metabolism
- ii Enzymology and molecular mechanism of drug metabolism
- iii Induction and inhibition of drug metabolism
- iv Factor affecting drug metabolism: internal and external factors
- v Types of metabolic reactions of drugs and related organic compounds
- vi Metabolic reactions based on functional groups
- vii Pharmacological and toxicological aspects of drug metabolism

RECOMMENDED BOOKS:

- 1: Gibson GG and Skett P (1986) "Introduction to Drug Metabolism" Chapman and Hall, London.
- 2: Wilson GO, Gisvold O and Dverge RF (1988) "Text Book of organic Medicinal and Pharmaceutical Chemistry" (7th. Ed.) JB Lippencott Co. Philadelphia , Toronto.

PHARM-808**CREDIT HOURS 3****SYNTHETIC CHEMISTRY-1**

The Disconnection Approach, Basic Principles: Synthesis of aromatic and heterocyclic aromatic compounds, the order of events, C- X Disconnection, one group and two groups, Amine Synthesis, Protecting groups, C-C disconnection , Alcohols, Carbonyl Compounds, Stereoselectivity, Choosing a disconnection..

RECOMMENDED BOOKS

- 1: Staurt, W. (1986) "Organic Syntheses The Disconnection Approach" John Wiley and Sons, Chichester, England.
2. Staurt, W. (1986) "Work Book for Organic Syntheses The Disconnection Approach" John Wiley and Sons, Chichester, England
3. I.Fleming, (1988) "Selected Organic Syntheses, A Guide Book for Organic Chemists" John Wiley and Sons, Chichester, England.

PHARM-809**CREDIT HOURS 3****BIO-POLYMERS**

Introduction, Methods for determining the size, shape and molecular weight of macromolecules, Electrophoresis, Stereochemistry of Proteins, Stability of proteins in solution, Binding of Legend Protein, Techniques for the study of protein conformation in solution.

RECOMMENDED BOOKS

- 1: Change P, (1977) "Physical chemistry with applications to biological system"

collin Macmillan , Inter. Ed. NY.

- 2: Billmyar G, 91988) “Text Book of Polymer Chemistry” Oxford Pub. Co..

PHARM-810

CREDIT HOURS 3

CLINICAL DISORDERS AND THEIR MANAGEMENT-II

Endocrine and metabolic disorders, diseases of skin, E.N.T.

RECOMMENDED BOOKS

- 1: Herfindal ET, Gourley RD and Hart LL, (1992) “Clinical Pharmacy and Therapeutics” Williams and Wilkins, USA.
- 2: Smith GDG and Aronson JK (1994), “Oxford Text Book of Clinical Pharmacy and Therapy” Oxford University Press, UK
- 3: Sneider W, (1986) “Drug development: from Lab. to Clinic” John Wiley & Sons, NY.
- 4: Burley DM and Binns TB, (1985) “ Pharmaceutical medicine” Edward Arnold, London.

PHARM-811

CREDIT HOURS 3

ANTIBIOTICS and CHEMOTHERAPEUTIC AGENTS

RECOMMENDED BOOKS

- 1: Spector R, (1986) “The scientific basis of clinical pharmacology; principles and examples” Little Brown and Co. Boston. USA..
- 2: Graham-Smith DG and Aronson JK, (1985) “Oxford Text Book of clinical pharmacology and drug therapy” Oxford Univ. Press, UK.
- 3: Ruther RL, (1990) “Pharmacology: drug action and reactions” Little Brown and Co.Boston. USA.
- 4: Gillies HC , Roger HJ, Spector RG and Traunce JR, (1989) “A text book of clinical pharmacology” Edward Arnold, London .

PHARFM-812

CREDIT HOURS 3

**PHARMACOLOGY OF CARDIOVASCULAR RESPIRATORY/
GENITO URINARY and DIGESTIVE SYSTEMS**

RECOMMENDED BOOKS

- 1: Spector R, (1986) "The scientific basis of clinical pharmacology; principles and examples" Little Brown and Co. Boston. USA.
- 2: Graham-Smith DG and Aronson JK, (1985) "Oxford Text Book of clinical pharmacology and drug therapy" Oxford Univ. Press, UK.
- 3: Ruther RL, (1990) "Pharmacology: drug action and reactions" Little Brown and Co. Boston. USA.
- 4: Gillies HC, Roger HJ, Spector RG and Traunce JR, (1989) "A text book of clinical Pharmacology" Edward Arnold, London.

PHARM-813**CREDIT HOURS 3****Pharmacology****THE DRUG THERAPY OF DISEASES-I**

The nervous system, analgesic and anti-rheumatic drugs, general and local anaesthetic, muscle relaxant, cardiovascular drugs, respiratory system, diuretics and drug acting on kidneys. The alimentary system and liver, vitamins and therapeutic nutritional drugs.

RECOMMENDED BOOKS

- 1: Spector R, (1986) "The scientific basis of clinical pharmacology; principles and examples" Little Brown and Co. Boston. USA..
- 2: Graham-Smith DG and Aronson JK, (1985) "Oxford Text Book of clinical pharmacology and drug therapy" Oxford Univ. Press, UK. .
- 3: Ruther RL, (1990) "Pharmacology: drug action and reactions" Little Brown and Co. Boston. USA .
- 4: Gillies HC , Roger HJ, Spector RG and Traunce JR, (1989) "A text book of clinical pharmacology" Edward Arnold, London .

