University of Babylon

College of

Pharmacy

Syllabuses For Under Graduate Students

2022 -2021

First year/Total units 33

First Semester

Course number	Course title	Credit hours/ week		Units	Code
		Theory	Practical		
111	Analytical Chemistry	3	2	4	Phpch21_111--
112	Computer Sciences	----	2	1	Phcls21_112--
113	English Langauge	2	----	2	Phcls21_113--
114	Human biology	2	2	3	Phcls21_114--
115	Mathematics and Biostatistics	3	----	3	Phcls21_115--
116	Medical Terminology	1	----	1	Phpht21_116--
117	Principles of Pharmacy Practice	2	----	2	Phind21_117--

Second Semester

Course number	Course title	Credit hours/ week		Units	Code
		Theory	Practical		
128	Human Anatomy	1	2	2	Phcls21_128--
129	Human Histology	2	2	3	Phcls21_129--
1210	Human Rights	1	----	1	Phcls21_1210--
1211	Medical Physics	2	2	3	Phcls21_1211--
1212	Organic Chemistry I	3	2	4	Phpch21_1212-
1213	Pharmaceutical Calculation	2	2	3	Phind21_1213--
1214	Computer Sciences	----	2	1	Phcls21_1214--

Second year/Total units 42

First Semester

Course number	Course title	Credit hours /week		Units	Code
		Theory	Practical		
211	Democracy	1	----	1	Phcls21_211--
212	Medical Microbiology I	3	2	4	Phcls21_212--
213	Organic Chemistry II	3	2	4	Phpch21_213--
214	Physical Pharmacy I	3	2	4	Phind21_214--
215	Physiology I	3	2	4	Phpht21_215--
216	Computer Sciences	----	2	1	Phcls21_216--
217	English Langauge	2	----	2	Phcls21_217--
218	Biosecurity & Biosafetay	1	2	2	Phcls21_218--

Second Semester

Course number	Course title	Credit hours /week		Units	Code
		Theory	Practical		
229	Medical Microbiology II	3	2	4	Phcls21_229--
2210	Organic Chemistry III	2	2	3	Phpch21_2210-
2211	Pharmacognosy I	3	2	4	Phcog21_2211--
2212	Physical Pharmacy II	3	2	4	Phind21_2212--
2213	Physiology II	3	2	4	Phpht21_2213--
2214	Computer Sciences	----	2	1	Phcls21_2214--

Third year/Total units 39

First Semester

Course number	Course title	Credit hours /week		Units	Code
		Theory	Practical		
311	Biochemistry I	3	2	4	Phcls21_311--
312	Inorganic Pharmaceutical Chemistry	2	2	3	Phpch21_312--
313	Pathophysiology	3	2	4	Phcls21_313--
314	Pharmaceutical Technology I	3	2	4	Phind21_314--
315	Pharmacognosy II	2	2	3	Phcog21_315--
316	English Langauge	2	----	2	Phcls21_316--

Second Semester

Course number	Course title	Credit hours /week		Units	Code
		Theory	Practical		
327	Biochemistry II	3	2	4	Phcls21_327--
328	Pharmacy Ethics	1	----	1	Phclp21_328--
329	Organic Pharm. Chemistry I	3	2	4	Phpch21_329-
3210	Pharm.Technology II	3	2	4	Phind21_3210--
3211	Pharmacognosy III	2	2	3	Phcog21_3211--
3212	Pharmacology I	3	----	3	Phpht21_3212--

Fourth year/Total units 36

First Semester

Course number	Course title	Credit hours /week		Units	Code
		Theory	Practical		
411	Biopharmaceutics	2	2	3	Phind21_411--
412	Clinical Pharmacy I	2	2	3	Phclp21_412--
413	Organic Pharm.Chemistry II	3	2	4	Phpch21_413--
414	Pharmacology II	3	2	4	Phpht21_414--
415	Public Health	2	----	2	Phcls21_415--
416	English Langauge	2	----	2	Phcls21_416--

Second Semester

Course number	Course title	Credit hours /week		Units	Code
		Theory	Practical		
427	Communication Skills	2	----	2	Phclp21_427--
428	Clinical Pharmacy II	2	2	3	Phclp21_428--
429	General Toxicology	2	2	3	Phpht21_429--
4210	Industrial Pharmacy I	3	2	4	Phind21_4210--
4211	Organic Pharm. Chemistry III	3	2	4	Phpch21_4211--
4212	Pharmacology III	2	----	2	Phpht21_4212--

Fifth year/Total units 35

First Semester

Course number	Course title	Credit hours /week		Units	Code
		Theory	Practical		
511	Applied Therapeutics- I	3	----	3	Phclp21_511--
512	Clinical Chemistry	3	2	4	Phcls21_512--
513	Clinical Laboratory Training	----	4	2	Phcls21_513--
514	Clinical Toxicology	2	2	3	Phpht21_514--
515	Industrial Pharmacy- II	3	2	4	Phind21_515--
516	Organic Pharm. Chemistry- IV	2	----	2	Phpch21_516--
517	Graduationproject	1	----	1	----------

