## COURSES OF STUDY FOR B.Sc.:

### First Year

#### First Semester

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<th>No.</th>
<th>Course</th>
<th>Weekly hours</th>
<th>Examination degree</th>
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<td>Lec.</td>
<td>Lab.</td>
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<td>3</td>
<td>Pharmaceutical Organic Chemistry (1)</td>
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<td>Pharmaceutical analytical Chemistry (1)</td>
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* Human rights does not be calculated from the total degrees
FIRST YEAR

First term:
1. Introduction to pharmaceutical dosage forms (3 hrs lect., 3 hrs pract.):
The prescription, Powders, Pharmaceutical calculations, pharmaceutical dosage forms, Route of administration, patient factors in dosage form design, incompatibilities.

2. General Pharmacognosy-1 (2 hrs lect., 3 hrs pract.):
I- General (14 hrs):
1- General introduction: Scope of pharmacognosy, definition, classification and description.
2- Reserved food materials (starches and its types, proteins, fixed and volatile oils).
3- Biproducts, calcium oxalate, calcium carbonate.
4- Active constituents e.g. alkaloids, glycosides, bitter principles, volatile oils. Crude drugs occurring naturally: Lycopodium, kamala, diatoms, lupulin, talc and chalk.
5- Cultivation of medicinal plants, collection, drying, packing, preservation, protection and adulteration.

II- The leaves (14 hrs):
General introduction, datura stramonium, Atropa belladonna, Hyoscyamus muticus, Hyoscyamus niger, Bucho leaf, Senna leaf, digitaqlis leaf, uva ursi, eucalyptus, hamamelis, rosemary, jaborandi, sweet basilk, sweet marjoram, henna, boldo, peppermint, squill, tea and Witch-hazel leaves.

3. Pharmaceutical Organic Chemistry-1 (3 hrs lect., 3 hrs pract.):
Part 1: 16 hours
1- Alkyl halides
Nomenclature, synthesis, physical and chemical properties, chemical reactions.
a- **Nucleophilic substitution reactions:**
Mechanism of unimolecular substitution reaction (SN1) and bimolecular substitution reaction (SN2). The structure and relative stability of carbocation. Factors affecting the rates of SN1 and SN2.

b- **Elimination reactions:**
Mechanism of unimolecular elimination (E1) and bimolecular elimination (E2) reactions. Substitution versus elimination.

**Halogen derivatives of unsaturated hydrocarbon**

2- **Conjugated dienes.**

3- **Alcohols, ethers and their sulphur analogues**

**Alcohols:**
Classification, nomenclature, synthesis, physical properties, chemical properties, and chemical reactions. Distinction between primary, secondary and tertiary alcohols. Interconversion between different alcohols. Stepping up or down in the series of alcohols. Test of hydroxyl group. Polyhydroxy alcohols.

**Ethers:**
Nomenclature, synthesis, physical properties, chemical properties and chemical reactions.

**Thiols, thioethers and thiophenols:**
Nomenclature, synthesis, physical properties, chemical properties and chemical reactions.

**Part II:** (6 hours)

**Organometallic compounds:**
Synthesis, physical properties, chemical properties, and chemical reactions.

**Part III:** (20 hours)

**Carbonyl compounds and amines:**

1- **Aldehydes and ketones**
Nomenclature, preparation (from alcohols, from carboxylic acids via Rosenmund reduction and pyrolysis of metal salts from nitriles by Stephen’s method and LiAlH4, from gem-dihalides, from olefins, hydration of alkynes). Physical properties, nature of carbonyl group.
Reactions, oxidation, reduction, nucleophilic addition reactions (addition of HCN, water, alcohols, sodium bisulphite, Grignard reagents, ammonia and its derivatives). Keto-enol tautomerism, reactions on $\alpha$ carbon, haloform reaction, aldol condensation, Cannizzaro reaction, and polymerization reactions.

2- Carboxylic acids:
Nomenclature, preparation. Acid strength of carboxylic acids, physical properties, reactions, preparation of various substituted acids: halo acids, alpha hydroxy acids, alpha amino acids and dicarboxylic acids), decarboxylation, oxidation and reduction.

3- Carboxylic acid derivatives:
*Acid chlorides, acid anhydrides, esters, amides and nitriles:*
Nomenclature, preparation, physical properties, and chemical reactions.

4- Beta keto esters and beta diketones.

5- Amines:
Classification, nomenclature, physical properties, basicity, reductive amination, Gabriel synthesis, Hofmann degradation, Curtius reaction. Separation through Hinsberg’s test, reactions.

**Practical Pharmaceutical Organic Chemistry-1 for 1st Year Pharmacy (1st semester)**
Laboratory safety measures. (one week)
Test for nitrogen. (2 weeks)
Test for sulphur. (one week)
Test for halogens. (2 weeks)
Test for halogen in presence of nitrogen or/and sulphur. (one week)
N.B This course, also, includes 7 tutorial classes.
4. Pharmaceutical analytical chemistry-1 (2 hrs lect. , 3 hrs pract.):

I- Acid-base titrations:
Introduction, Acid-base titrations in aqueous medium, Buffer solutions, Neutralization indicators, Titration curves, applications on neutralization titrations, Titrations in non-aqueous solvents.

II- Precipitometry:
Introduction, solubility & solubility product constant, factors affecting solubility of the precipitate, precipitometric titration curves, detection of the end point (Mohr’s, Volhard’s, Fajan’s, Leibeg’s, and Denig’s methods), applications on precipitometry.