PHARM-814**CREDIT HOURS 3****NATURAL PRODUCTS-II**

Steroids: Introduction, Cardioactive drugs, Digoxin, Antifertility Drugs

1) Progesterone

2) Androstane;

3) Antibiotics: Penicillin, Chloramphenicol, Tetracycline, Prostaglandins.

Recommended Books

- 1: Finar, I.L., (1994) "Organic Chemistry Vol-I, The Fundamental Principles" English Language Book Society/Longman, Essex, England.
- 2: Finar, I.L., (1994) "Organic Chemistry Vol-II, Stereochemistry and the Chemistry of Natural Products" English Language Book Society/Longman, Essex, England
- 3: Wolf, M.E. (1992) "Burger's Medicinal Chemistry. Vol-I, II and III" John Wiley and Sons, Chichester, England

PHARM-815 **CREDIT HOURS 3**

PHYTOCHEMISTRY

- 1: Phytochemical enzymes
- 2: Cell cultures as source of drugs
- 3: phyto-allergens:- mechanism and classification of allergic reactions
- 4: Irritant and allergic contact dermatitis with special reference to plants and their products.

Recommended Books:

- 1: Tyler E, Brady RL and Robbers EJ, (1988), Pharmacognosy, (9th Ed), Lea & Febiga, Philadelphia.
- 2: Trease GE and Evan WC, (1992), Pharmacognosy (12th Ed), ELBS, UK.

PHARM-816 **CREDIT HOURS 3**

NEUROTRANSMITTER SYSTEMS AND DRUG DEPENDENCE MECHANISMS

PHARM-817 **CREDIT HOURS 3**

TABLETS (SOLID DOSAGE FORM)

PHARM-818 **CREDIT HOURS 3**

SMART OR INTELLIGENT HYDROGELS

PHARM-819 **CREDIT HOURS 3**

POLYMERS IN CONTROLLED DRUG DELIVERY

PHARM-820 **CREDIT HOURS 3**

CARBOHYDRATE CHEMISTRY

PHARM-821 **CREDIT HOURS 3 + 1**

MORPHOLOGY AND HISTOLOGY OF CRUDE DRUG + LAB WORK

PHARM-822 **CREDIT HOURS 3 + 1**

MEDICINAL AND POISONOUS PLANTS OF PAKISTAN + LAB WORK

PHARM-823 **CREDIT HOURS** 3

SPECIAL TOPICS IN PHARMACOGNOSY

PHARM-824 **CREDIT HOURS** 3

SPECIAL TOPICS IN EXPERIMENTAL PHARMACOLOGY

PHARM-825 **CREDIT HOURS** 3

ADVANCED PHARMACOKINETICS AND PHAMACODYNAMICS

PHARM-826 **CREDIT HOURS** 3

DESIGN AND DEVELOPMENT OF RADIO PHARMACEUTICALS

PHARM-827 **CREDIT HOURS** 3

ADVANCED ORGANIC CHEMISTRY

PHARM-828 **CREDIT HOURS** 3

SPECIAL TOPICS IN PHARMACEUTICAL CHEMISTRY

PHARM-829 **CREDIT HOURS** 3

TECHNIQUES IN DRUG DESIGN

PHARM-830 **CREDIT HOURS** 3

ADVANCED TECHNIQUES IN DRUG DESIGN

PHARM-831 **CREDIT HOURS** 3

PHARMACOKINETICS AND BIOAVAILABILITY OF DRUGS FROM ORAL DOSAGE FORM

PHARM-832 **CREDIT HOURS** 3

CLINICAL PHARMACY AND PHARMACEUTICAL CARE

PHARM-833 **CREDIT HOURS** 3

CLINICAL TRIALS OF DRUGS

PHARM-901 **CREDIT HOURS** 3

The DRUG THERAPY OF DISEASES-II

Drug acting on blood, chemotherapy of infection, cancer chemotherapy, allergy and immunosuppressent, drug dependence and drug abuse.

RECOMMENDED BOOKS

- 1: Spector R, (1986) "The scientific basis of clinical pharmacology; principles and examples" Little Brown and Co. Boston. USA. (1986).
- 2: Graham-Smith DG and Aronson JK, (1985) "Oxford Text Book of clinical pharmacology and drug therapy" Oxford Univ. Press, UK.
- 3: Ruther RL, (1990) "Pharmacology: drug action and reactions" Little Brown and Co. Boston. USA.
- 4: Gillies HC, Roger HJ, Spector RG and Traunce JR, (1989) "A text book of clinical pharmacology" Edward Arnold, London.

PHARM-902

CREDIT HOURS 3

SYNTHETIC CHEMISTRY-II

Alkenes, alkynes Synthesis, Regio Selectivity, Diels -Alder Reaction, Strategy of Carbonyl disconnection in 1,3-difunctionalized compounds and α, β unsaturated carbonyl compounds, addition and Robinson annelation, Use of Aliphatic Nitro Compounds in Synthesis. Three membered rings, Rearrangements and Photochemistry in Synthesis, Six-membered rings.

Lab. Work of SYNTHETIC CHEMISTRY-II

CREDIT HOURS 1

Synthesis of some drugs and therapeutic agents

RECOMMENDED BOOKS

- 1: Sturt, W. (1986) "Organic Syntheses The Disconnection Approach" John Wiley and Sons, Chichester, England.
- 2: Sturt, W. (1986) "Work Book for Organic Syntheses The Disconnection Approach" John Wiley and Sons, Chichester, England
- 3: I. Fleming, (1988) "Selected Organic Syntheses, A Guide Book for Organic Chemists" John Wiley and Sons, Chichester, England.