Second Semester

Course number	Course title	Credit hours /week		Units	Code
		Theory	Practical		
528	Advanced Pharmaceutical Analysis	3	2	4	Phpch21_528--
529	Applied Therapeutics- II	2	----	2	Phclp21_529--
5210	Dosage Form Design	2	----	2	Phind21_5210--
5211	Hospital Training	----	4	2	Phclp21_5211--
5212	Pharmacoeconomic	2	----	2	Phclp21_5212--
5213	Therapeutic Drug Monitoring (TDM)	2	2	3	Phclp21_5213--
5214	Pharmaceutical Biotechnology	1	----	1	Phind21_5214--

First Year

Department of Pharmaceutical Chemistry

Title of the course: ***Analytical Chemistry***
Level: 1st Class, 1st Semester
Course number:**111**
Code: Phpch21_111--
Credit (hours/week):Theory (3) Laboratory (2)Units: 4

No.	Lecture title	Hours
1.	**Review of elementary concept important to analytical chemistry: Strong and weak electrolytes; important weight and concentration units**	**4**
2.	**The evaluation of analytical data: Definition of terms**	**1**
3.	**An introduction to gravimetric analysis: Statistical analysis of data; rejection of data; precipitation methods; gravimetric factor**	**9**
4.	**The scope of applications of gravimetric analysis: Inorganic precipitating agents; organic precipitating agents**	**4**
5.	**An introduction to volumetric methods of analysis: Volumetric calculations; acid-base equilibria and pH calculations**	**5**
6.	**Buffer solutions: Theory of neutralization titrations of simple system**	**3**
7.	**Theory of neutralization titrations of complex system; Precipitation titrations**	**5**
8.	**Calculation of pH in complex system; Volumetric methods based on complex system**	**4**
9.	**Equilibria in oxidation-reduction system; theory of oxidation-reduction titrations**	**6**
10.	**Spectrophotometric analysis: An introduction to optical methods of analysis; Methods based on absorption of radiation**	**4**

Reference text

Stoog DA, West DM. Fundamentals of Analytical Chemistry, 9th edition, 2008.

Department of Pharmaceutical Chemistry

Title of the course: ***PracticalAnalytical Chemistry***
Level: 1st Class, 1st Semester
Course number:**111**
Code: Phpch21_111--

No.	Title	Hours
1.	**Demonstration of some laboratory equipments**	**2**
2.	**Separation and identification of group 1 cations (individual test)**	**2**
3.	**Analysis of group 1 cataions mixture**	**4**
4.	**Preparation and standardization of an acid**	**2**
5.	**Determination of the percentage of acetic acid**	**2**
6.	**Analysis of sodium carbonate and sodium hydroxide mixture**	**2**
7.	**Determination of chloride by the Mohr method**	**2**
8.	**Determination of chloride by the Volhard method**	**2**
9.	**Preparation and standardization of 0.1N $KMnO_4$**	**2**
10.	**Determination of ferrous form of iron in Mohr's salt**	**2**
11.	**Determination of total hardness in tab water**	**2**
12.	**Gravimetric determination of Nickel**	**2**
13.	**Analytical analysis of sodium carbonate and sodium bicarbonate Mixture**	**2**
14.	**Determination of copper**	**2**

Reference text

Handbook for Analytical Chemistry lab adopted by the department.

Department of Clinical Laboratory Sciences

Title of the course: ***Practical of Computer Sciences***

Level: 1st Class, 1st Semester

Course number: **112**

Code: Phcls21_112--

Credit (hours/week):Theory (0) Laboratory (2) Units: 1

Title	Hours
· Home Tab	**2**
· Modifying Spreadsheets	
· Move/Copy Cells	
· Insert Tab	**2**
Ø Tables	
Ø Illustration	**1**
Ø Charts	**2**
Ø Create a Chart	1
Ø Move Chart to New Sheet	
Ø Change Chart Name	
Ø Change Chart Layout	2
Ø Change Chart Style	
Ø Chart or Axis Titles	
Ø Data Labels	**2**
Ø Legend	
Ø Move or Resize Chart	
Ø Formatting an Excel Trendline	
Ø Reports	**2**
Ø Sparklines	**2**
Ø Filter	**2**
Ø Links	
Ø Symbols	
· Formulas Tab	**4**
Ø Function Library	
Ø Defined Names	
Ø Formula Auditing	
Ø Calculation	2
Ø Data tab contains 5 groups:-	
1- Get external data	1
2- Connections	1
3 - Sort & filter	1
4- Data Tools	1
5- Outline	1
· Add Data Analysis	**2**
Ø T-test	

Department of Clinical Laboratory Sciences

Title of the course: ***English Langauge***

Level: 1st Class, 1st Semester

Course number:**113**

Code: Phcls21_113--

Credit (hours/week):Theory (2) Laboratory (0) Units: 2

No.	Lecture title	Hours
1.	Hello	2
2.	Your world	2
3.	All about you	2
4.	Family and friends	2
5.	The way I live	2
6	Every day	2
7	My favorites	3
8	Where I live	2
9	Times past	2
10	We had a great time	2
11	I can do that	2
12	Please and thank you	2
13	Here and now	3
14	Its time to	2

Reference text

English (John and Liz Soars, New Headway Plus, Oxford: Oxford).