III. Gravimetry:
Introduction, steps of gravimetric analysis, factors affecting completeness of precipitation, thermogravimetry, selectivity & specificity of precipitating agents, Von-Weimarn equation, homogenous precipitation, organic precipitants, applications.

5. Physiology (4 hrs lect.):
Second term:
1-Physical pharmacy-1 (3 hrs lect., 3 hrs pract.):

2. General Pharmacognosy-2 (2 hrs lect., 3 hrs pract.):
I- Barks (14 hrs):
General introduction, cascara, frangula, cinchona, cinnamon, cassia, quillaia, cascarilla, canella, euonymus, pomegranate, Sassafrass, witch-hazel, and wild cherry barks.

I- Galls (2 hrs):
Blue galls, Chinese and English galls.

III- Flowers (14 hrs):
General introduction, Roman and German Chamomiles, clove, pyrethrum, chamomile, santonica, hibiscus, arnica. Saffron, Safflower, Arnica, calendula, lavender, and Karkadeh.

3- Pharmaceutical Organic Chemistry-2 (3 hrs lect., 3 hrs pract.):
Course contents:
1- Isomerism and stereo chemistry (14 hours):
2- Carbohydrates (10 hours):
Introduction, nomenclature, and classification.
Monosaccharides; classification and nomenclature.
Mutarotation and glycoside formation. Reactions;
reduction properties, effect of alkalies, ether, ester, and
osazone formation. Ascending and descending the sugar
series. Fischer’s proof of structure of glucose.
Disaccharides, starch, glycogen, and cellulose. Cellulose
derivatives, deoxy-and amino sugars.

4- Amino acids and proteins (6 hours):
Structure and nomenclature, properties of amino acids,
preparation (form halo acids, phthalimide, and strecker
synthesis from aldehydes, preparation of peptides and
sequence analysis of peptides.

4- Polymers and polymerization reactions (6 hours):
Definition, natural and synthetic polymers. Linear and
branched polymers. Polymerization reactions.
Heteroatom-containing addition polymers. Industrial
and medicinal uses of polymers.

5- Alicyclic compounds (6 hours):
Nomenclature, physical properties, preparation (Diels-
alder, Ziegler-Thorpe, Dieckmann, pyrolysis, Freund,
Perkin, Pinacol reduction, Grignard method and
reduction of benzene or its derivatives). Relative
stability of cycloalkanes,

Practical Pharmaceutical Organic Chemistry-2 for
1st Year Pharmacy (2nd semester)
1-Aliphatic carboxylic acids.
2-Aromatic carboxylic acids.
3-Phenols
4-Alcohols
5-Aldehydes
6-Ketones
7-Amines
N.B This course, also, includes 7 tutorial classes.
4. Pharmaceutical analytical chemistry-2 (2 hrs lect., 3 hrs pract.):

I- Statistics in Analytical Chemistry:
Types of errors, accuracy, precision, measures of precision, Q-test/ correlation and regression, significant figures, validation of analytical procedures.

II- Redox:
Introduction, electrical properties of redox systems, factors affecting oxidation potential, redox titration curves, detection of the end points, important properties of oxidizing agents (KMnO4, K2Cr2O7, Ce(SO4)2, KIO3), iodometry, iodimetry, bromometry, applications of redox titrations.

III. Complexometry:
Introduction, analytical importance of complexes, complexones, stability of complexes, titration curves, detection of the end point, applications (Direct EDTA titrations, Back titrations, displacement titrations & indirect titration of anions), masking and demasking, non- EDTA titrations.

Practical: Standard solutions; Determination of pH of tap water; Buffer solutions; Titration curves; Double indicator titrations; Non aqueous titrations; Determination of solubility product; Determination of halides by different methods. Determination of mercuric oxide and chloride. Determination of zinc salts., Direct EDTA titrations; Indirect EDTA titrations. Gravimetric determination of some elements.

5- Pharmacy Adminstration (2 hrs lect.):
Accounting principles (include nature and purpose of account and accounting records, recording financial transactions, preparing results of operation and and financial position statements).
Accounting information and its role in planning, organizing, directing and controlling.
المحتوى الدراسي لمقرر حقوق الإنسان (2 ساعة نظرية أسبوعيا):

1. مفاهيم أساسية حول قانون حقوق الإنسان و مصادره:
   - مهارة حقوق الإنسان و أهمية دراستها
   - مصادر حقوق الإنسان
   - أنواع حقوق الإنسان و القيود التي ترد عليها

2. حقوق الإنسان المدنية:
   - الحقوق السياسية للإنسان في النظام الدستوري المصري و الحقوق المجاورة
   - الحقوق الاقتصادية و الاجتماعية

3. حقوق الإنسان في الإسلام:
   - الحماية في المسافة
   - الحقوق في التعليم و التعلم
   - الحقوق في العمل
   - الحقوق في اللمكل
   - الحقوق في الفكر و الاعتقاد
   - الحقوق في الإقامة و التنقل و السفر و الهجرة
   - الحقوق في الميراث
   - الحقوق في تكوين الأسرة
   - القيود التي ترد على حقوق الإنسان

4. آلية حماية حقوق الإنسان على المستوى الوطني
5. آلية حماية حقوق الإنسان على المستوى الدولي