CHROMATOGRAPHIC METHODS FOR DRUG(S) ANALYSIS

Advanced Chromatographic Methods (HPLC, GC and CE) for analysis of pharmaceuticals (both in-vivo and in-vitro): Theory, instrumentation, columns (normal, and reversed phase), analytical techniques, pre-column and post column Derivatization, pharmaceutical and bio-medical applications.

RECOMMENDED BOOKS

- 1: Braun RE, (1987) "Introduction to instrumental analysis" McGraw Hill Book Co. NY.
- 2: Bryant R, (1989) "The pharmaceutical quality control hand book" Aster Pub. Corp. Eugene. USA
- 3: Pakistan Pharmacopoes, (1973)
- 4: British Pharmacopoes (1993).
- 5: USP (1996).
- 6: Chapman JR, (1986) " Practical organic Mass Spectroscopy" John-Wiley & Sons. NY

PHARM-904**CREDIT HOURS 3****ENZYME CATALYSIS**

Introduction, Michaelis-Menten Kinetics with special reference to α -Chymotrypsin. Enzyme Inhibition, two substrate system, Allosterism, Factors affecting enzyme Kinetics and Applications.

RECOMMENDED BOOK.

- 1: Change P, (1977) "Physical chemistry with applications to biological system" collin Macmillan , Inter. Ed. NY

PHARM-905**CREDIT HOURS 3****SPECIAL TOPIC IN PHARMACEUTICS****PHARM-906****CREDIT HOURS 3****STRUCTURE ELUCIDATION OF NATURAL PRODUCTS****PHARM-907****CREDIT HOURS 3****PHARM-908****CREDIT HOURS 3****DRUG TRANSPORTERS**

**University of Peshawar Regulations for Graduate Degree Programs
(2022 and onwards) Short Title, Commencement and**

Application:

- i. These regulations shall be called the "University of Peshawar Regulations for Graduate Degree Programs 2022".
- ii. These regulations shall come into force with effect from academic session 2022-2023.

- iii. These regulations shall be applicable to all graduate degree programs offered by the University of Peshawar or its constituent institutions.

Definitions:

In these regulations, unless the context otherwise requires, the following expressions shall have the meanings hereby respectively assigned to them:

- i. "University" means the University of Peshawar.
- ii. "Vice-Chancellor" means the Vice-Chancellor of the University.
- iii. "Dean" means Dean of a Faculty of University of Peshawar.
- iv. "Head" means Chairperson of a Department, or Principal of a College, or Director of an Institute/Academy/Centre.
- v. "Institution" means a constituent or affiliated Department/College/Institute/Centre/Academy of the University.
- vi. "Graduate Scholars' Advisor (GSA)" means a faculty member of the Institution who has been assigned the duty under these regulations.
- vii. "Graduate Studies Committee (GSC)" means a committee constituted under these regulations.
- viii. "Board" means Advanced Studies and Research Board (ASRB).
- ix. "Scholar" means a student of the graduate degree program.
- x. "Entry Test" means test conducted by HAT/NTS/ETC/ETS or University for Graduate Degree Programs.

Part-I

MS, MPhil and LLM

1. Criteria for Launching of the Program

- i. There should be at least two relevant full time PhD faculty members in the Institution.
- ii. No Objection Certificate (NOC) from Higher Education Commission (HEC) before launching the program.

2. Eligibility of the Candidate for the Program

- i. Candidates possessing the relevant BS/MA/MSc degree or equivalent (minimum 16 years of education) with at least CGPA of 2.5 (out of 4 in semester system) or 2nd Division (in annual system) from a HEC recognized University, shall be eligible for admission.
- ii. The candidates should have to pass (50%) HAT/NTS/ETC/ETS or University own test according to HEC guidelines/requirements (where applicable as eligibility requirements).

3. Duration of the Program

- i. The normal duration is from 1.5 to 2 years. However, it can be extended up to 4 years (maximum).

4. Admissions Procedure and Criteria

- i. Admission shall be advertised by the Director Admissions in consultation with the Head of Institution.
- ii. The number of scholars to be admitted shall be determined by the Head according to the availability of supervisors.
- iii. Applications on prescribed forms (hard/online) shall be submitted to the Director Admissions, within the prescribed period and will be forwarded to the concerned Head for further processing. The Director Admissions shall keep a record of all the applications received.
- iv. The Head/Convener through GSC shall conduct the interview, for determining merit of the applicants.
 - v. The merit shall be determined on the following criteria:
 - a. 50% weightage shall be given to the marks obtained in the last qualifying examination.
 - b. 30% weightage shall be given to the entry test.
 - c. 20% weighting shall be given to the performance in the interview.
 - vi. Passing marks of interview shall be 50%.
- vii. The names (along with relevant documents) of the provisionally admitted candidates shall be forwarded to the Directorate of Admissions within one month of selection.
- viii. The Directorate of Admission shall maintain a register and assign a registration number to each student/scholar at the time of provisional admission in the concerned Institution.
- ix. The provisional admission of a scholar(s) may be confirmed by the Head after successful completion of the required coursework through a notification.