Department of Clinical Laboratory Sciences

Title of the course:***Human Biology***
Level: 1st Class, 1st Semester
Course number:**114**
Code: Phcls21_114--
Credit (hours/week):Theory (2) Laboratory (2) Units: 3

No.	Lecture title	Hours
1.	Biology	2
2.	Cell	2
3.	Tissues, bone and cartilages	3
4.	Nervous system (central and peripheral)	4
5.	Nutrition	2
6.	Digestive system (Mouth, Esophagus, Stomach)	2
7.	Digestive system (intestine)	1
8.	Excretory system and respiration	3
9.	Human genetics (chromosomes and semi-lethal genes	3
10.	Skin	2
11.	Circulatory system	3
12.	Immunity (Inflammation, immunity and the blood, immunity to disease)	3

Reference text

Johnks and Lnglis. Text Book of Human Biology, 3rdedition.1985.

Department of Clinical Laboratory Sciences

Title of the course:***Practical of Human Biology***
Level: 1st Class, 1st Semester
Course number:**114**
Code: Phcls21_114--

No.	Lab. Title	Hours
1.	**The microscope**	**2**
2.	**The cells**	**2**
3.	**Cell division (Mitosis)**	**2**
4.	**Cell division (Meiosis)**	**2**
5.	**The tissues (Single epithelial tissue)**	**2**
6.	**Connective tissue**	**2**
7.	**Muscular tissue**	**2**
8.	**Nervous tissue**	**2**
9.	**Bone and Cartilage**	**2**
10.	**Digestive system(digestion)**	**2**
11.	**Digestive system (Small and Large intestine)**	**2**
12.	**Blood**	**2**
13.	**The Chromosome**	**2**
14.	**Excretory system**	**2**
15.	**Skin**	**2**

Reference text

Lab Manual for Practical Human Biology adopted by the department.

Department of Clinical Laboratory Sciences

Title of the course:***Mathematics and Biostatistics***
Level: 1st Class, 1st Semester
Course number:**115**
Code: Phcls21_115--

Credit (hours/week):Theory (3) Laboratory (0) Units: 3

No.	Lecture title	Hours
1.	**Mathematics: General concepts; coordinate and graph in plane; inequality; absolute value or magnitude; function and their graphs; displacement function; slope and equation for lines**	**6**
2.	**Limits and continuity: Limits; theorem of limits; limit involving infinity; continuity; continuity conditions**	**4**
3.	**Derivatives: Line tangent and derivatives; differentiation rules; derivative of trigonometric function; practice exercises**	**6**
4.	**Integration: Indefinite integrals; rules for indefinite integrals; integration formulas for basic trigonometric function; definite integrals; properties of definite integrals; practice exercises**	**6**
5.	**Biostatistics: General concepts of statistics; statistical methods; statistical theory; applied statistics; statistical operations**	**2**
6.	**Probability concepts: Properties of probability; Set theory and set notation (basic notation); counting techniques- permutations and combinations; calculating the probability of an events; probability distribution of discrete variable; binomial distribution, Poisson distribution; continues probability distribution and normal distribution, review questions and exercises**	**6**
7.	**The concept of central tendency: Mean of sample and mean of population; median; mode; measure of central tendency; review questions and exercises**	**5**
8.	**Deviations and variation: Deviation; dispersion and variability; standard deviation and variance; coefficient of variations; standard error; correlation analysis; (regression model and sample regression equation); application of statistic in medical field; review questions and exercises.**	**8**
9-	**Test of hypotheses.**	**2**

Reference text

1. Thomas GB, Finny RI. Calculus and Analytical Geometry. 9th edition, 2009.
2. Daniel WW. Biostatistics: A Foundation for Analysis in theHealth Science, 10th edition, 2013, wiley.

Department of Pharmacology and Toxicology

Title of the course:***Medical Terminology***
Level: 1st Class, 1st Semester
Course number:**116**
Code: Phpht21_116--
Credit (hours/week):Theory (1) Laboratory (0) Units: 1

No.	Lecture title	Hours
1.	**Basic word roots and common suffixes**	1
2.	**More word roots, suffixes and prefixes related to pharmaceutical sciences (pharmacognosy, clinical pharmacy, pharmaceutics,…etc)**	1
3.	**Basic anatomical terms and abnormal conditions**	2
4.	**The genitals and urinary tract**	1
5.	**The gastrointestinal tract**	1
6.	**The heart and cardiovascular system**	1
7.	**Symptoms, diagnoses, treatments, communication qualifiers, and statistics**	2
8.	**Growth and development, and body orientation**	1
9.	**Gynecology, pregnancy, and childbirth**	1
10.	**The eye and the respiratory tract**	1
11.	**The nervous system and behavioral disorders**	2
12.	**Blood and immunity**	1

Reference text
Collins CE., A Short course in Medical Terminology. 3rd edition, 2014. Lipincott Williams and Wilkins.