5. Scheme of Studies

- i. Coursework in the major (compulsory/optional) subjects, in which a scholar is registered from the approved syllabus of the program.
- ii. Coursework in subject(s) related to the major subject from the approved syllabus of the program
 - iii. Thesis, on a topic approved by the Board.
 - iv. Viva-Voce / Public Defense, as the case may be.

Note: However, there will be no thesis and viva-voce requirements for MPhil/MS/LLM Course-based programs.

6. Coursework Requirements

- i. **Research-Based Program:** A scholar admitted in MPhil/MS/LLM program shall have to complete a minimum of 24 credit hours coursework with a minimum CGPA of 3.0, in consultation with the supervisor, in the major(s)/related subjects (700 & above course code).
- ii. **Course-Based program:** A scholar admitted in MPhil/MS/LLM course-based program shall have to complete a minimum of 30 credit hours coursework with a minimum CGPA of 3.0, in consultation with the GSA, in the major(s)/related subjected (700 & above course code).
- iii. In case the CGPA falls below 3.00, a scholar shall be allowed to improve the CGPA by taking additional course(s) or by repeating the course(s) already taken in the following semester(s), failing which he/she shall be considered as withdrawn.
- iv. The scholar shall have to attend at least 75% of the total contact hours of a course.

7. Research Work Requirements

- i. On successful completion of the required course work, the Research scholar shall submit a research proposal in consultation with the approved supervisor/co-supervisor for the approval of the Board through concerned GSC along with anti-plagiarism certificate from the Directorate of Quality Enhancement or GSA of the concerned Institute.
- ii. The Research scholar shall write a thesis in the field of his/her major subject.
- iii. A copy (in hard and soft form) of the thesis shall be submitted to the Head of the Institution for onward submission to the Directorate of Advanced Studies, through the Dean, for the purpose of examination along with a panel of examiner(s).
- iv. Thesis soft copy should be submitted both in word and PDF format via institutional e-mail.
- v. The hard copy (duly signed by the supervisor) and the anti-plagiarism certificate will be submitted in original for official record to the Directorate of Advanced Studies.
- vi. The thesis shall be of 6 (six) credit hours and there shall not be any numerical grade.
- vii. There are no thesis requirements for the MPhil/MS/LLM course-based degree program. However, these degree holders are also eligible for taking admission in PhD program upon the completion of other requirements in vogue.

8. Appointment of Examiners and Their Recommendations

- i. The GSC, in consultation with the supervisor, through respective Dean, shall send a panel of three examiners from within the country, out of whom one examiner be appointed for evaluation of the thesis by Board.
 - ii. The Directorate of Advanced Studies shall send the thesis to the examiner (through online mechanism/email), who shall examine the thesis and communicate the result to the Director with his/her comments/decision. The examiner shall either:
 - a) Recommend the thesis for the award of degree in the present form. or
 - b) Recommend the thesis for the award of degree with minor changes/revision, or
 - c) Recommend the thesis for the award of degree with major changes/revision.
- (i). If the examiner feels that the thesis, despite having some shortcomings, is of sufficient merit, the scholar may be allowed to improve and submit the thesis to the Directorate of Advanced Studies within 6 months and there will be no need of Re-evaluation. However, the supervisor will submit a certificate that the comments/changes/suggestions have been rectified and addressed by the scholar in the revised version of the thesis. OR
- d) Recommend the thesis for resubmission/re-evaluation with major changes/revisions
 - (i) If the examiner feels that the thesis needs major revision and requires re-evaluation, the scholar may be allowed to improve/revise the thesis as per comments/changes/suggestions of the examiner/evaluator within six months of re-submission and fresh evaluation by the same examiner. In addition, the supervisor will submit a certificate that the comments/changes/suggestions have been rectified and addressed by the scholar in the revised version of the thesis.
 - e) Reject the thesis, for the award of the degree, with valid reasons
- (i). In such a case, the Board will assess the reasons that if there is any possibility with which the Board doesn't agree it can approve the decision of the examiner or can give another chance to the candidate for evaluation by another examiner from the panel.
- iii. The evaluator will be given one month for submission of the evaluation report. In case of no response, a reminder will be sent to the evaluator after one month and then a second reminder after a week. In case of no response after 45 days, the reviewer will be changed without his/her reply and the thesis will be sent to another evaluator approved by the Vice-Chancellor.

- iv. After revision of the thesis, in light of the reviewer's comments/suggestions, the scholar must submit the itemized responses to the comments in tabulated form and it should be signed by him/her and also by the concerned supervisor along with a correction certificate.
- v. At the result declaration stage, a certificate shall be provided by both scholar and supervisor that the soft and hard copies of the thesis are explicitly and implicitly the same.

9. Viva-Voce/ Public Defense

- i. The Research scholar shall pass a viva-voce/public defense related to his/her research work. This examination shall be conducted by the approved examiner (section 8(i)) in the presence of his/her supervisor/co-supervisor, or any other faculty member nominated by the supervisor.

10. Re-Viva-Voce/Public Defense

- i. If the thesis is adjudged as adequate but the scholar fails in the Viva-Voce/ public defense, as the case may be, the scholar may be given a chance to reappear in the Viva-Voce/ public defense, as the case may be, within a period not exceeding six months.

11. Thesis Format

- i. The thesis format should be as follows
 - a. A cover page having Title of thesis, University Monogram, Scholar Name, Institution and session.
 - b. A title page (inner page) having Title of thesis, University Monogram, Name of the scholar & supervisor(s), session, and Institution.
 - c. Paper size shall be A4 with both side printing.
 - d. Font size for chapter names shall be in capital letters 14 (bold), headings shall be 12 bold and capital letters and subheadings shall be 12 bold small letters.
 - e. Font size and type shall be 12 and Times New Roman (normal) with 1.5-line spacing.
 - f. Thesis (5 copies) shall be hard bound in Navy Blue color.
 - g. The spine should have the name of the scholar, the year in which the thesis was submitted and the name of the degree for which the thesis was presented i.e. MPhil/MS/LLM.
 - h. English shall be the medium of instruction and examinations for the thesis of all subjects, except languages in which the medium shall be either the language itself or English. However, the medium for Islamic Studies shall be Arabic/Pashto/Urdu and/or English.

12. Extension in the Study Period

- i. In special circumstances, with reasons to be recorded, extension in the study period for up to a maximum of 2 years may be allowed by the Board on the recommendation of the supervisor, subject to the payment of normal fee, etc.

Part-II PhD

13. Criteria for Launching of the Program

- i. There should be at least three relevant full-time PhD faculty members in the Institution.
- ii. NOC from HEC before launching the program.

14. Eligibility of the Candidates for the Program

- i. Candidates possessing the relevant BS/MA/MSc/MS/MPhil/LLM (minimum 16 years of education) degree with at least CGPA of 3.0 (out of 4 in the semester system) or 1st Division (in the annual system) from HEC recognized University, shall be eligible for admission.

- ii. The candidates should have to pass (60%) HAT/NTS/ETC/ETS or University own test according to HEC guidelines/requirements (where applicable as eligibility requirements). The test shall be general or subject-based.
- iii. A prior degree in the same discipline shall generally not be a requirement for admission to a PhD program; however, GSC will determine the relevancy.
- iv. Submission of the Statement of Purpose by the scholar along with the application form.

15. Duration of the Program

- i. The normal duration is 3-5 years. However, it can be extended up to 8 years, provided that for scholars who are unable to complete the program within eight (8) years, the Board will determine whether the delay was caused by circumstances beyond the student's control, and if so, grant an extension in such exceptional circumstances; provided further that, in no event shall the PhD degree be awarded more than ten (10) years, after the enrolment of the student in the program.
- ii. The date of notification of the award of the PhD degree subsequent to the PhD defense shall be considered to be the date of the completion of PhD studies.

16. Admission Procedure and Criteria

- i. Admission shall be advertised by the Director Admissions in consultation with the Head of Institution.
- ii. The number of scholars to be admitted shall be determined by the Head, according to the availability of supervisors.
- iii. Applications on prescribed forms (hard/online) shall be submitted to the Director Admissions, within the prescribed period, who will forward them to the concerned Head after the closing date. The Director Admissions shall keep a record of all the applications received.
- iv. The Head through GSC shall conduct an interview, for determining merit of the applicants.
- v. The merit shall be determined on the following criteria:
 - a. 50% weightage shall be given to the marks obtained in the last qualifying examination.
 - b. 30% weightage shall be given to the entry Test.
 - c. 20% weighting shall be given to the performance in the interview.
- vi. Passing marks of interview shall be 50%.
- vii. The names (along with the relevant documents) of the provisionally admitted candidates shall be forwarded to the Directorate of Admissions within one month of selection.
- viii. The Directorate of Admissions shall maintain a register and assign a registration number to each scholar at the time of provisional admission in the concerned Institution.
- x. The provisional admission of a scholar(s) may be confirmed by the concerned Dean after successful completion of the required coursework and comprehensive examination through a notification.

17. Scheme of Studies

- i. Coursework in the major (compulsory/optional/related) subjects, in which a scholar is registered from the approved syllabus of the program.
- ii. Passing of Comprehensive Examination after completion of the required coursework.
- iii. Publication of a research article/paper in HEC recognized journal(s).
- iv. Thesis, on a topic approved by the Board.
- v. Public Defense.

18. Coursework Requirements

- i. A scholar admitted based on MPhil/MS/LLM (18 year of education) program shall have to complete a minimum of 24 credit hours coursework with a minimum CGPA of 3.0, in consultation with the supervisor, in the major(s)/optional/related subjects (800 & above course codes).

- ii. A scholar admitted based on BS/MA/MSc (16 years of education) shall have to complete a minimum of 48 credit hours coursework with a minimum CGPA of 3.0, in consultation with the supervisor, in the major(s)/related/optional subjects (out of which 24 credit hours from 700 & above and 24 credit hours from 800 & above course codes).
- iii. In case the CGPA falls below 3.00, a research scholar shall be allowed to improve the CGPA by taking additional course(s) or by repeating the course(s) already taken in the following semester(s), failing which he/she shall be considered as withdrawn.
- iv. The scholar shall have to attend at least 75% of the total contact hours of a course.