Department of Pharmaceutics

Title of the course:***Principal of Pharmacy Practice***
Level: 1st Class, 1st Semester
Course number:**117**
Code: Phind21_117--
Credit (hours/week):Theory (2) Laboratory (0) Units: 2

No.	Lecture title	Hours
1.	**Some fundamentals of measurements and calculations**	**4**
2.	**Interpretation of prescription or medication orders**	**4**
3.	**The metric system**	**4**
4.	**Calculation of doses**	**4**
5.	**Reducing and enlarging formulas**	**4**
6.	**Density, specific gravity and specific volume**	**4**
7.	**Percentage and ratio strength calculation**	**6**

Reference

Ansel HC, Stoklosa MJ. Pharmaceutical Calculations 13th ed.Philadelphia, PA: Lippincott. Williams & Wilkins, 2010.

Department of Clinical Laboratory Sciences

Title of the course:***Human Anatomy***
Level: 1st Class, 2nd Semester
Course number:**128**
Code: Phcls21_128--

Credit (hours/week):Theory (1) Laboratory (2) Units: 2

No.	Lecture title	Hours
1.	**Circulatory system:** **Location of vascular system (Heart, Arteries, Veins)**	1
2.	**Circulatory system:** **Location of lymphatic system (Lymphatic capillary)**	1
3.	**Lymphoid tissue:** **location of the (Thymus gland, Spleen & Lymph nodes)**	1
4.	**Lymphoid nodule (MALT) and Tonsils**	1
5.	**Nervous system:** **Central & Peripheral nervous system by location**	1
6.	**Respiratory system:** **-Conducting portion (Nose, Nasopharynx, Trachea Bronchus and Bronchioles).** **-Respiratory portion (Lung)**	1
7.	**Digestive system:** **-location of different parts of digestive tract (GIT) (Oral cavity, Mouth, Esophagus and Stomach)** **-Small intestine, Large intestine, Rectum and Anus.**	2
8.	**Digestive system:** **Glands associated with the digestive tract by location (Salivary glands, Pancreas, Liver and Gall bladder).**	1
9.	**Endocrine system:** **-location of the pituitary gland** **-location of the Adrenal, Thyroid, Parathyroid, Islet of Langerhans & Pineal glands.**	1
10.	**Male reproductive system:** **-location of the testes.** **-Excretory genital ducts** **-Excretory genital glands (Seminal vesicles, Prostate and Cowper's glands)**	2
11	**Female reproductive system:** **-location of ovary, Oviduct, Uterus & Vagina**	2
12	**Urinary system:** **-location of the (kidney & nephrone)** **- location of the (Ureter, Bladder & Urethra)**	1

Reference text

Snell RS. Clinical Anatomy. ByRegions9thedition, 2010.

Department of Clinical Laboratory Sciences

Title of the course:***PracticalofHuman Anatomy***
Level: 1st Class, 2nd Semester
Course number:**128**
Code: Phcls21_128—

No.	Lecture title	Hours
1.	**Circulatory system:** **Location of vascular system (Heart, Arteries, Veins)**	2
2.	**Circulatory system:** **Location of lymphatic system (Lymphatic capillary)**	2
3.	**Lymphoid tissue:** **location of the (Thymus gland, Spleen & Lymph nodes)**	2
4.	**Lymphoid nodule (MALT) and Tonsils**	2
5.	**Nervous system:** **Central & Peripheral nervous system by location**	2
6.	**Respiratory system:** **-Conducting portion (Nose, Nasopharynx, Trachea Bronchus and Bronchioles).** **-Respiratory portion (Lung)**	2
7.	**Digestive system:** **-location of different parts of digestive tract (GIT) (Oral cavity, Mouth, Esophagus and Stomach)** **-Small intestine, Large intestine, Rectum and Anus.**	4
8.	**Digestive system:** **Glands associated with the digestive tract by location (Salivary glands, Pancreas, Liver and Gall bladder).**	2
9.	**Endocrine system:** **-location of the pituitary gland** **-location of the Adrenal, Thyroid, Parathyroid, Islet of Langerhans & Pineal glands.**	2
10.	**Male reproductive system:** **-location of the testes.** **-Excretory genital ducts** **-Excretory genital glands (Seminal vesicles, Prostate and Cowper's glands)**	2
11.	**Female reproductive system:** **- location of ovary, Oviduct, Uterus & Vagina**	2
12.	**Urinary system:** **-location of the (kidney & nephrone)** **- location of the (Ureter, Bladder & Urethra)**	2

Reference text

Snell RS.Clinical Anatomy.ByRegions9th edition, 2010.