19. Research Work Requirements

- i. On successful completion of the required coursework and passing of comprehensive examination, the scholar shall submit a research proposal in consultation with the approved supervisor/co-supervisor for the approval of the Board through concerned GSC along with an anti-plagiarism certificate from the Directorate of Quality Enhancement or GSA of the concerned Institution.
- ii. The scholar shall be required to publish at least one research paper (available in print or online form) as its first author during his or her doctoral studies (after his/her admission in the program but before defense) in an HEC approved Y category (or above) journal for the award of PhD degree.
- iii. The scholar shall provide a certificate endorsed by his/her supervisor along with published research paper, stating that the paper is published from PhD research work/data.
- iv. The student shall write a thesis in the field of his/her major subject. A copy in hard and soft form of the thesis shall be submitted to the Head of the Institution for onward submission to the Directorate of Advanced Studies, through the Dean, for the purpose of examination along with a panel of examiner(s).
- v. Thesis soft copy should be submitted both in word and PDF format via institutional e-mail.
- vi. The hard copy (duly signed by the supervisor) and the anti-plagiarism certificate will be submitted for official record to the Directorate of Advanced Studies.
- vii. The thesis shall be of 9 (nine) credit hours and there shall not be any numerical grade.

20. Comprehensive Examination

- i. On completion of the coursework, a PhD scholar shall have to pass the comprehensive examination with 50% in the subjects already studied in PhD program/discipline before writing up a research proposal.
- ii. The Head/GSA shall arrange the comprehensive exam within three months from the date of completion of the coursework.
- iii. There shall only be two chances for passing the comprehensive examination. However, the second comprehensive examination shall be held within three months of the first comprehensive examination.
- iv. The comprehensive examination shall be conducted by the GSC.
 - v. In case of failing the comprehensive examination:
 - a. A scholar admitted on the basis of MPhil/MS/LLM may get only a course completion certificate containing details of the courses studied with grades.
 - b. A scholar admitted on the basis of BS/MA/MSc (16 years of education) may get a course-based MPhil/MS/LLM degree. OR

- c. A scholar admitted on the basis of BS/MA/MSc (16 years of education) may continue as MPhil/MS/LLM research scholar and shall complete the research work requirements for MPhil/MS/LLM degree.

21. Appointment of Examiners and Their Recommendations

- i. PhD examination committee shall comprise of the following
 - a. External Examiner 1 (thesis evaluator).
 - b. External Examiner 2 (within the University).
 - c. Internal Examiner (supervisor/co-supervisor).
- ii. In addition to the PhD examination committee, the PhD thesis must be evaluated by at least two external experts, who may be either (i) Pakistan-based Distinguished National Professors, Meritorious Professors, or Tenured Professors, or (ii) PhD experts from academically advanced countries (approved list of academically advanced countries for evaluation of PhD thesis is provided in Annex-1 and subject to revision); provided, however, that if the PhD candidate publishes his or her thesis research in a peer reviewed journal that is classified by the HEC as category X or above, the PhD thesis will only require evaluation by one external expert.
- iii. The GSC, in consultation with the Supervisor, shall send a panel of examiners consisting of (a) at least five experts (under section 21 (ii)) and (b) at least three experts from within the country (having PhD) to the Directorate of Advanced Studies. The Board will appoint one or two examiners (as required under section 21 (ii)) and one examiner from within the country for the evaluation of the thesis.
- iv. The Directorate of Advanced Studies shall send the thesis to the examiners who shall examine the thesis and communicate the result as follows:
 - a. The scholar may be recommended for the award of the degree, if the report(s) of the evaluator(s) is/are positive.
 - b. The scholar may be asked to revise the thesis for re-submission, if the evaluator(s) suggests so.
 - c. The thesis may be recommended for the award of the PhD degree, if the majority (at least two) of the examiners so advise.
 - d. The thesis may be completely rejected, if suggested by the majority of examiners. In case of one rejection, the thesis may be sent to another evaluator according to section 21(ii) from the list of five after the Vice Chancellor's approval.
 - e. If the examiners find that the thesis needs revision, the scholar shall be allowed to revise it. It shall be re-submitted for a fresh examination to the same examiner(s) within a period of twelve months.
 - f. If the majority of examiners feel that the thesis, despite some shortcomings, is of sufficient merit, the scholar may be directed to improve the thesis for re-submission within six months, but without a fresh examination. The re-submitted thesis must carry a certificate by the Supervisor that the shortcomings so identified have been rectified.
 - g. Revised thesis with the panel of examiners will be sent to the Directorate of Advanced Studies for approval of public defense.
- v. In case of a delay in examiner(s) report(s), a reminder will be sent to the concerned evaluator(s) after 45 days and then a second reminder after two weeks. In case of no response after 60 days, then the evaluator(s) will be changed without his/her reply and the thesis will be sent to another evaluator approved by the Vice-Chancellor.

- vi. After thesis revision in light of the evaluator's comments/suggestions, the scholar must submit itemized responses to the comments in tabulated form and it should be signed by the scholar and his/her supervisor along with a correction certificate.
- vii. At the result declaration stage, a certificate shall be provided by both the scholar and his/her supervisor that the soft and hard copies of the thesis are explicitly and implicitly the same.
- viii. The Directorate of Advance Studies will update the supervisor(s) regarding the evaluation process.

22. Public Defense

- i. The scholar shall pass a public defense related to his/her research work. This examination shall be conducted by the approved examination committee in the presence of his/her supervisor/cosupervisor or any faculty member nominated by the supervisor.