Department of Clinical Laboratory Sciences

Title of the course:***Human Histology***
Level: 1st Class, 2nd Semester
Course number:**129**
Code: Phcls21_129--
Credit (hours/week):Theory (2) Laboratory (2) Units: 3

No.	Lecture title	Hours
1.	**Circulatory system:** **Structure of the vascular system (Heart wall, Arteries, Veins and Capillaries)**	2
2.	**Circulatory system:** **Structure of the lymphatic system (Lymphatic capillary).**	1
3.	**Lymphoid tissue:** **Structure and function of the (Thymus gland, Spleen & Lymph nodes)**	1
4.	**Lymphoid nodule (MALT) and Tonsils**	1
5.	**Nervous system:** **Central and Peripheral nervous system**	3
6.	**Respiratory system:** **-Conducting portion (Nose, Nasopharynx, Trachea Bronchus and Bronchioles).** **-Respiratory portion (Lung)**	3
7.	**Digestive system:** **-Digestive steps.** **-General structure of the digestive tract (GIT) (Oral cavity, Mouth, Esophagus & Stomach)** **-Small intestine, Large intestine, Rectum and Anus.**	3
8.	**Digestive system:** **Glands associated with the digestive tract (Salivary glands, Pancreas, Liver and Gall bladder).**	1
9.	**Endocrine system:** **-General structure of the pituitary gland** **-Histophysiologies of the pituitary gland.**	2

To be continue .....

Human Histology

No.	Lecture title	Hours
10.	**Endocrine system:** **-General structure of the Adrenal, Thyroid, Parathyroid, Islet of Langerhans & Pineal glands**	**2**
11.	**Male reproductive system:** **-General structure of the testes** **-Stages of spermatogenesis**	**2**
12.	**Male reproductive system:** **-Excretory genital ducts** **-Excretory genital glands (Seminal vesicles, Prostate an Cowper's glands)**	**1**
13.	**Female reproductive system:** **-General structure of ovary, Oviduct, Uterus and Vagina** **-Stages of follicle development.** **-Ovulation**	**3**
14.	**Urinary system:** **-Structure & Function of the (kidney & nephrone)** **-Histology of the nephrone (filtration, absorption and excretion)** **- Structure of the (Ureter, Bladder & Urethra)**	**3**
15.	**The skin** **-Thick and Thin skin**	**2**

Reference text

Junqueira LC, Careiro J. Basic Histology, Text and Atlas. 11th edition, 2005.

Department of Clinical Laboratory Sciences

Title of the course:***Practical of Human Histology***
Level: 1st Class, 2nd Semester
Course number:**129**
Code: Phcls21_129--

No.	Title	Hours
1.	**Circulatory system (Artery and Vein)**	**2**
2.	**Lymphatic system (Thymus gland and spleen)**	**2**
3.	**Lymphatic system (Lymph node and Islet of Langerhans)**	**2**
4.	**Nervous system (Cerebral and cerebrum cortex)**	**2**
5.	**Nervous system (Spinal cord)**	**2**
6.	**Respiratory system (Trachea and lung)**	**2**
7.	**Digestive system (Tongue, Esophagus and Stomach)**	**2**
8.	**Digestive system (Small and Large intestine)**	**2**
9.	**Digestive system** **-Accessory glands of the digestive system (liver and Pancreas)**	**2**
10.	**Endocrine system (Pituitary and Thyroid gland)**	**2**
11.	**Endocrine system (Adrenal and pineal gland)**	**2**
12.	**Male reproductive system (Testes and prostate gland)**	**2**
13.	**Female reproductive system (Ovary and Uterus)**	**2**
14.	**Urinary system (Kidney and Urinary bladder)**	**2**
15.	**Skin (Thick and Thin skin)**	**2**

Reference text

1-Mariano SH Di Fiore.Atlas of Human Histology by 5th edition, 1989.
2- Eroschenko VP. Atlas of Human Histology. 11thedition, 2008.

Department of Clinical Laboratory Sciences

Title of the course:***Human Right***

Level: 1st Class, 2nd Semester

Course number:**1210**

Code: Phcls21_1210--

Credit (hours/week):Theory (1) Laboratory (0) Units: 1

Hours	Lecture title	No.
3	حمبق الُسبْ بُنَ اُشرَيتالسالِيُت واُفراُمبُیَ اُغربِ	-1
	حمىق السبْ نِ اُيثبئك اُذسخىرَت	
	اُىثبئك اُذوُت ُحمىق الُسبٰ	
3	حمبق الُسبْ نِ شرَيتالسالَ	-2
	أحك فِ أفمُ االسالِ	
	ارحببط اُحك ببُشبرع نِ االسالَ ضَبْ وحىثُك ُيذي الررَيت ُالسخبذاد	
	أحمىق وأاجببث	
	االسخالف نِ االرع ووراِت الُسبْ	
7	حمبق الُسبْ نِ شرَيتالسالَ سُبسُت واجخَبكُت وِسىُت اُذوّ نِ ضَبَهب اَجببُت	-3
	ا-أحمىق واُحرَبث اَُخكِمت بشخض الُسبٰ نِ راحٰ وبذَ	
	ة-أحمىق واُحرَبث اَُذيِمت بخظطُبث الُسبْ ِيٰ حُبحٰ اُخبطت واسرحٰ وِسىِ وشرفٰ وسُيخِ	
	ج-اُحمىق واُحرَبث اَُخكِمت ببَُبوي واُخِمَ واالتِبت	
	د-أحمىق وأحرَبث أفرَت أو أكِبَت	
	ِ-اُحمىق واُحرَبث اُسُبسُت	
	و-اَُسبواة ابِٰ اُمبُیْ	
	ز-أحمىق وأحرَبث الجخَبكَت واللخظبدَت	
	ِبَخكِ ببالسرة	
	ج-اُحمىق واُحرَبث اللخظبدَت: اُخَِه	
	ط-حك اُيَّ	
	ُ-اُضَبٰ الجخَبكِ	
	ن-حك اُذيُ	
	ي-أحمىق أجَبكَت ُشكِىة	
1	حمرَرحمىق الُسبْ نِ االسالَ	-4
1	اُضَبُبث َُِغ الَخذاء كَِ حمبق الُسبْ	-5

أظذر

حمبق الُسبْ بُنَ اُشرَيت السالِيُت واُفر اُمبُیَ اُغربِ

اسُ أوُف: د. دمحم فخح كُتبْ

جهت االطذار: وزارة اُذيُ اُيبٰ واُبحث اُيَِ-جبِيت اَُطٰ

دار ابَ الثُر ُِطببكَت واُِشر نِ جبِيت اَُطٰ .

Department of Clinical Laboratory Sciences

Title of the course:***Medical Physics***
Level: 1st Class, 2nd Semester
Course number:**1211**
Code: Phcls21_1211--
Credit (hours/week):Theory (2) Laboratory (2) Units: 3

No.	Lecture title	Hours
1.	**General concepts: Method of physics and standards. Thermodynamics system and system properties; conservation of energy principle; application of thermodynamics; the Zeroth law,**	**3**
2.	**Pressure; temperature and temperature scales (Celsius, Fahrenheit, Kelvin); equation of state; Kinetic theory of a gas; ideal gas and real gas; general law of gases; clauses equation and Vander Waales equation; equilibrium and types of equilibrium; compressibility factor, coefficient of volume expansion, elastic coefficient (bulk modulus)**	**6**
3.	**Heat and energy; work and mechanical forms of work; power; the 1st law of thermodynamics; Boyles and Charles law; practice exercises**	**3**
4.	**Fundamental of physics: electromagnetic waves; Maxwell equations; physical optics**	**6**
5.	**Radiation terms & law (Kirshoffs law; planks law; Stefan-Boltzman law; Wiens law); Black body and Albedo; Heat transfer (radiation, convection, conduction).**	**6**
6.	**Production of X-Ray and X-Ray spectra; absorption of X-Ray; U.V and IR effects. Medical and biological effects of radiation; Radio active of isotopes, Dangerous of radioactivity on human body. Effects of α β γ and neutron on human body; Radiotherapy.**	**3**
7.	**Sound in medicine. The LEASER concept and its application in medicine**	**3**

Reference text

1. **Cameron J. R., Skofronick J. G, Grant R. M.Physics of the body, Madison, WI: Medical Physics Publishing, 1992.**

Department of Clinical Laboratory Sciences

Title of the course:***Practical of Medical Physics***
Level: 1st Class, 2nd Semester
Course number:**1211**
Code: Phcls21_1211--

No.	Title	Hours
1.	**Explain how to plot graph and make laboratory report**	2
2.	**Optical Fiber Loss (bend) Measurement**	2
3.	**Simple pendulum**	2
4.	**Spectral photometric**	2
5.	**Density of liquid**	2
6.	**The focal length of convex lens**	2
7.	**Measurement of Viscosity of liquids**	2
8.	**Ostwald´s Viscometer: find viscosity of unknown; find the molecular weight; find concentration of unknown substance**	4
9.	**Measuring surface tension (by capillary rise method and traveling microscope)**	2
10.	**Measuring surface tension (differential height capillary method)**	2
11.	**Decay curve and half life**	2
12.	**Boyle's Law**	2
13.	**Speed of sound**	2
14.	**Laser application for measurement of single slit**	2

Reference text

Armitage E. Practical Physics in S.I. 2nd edition, 2009, John Murray, London.

Department of Pharmaceutical Chemistry

Title of the course:***Organic chemistry- I***
Level: 1st Class, 2nd Semester
Course number:**1212**
Code: Phpch21_1212--
Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	**Introduction**	3
2.	**Alkanes and methane**	6
3.	**Alkenes I and II**	5
4.	**Alkynes and dienes**	5
5.	**Stereochemistry I and II**	8
6.	**Alcohols and ethers**	8
7.	**Alkyl halides**	6
8.	**Cycloalkanes**	4

Reference text

Morrison RT, Boyd RN. Organic Chemistry. 6th edition.2008.