23. Chances for Re-Submission of Thesis and Re-Public Defense

- i. Only one chance for re-submission of the thesis shall be allowed to a scholar.
- ii. If the revised thesis is not approved, it may be rejected, and the scholar may be allowed for one of the following
 - a. A scholar admitted on the basis of MPhil/MS/LLM may get only a course completion certificate containing details of the courses studied with grades.
 - b. A scholar admitted on the basis of BS/MA/MSc (16 years of education) may get a course based MPhil/MS/LLM degree, OR
 - c. A scholar admitted on the basis of BS/MA/MSc (16 years of education) may continue as MPhil/MS/LLM research scholar and shall complete the research work requirements for MPhil/MS/LLM.
- iii. If the thesis is adjudged as adequate but the scholar fails in the public defense, the scholar may be given a chance to reappear in the public defense within a period not exceeding six months.

24. Thesis Format

- i. The thesis format should be as follows
 - a. A cover page having title of thesis, University monogram, Name of the scholar, Institution, and session
 - b. A title page (inner page) having title of thesis, University monogram, name of the scholar & supervisor(s), session, and Institution.
 - c. Paper size shall be A4 with both side printing.
 - d. Font size for chapter names shall be in capital letters 14 (bold), headings shall be 12 bold and capital letters and subheadings shall be 12 bold small letters.
 - e. Font size and type shall be 12 and Times New Roman (normal) with 1.5-line spacing.
 - f. Thesis (5 copies) shall be hard bound in Black color.
 - g. The spine should have the surname of the scholar, the year in which the thesis was submitted and the name of the degree for which the thesis was presented i.e. PhD.
 - h. English shall be the medium of instructions and examinations for the thesis of all subjects, except languages in which the medium shall be either the language itself or English. However, the medium for Islamic Studies shall be Arabic/Pashto/Urdu and/or English.

Part-III
General Regulations 25.

Supervisor and Supervision

- i. In consultation with scholar, a teacher/expert in the relevant field shall be appointed as supervisor (HEC approved supervisor in case of PhD).
- ii. The GSC shall forward the name of the supervisor working in the same institution through the Dean, who agrees to such supervision, for each scholar, for approval of the Board.
- iii. A co-supervisor can be appointed preferably from a different field of specialization and can be from the same department, other department and/or from outside the University.
- iv. A supervisor can supervise (as supervisor or co-supervisor) twelve (12) MPhil/MS/LLM/PhD scholars at a time, with no more than five (5) of these scholars being enrolled in PhD program. However, this number may be increased to 8 in special circumstances, which will be decided by the Board.
- v. A supervisor shall perform the following functions:
 - a. To recommend and plan courses of studies.
 - b. To propose the topic of research in consultation with the scholar.
 - c. To supervise and review the progress of the scholar periodically.
 - vi. In case of scholar's assessment and performance, the report/decision of the supervisor (regarding progress of the scholar) will be final.

26. Graduate Studies Committee (GSC)

- i. There shall be a Graduate Studies Committee (GSC) for a period of Two-years to be appointed by the Vice-Chancellor. The Dean, after consulting with the Head of the Institution, shall forward the names of the members of the GSC to the Directorate of Advanced Studies for approval of the Vice-Chancellor.
- ii. The GSC shall consist of the following members:
 - a. The Head as Convener.
 - b. Two seniors most teachers of the Institution having a PhD degree.
 - c. Two experts, to be nominated by the Dean in consultation with the Head.
 - d. Graduate Scholars' Advisor (GSA) will act as secretary (member or non-member as the case maybe) of the GSC.
- iii. If any member(s) is/are not attending GSC meetings (for at least three consecutive meetings) without any valid reason(s) or not contributing substantially to GSC activities, the Convener should recommend changes in GSC accordingly.

27. Functions of the GSC

- i. To process the applications received for admission by the Director Admissions.
- ii. To manage and facilitate the smooth functioning of the graduate programs.
- iii. To conduct and supervise the Institutional Assessment Test, interview and comprehensive examination.

28. Graduate Scholars' Advisor (GSA) and his/her Functions

- i. A faculty member shall be recommended by the Head for approval of the concerned Dean for a period of two years as GSA.
- ii. GSA will make all arrangements for GSC meetings, such as, preparation of agenda items and recording the minutes and ensuring the timely processing of all the related matters to the concerned quarters.
- iii. GSA will maintain all the records of the graduate scholars, through the dealing assistant/Clerk (who will work under his/her supervision).
- iv. GSA will provide guidance to the scholars from time-to-time.
- v. GSA will arrange the timetable for courses, date sheets for mid/final term examinations and comprehensive tests according to the University calendar.
- vi. All these responsibilities of GSA will be equivalent to one course (3 credit hours) in his/her Institutional workload.

29. Admission, Tuition Fee

- i. Fee shall be deposited by the scholar for each semester as per prescribed rates as defined by the statutory bodies of the University and changes in it approved from time to time.
- ii. In case of extension in the study period normal semester fee will be paid by the scholar.
- iii. Foreign nationals shall be required to pay tuition fee, etc., as prescribed by the HEC /University of Peshawar foreign scholars' admission policy. Such candidates shall have to forward their cases of admission as per prescribed routes/rules.

30. Conduct of Examination

- i. For each Semester, there shall be two examinations – mid-term and final-term, in addition to assignments etc.
- ii. The weighting/weightage of the examinations and assignments shall be as follows:
 - a. Mid-term examination 30%
 - b. Assignments/presentations/term papers, etc. 20%
 - c. Final-term examination 50%
- iii. In courses where examinations are not required, the concerned teacher may change the evaluation procedure in consultation with the GSC, if already not specified in the curriculum.