Department of Pharmaceutical Chemistry

Title of the course:***Practical of Organic chemistry- I***
Level: 1st Class, 2nd Semester
Course number:**1212**
Code: Phpch21_1212--

No.	Lab. Title	hours
1.	**Determination of melting point (Known sample)**	**2**
2.	**Determination of melting point (quiz and unknown)**	**2**
3.	**Determination of boiling point (known sample)**	**2**
4.	**Determination of boiling point (quiz and unknown)**	**2**
5.	**Elemental analysis (explanation of basic concepts)**	**2**
6.	**Elemental analysis (known quantity and quality sample)**	**2**
7.	**Solution and filtration techniques (explanation of basic concepts)**	**2**
8.	**Re-crystallization (known sample)**	**2**
9.	**Re-crystallization (quiz and unknown sample)**	**2**
10.	**Extraction technique (known sample)**	**2**
11.	**Extraction technique (quiz and unknown)**	**2**
12.	**Distillation techniques (known samples)**	**2**
13	**Distillation techniques (quiz and unknown)**	**2**
14	**Sublimation technique (known sample)**	**2**
15.	**Sublimation technique (quiz and unknown)**	**2**

Reference text

Handbook for practical organic chemistry.

Department of Pharmaceutics

Title of the course:***Pharmaceutical Calculation***
Level: 1st Class, 2nd Semester
Course number:**1213**
Code: Phind21_1213--
Credit (hours/week):Theory (2) Laboratory (2) Units: 3

No.	Lecture title	Hours
1.	**Dilution and concentration of pharmaceutical preparations**	**10**
2.	**Isotonic solutions**	**6**
3.	**Electrolyte solutions (milliequivalents, millimoles and milliosmoles)**	**6**
4.	**Constituted solutions, I.V admixtures and flow rate calculations**	**8**

Reference text

Ansel HC, Stoklosa MJ. Pharmaceutical Calculations 13th ed.Philadelphia, PA: Lippincott. Williams & Wilkins, 2010.

Department of Pharmaceutics

Title of the course:***Practical of Pharmaceutical Calculation***
Level: 1st Class, 2nd Semester
Course number:**1213**
Code: Phind21_1213--

No.	Title	Hours
1.	**Demonstration of different glass wares and equipments used in the field of pharmacy**	**2**
2.	**Pharmaceutical measurements**	**2**
3.	**Volume measurements**	**2**
4.	**Preparation of aromatic waters**	**4**
5.	**Preparation of simple solutions**	**4**
6.	**Reducing and enlarging prescription contents**	**6**
7.	**Percentages in calculating prescription contents**	**4**
8.	**Stock solutions and dilution technique during dispensing technique**	**6**

Reference text

Labarotary Manual for Practical Pharmacology adopted by the department.

Department of Clinical Laboratory Sciences

Title of the course: ***Practical of Computer Sciences***

Level: 1st Class, 2nd Semester

Course number:**1214**

Code: Phcls18_1214--

Credit (hours/week):Theory (0) Laboratory (2) Units: 1

Title	Hours
Introducing Operating System Window 7	**2**
Microsoft Office Professional 2010	**2**
Introduction Microsoft Word 2010	2
Microsoft Office Interface.	
File Ribbon Tab	
Microsoft Office Quick Access Toolbar	
Appearance of Microsoft Word	
Creating a New Document	
Opening a Document	2
Home Tab	2
Insert Tab - Inserting Objects	2
Page Layout Tab - Document Layout	2
References Tab	2
Review Tab	**2**
Mailings Tab - Mail Merge	**2**
Introduction Power Point 2010	2
Microsoft Office Interface.	2
File Ribbon Tab	2
Microsoft Office Quick Access Toolbar	2
Appearance of Microsoft Word	2
Creating a New Document	2
Opening a Document	2
Home Tab – Styling your Presentation	2
Insert Tab – Inserting Objects	2
Design Tab – Slide Layout	
Transitions Tab	
Animations Tab	2
Slide Show Tab	2
Review Tab	2