31. Grades and Academic Standing

- i. The grading system for the graduate program courses (700 and above course codes) shall be done on a scale of 1-4.
- ii. Equivalence between Letter grading and Numerical grading shall be as follows:

Marks (% age)	Value	Grade	Remarks
80 and above	4.0	A	Excellent
79	3.9	B	Good
78	3.8		
77	3.8		
76	3.7		
75	3.6		
74	3.6		
73	3.5		
72	3.4		
71	3.4		

70	3.3		
69	3.2		
68	3.2		
67	3.1		
66	3.0		
65	3.0		
64	2.9		
63	2.8	C	Satisfactory
62	2.8		

61	2.7		
60	2.6		
59	2.6		
58	2.5		
57	2.4		
56	2.4		
55	2.3		
54	2.2		
53	2.2		
52	2.1		
51	2.0		
50	2.0		
49	1.9		
48	1.8		
47	1.7		
46	1.6		
45	1.5		
44	1.4		
43	1.3		
42	1.2		
41	1.1		
40	1.0		
39 and below	0.0	F	Fail
I	--	I	Incomplete
W	--	W	Withdrawal
P	--	P	Pass (Non-Credit Course)

- iii. Fractions of marks obtained in a course shall be counted as one mark, e.g. 60.3 shall be considered as 60 while 49.5 or more is to be considered as 50.

Note: In case numerical grades are not feasible (e.g. field work, thesis) or not required (e.g. related courses), letter grade P (Pass) or F (Fail) shall instead be used, and not counted towards the CGPA.

32. Credits and Audits

- i. Unless otherwise noted, a credit shall represent a study in an approved course carried out for one theory hour or two laboratory hours per week per semester.
- ii. A scholar who desires to attend a course without taking examination in that course shall be called an *Auditor* and shall be shown as such in the transcript. An *auditor* must secure the consent of the instructor before he/she is registered as an *auditor*. He/She shall pay the regular fees, but no credit shall be granted for the course.

33. Course Change and Credits

- i. A scholar is expected to complete the coursework within the semester in which he/she takes that course. The supervisor may recommend an extension of time up to one year for the completion of that course. If a scholar fails to complete the course within the permitted period of extension, the course shall be shown as "incomplete" on the scholar's record and shall not be credited towards the CGPA. ii. A scholar may request the Head of the Institution that his/her status in a course be changed to that of

an *auditor* or that he/she may be permitted to withdraw from a course, not later than the end of the fourth week of the semester. If the request is accepted, the scholar's record shall be marked as *Auditor* or as *Withdrawn* against that course. A scholar who fails to complete a course without having his/her status so changed to *Auditor* or *Withdrawn* shall receive, at the teacher's discretion, either a grade of I (Incomplete) or F (Fail).

34. Study Leave and No Objection Certificate

- i. An employed person may be considered as a full-time regular scholar with or without obtaining leave of absence, subject to the production of:

“A No Objection Certificate (NOC) from the Employer concerned to the effect that studies of the scholar in the graduate degree program would not be affected by official duties”.

35. Leave of Absence

- i. On the recommendation of the Head and the approval of the Dean, a scholar may be allowed Leave of Absence up to two semesters on valid grounds.
- ii. Leave of Absence/freezing shall be included in the total period of study. The scholar shall not be required to pay any fee during the leave of absence.
- iii. Freezing is not allowed in the first semester.
- iv. Application for freezing of semester must be initiated by the scholar before the mid-term examination.

36. Cancellation of Registration

- i. If a scholar does not fulfill the requirements as prescribed, his/her registration shall be cancelled.
- ii. The admission of a scholar may be cancelled if his/her academic progress or conduct is found unsatisfactory at any stage by the Supervisor.
- iii. The scholar shall abide by the rules and regulations framed by the University from time-to-time.

37. Transfer of Credit Hours

- i. The transfer of credit hours will be allowed by meeting the following points.
 - a. The grade in the claimed courses must be “B” or higher.
 - b. Credit hours transfer shall only be acceptable into this University after taking fresh enrollment subject to furnishing an NOC from the University where the scholar was enrolled previously.
 - c. In case of fresh-admission after time-barred or cancellation, all the previously studied coursework (studied within five years) will be transferred totally, while 50% will be transferred, if the courses are studied before five years. In such cases, course transfer must be recommended by GSC and for the approval of the Board.

38. Repeal and Saving

- i. The MPhil/PhD Regulations 2005 are hereby repealed. All previous admissions, relating to MPhil/PhD Degrees made prior to the promulgation of these Regulations, shall be governed under the Regulations of 2005.
- ii. In cases where the operation of these regulations causes undue hardship to a scholar, the Board may, for reasons to be recorded in writing, relax any of these regulations in his/her favor. iii. Where these regulations are silent, the Board shall have the discretion to make such decisions as it deems fit and proper to facilitate the scholars and run the academic programs smoothly.

Note: Notwithstanding the foregoing, the University and currently enrolled students may take advantage of the following revisions in the policy, even if the student had enrolled before the effective date:

- a. Time period for degree completion
- b. Research publication requirement
- c. Revised external evaluation policy

39. Result Declaration and Award

- i. If a scholar qualifies all the requirements, the Head of the Institution shall forward the case to the Directorate of Advanced Studies for approval of the Vice-Chancellor for declaration of his/her result.
- ii. The date of notification of the award of the degree, subsequent to the viva-voce/defense, shall be considered to be the date of the completion of the relevant degree program.