Second Year

Department of Clinical Laboratory Sciences

Title of the course:***Democracy***

Level: 2nd Class, 1st Semester

Course number:**211**

Code: Phcls21_211--

Credit (hours/week):Theory (1) Laboratory (0) Units: 1

Hours	Lecture title	No.
2	ِمذِت ڤَ ّ ُظرِت اٌحرِبث اٌُِبِت	-1
	ِفهِی َ اٌحرِبث اٌُِبِت	
	حطىر اٌحرِبث اٌُِبِت	
3	اس‌س اٌحرِبجٌُِبِت	- 2
	-اٌٌّفرداث االسبسُِت ٌِحرِبث اٌُِبِت	
	1-ِفهِی َ اٌٌّسبواة	
	2-حرِت اٌرأً	
	3-حرِت االٌخِهبد	
	4-اٌحرِت اٌُفِرِت	
5	اٌحرِت فِ االسالَ	-3
	اوال-ِفهِىِبٌحرِتفٌُبالسالَ	
	اٌسبواة بُِّ اٌرجً واٌٌّراة	
	اٌخفبوجٌُِبٌرجىاٌٌّراة	
	ثبٌُِب-االسالَ وحرِت االٌخِهبد واٌٌُِالت ِغ غٌُر اٌٌّسٌٍُُِّّ	
	ثبٌُثب-ِفهِی َ اٌذوٌت االسالٌُِت	
	رابِکب-االسالَ واٌخِکِذِت اٌسُِبسُِت	
5	إٌظبَ اٌُِّی ٌٍِ ٌٍِحرِبث اٌُِبِت	-4
	اوال- اثر اٌٌِظىص اٌذسخِىرِت ڤٌَِ شرکٌُِت اٌحرِبث اٌُِبِت	
	ثبٌُِب- اثراٌُِّی ٌِ اٌُِبدٌ وضِّبٌُِت ٌٍِحمیق واٌحرِبث	
	ثبٌُثب- حِِظ اٌحرِبثِ لبُِ اٌسِطبث اٌُِبِت	
	رابِکب- ضِّبُبث اٌحرِبث اٌُِبِت	
	ا-اٌخمبضٍ أو اٌخظٍ غٌر اٌمضبئٍ	
	ة-اٌطکِ ٌٍِّمضبئٍِ	

اٌّظذر

اٌحرِبث اٌُِبِت وضٌُّبٌحهب

اٌذسخىرِت

اٌِّّف د. دمحم ِِس اٌظبئغ و د. وسبٌِ ٌِچ اٌِسٌذِ

جهت االطذار: وزارة اٌخٌٍُُ اٌُِبٌٍِ واٌبحث اٌٌٍِّّ-جبِکت اٌٌّسطٌ

Department of Clinical Laboratory Sciences

Title of the course:***Medical Microbiology - I***

Level: 2nd Class, 1st Semester

Course number:**212**

Code: Phcls21_212--

Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	Importance of microbiology, History of microbiology	2
2.	Anatomy of bacteria: Surface appendage, Capsule, Cell wall of G +ve & G – ve bacteria, Cytoplasmic membrane.	2
3.	Bacterial physiology: Physical and chemical growth determinate, growth and growth curves, bacterial reproduction.	2
4.	Genetics: Definition, genetic, element, mutation (spontaneous, gene transfer, transformation, conjugation, and gene transduction).	2
5.	Recombinant DNA biotechnology.	2
6.	Sporulation and germination.	2
7.	Sterilization (chemical + physical Methods).	2
8.	Chemotherapy.	2
9.	Morphology of Bacteria, Staining and Classification.	1
10.	Staphylococci species: Streptococcus pyogenes; Streptococcus pneumoniae.	3
11.	Aerobic Spore-forming bacteria Bacillus species (B. anthracis, B. subtilis, B. ceseus).	1
12.	Clostridium perfringens; Clostridium tetani; Clostridium botuliun	3
13.	Corynebacterium diphtheria	1
14.	Propionibacterium acnes, Listeria	1
15.	Mycobacterium tuberculosis; M. leprae	1
16.	Chlamyadiae; Actinomycetes	2
17.	Identification & classification of G-vebacteria	1
18.	Enterobacteriaceae: E. coli; Klebsiella spp.; Cilrobacte , Sertalia, Hafmia, Enterobacter	4
19.	Shigella spp; Salmonella spp; Proteus spp , Pseudomonas spp	3
20.	Vibrio Cholerae; Brucella spp; Haemophilus spp; Campylobacter spp.	3
21.	Helicobacter spp; Bordetella pertusis; Trepanoma pallidum (Spirochates);Yersinia pestis; Pasteruella multocida.	5

Reference text

1. **Brooks GF, Carroll KC, Butel JS, Morse SA. Jawetz, Melnick, and Adelberg's Medical Microbiology, 24th edition, MCGraw-Hill,2007.**
2. **Brwn AE. Bensonn's Microbiological Application, MCGraw-Hill.**

Title of the course:

Practical of Medical Microbiology - I

Level: 2nd Class, 1st Semester

Course number:**212**

Code: Phcls21_212--

No.	Title	Hours
1.	**Orientation to the laboratory. Rules of conduct and general safety. Microscopic techniques. Bright-field light microscope**	**2**
2.	**Examination of stained microorganisms; Smear preparation and simple staining; Gram staining**	**2**
3.	**The hanging drop slide and bacterial motility; Acid-fast staining procedure**	**2**
4.	**Bacterial spores and endospores staining; Microbiological culture media and sterilization; Methods of inoculation and isolation of pure culture**	**2**
5.	**Action of dyes and antibiotics; Enzymes assays for some specific microbial enzymes**	**2**
6.	**Assays for specific metabolic activities; Acid and gas production from: Carbohydrate fermentation; Triple sugar iron agar test; IMVIC tests**	**2**
7.	**Systemic bacteriology: Staphylococci spp**	**2**
8.	**Streptococci species**	**2**
9.	**Salmonella species**	**2**
10.	**Shigella species**	**2**
11.	**Pseudomonas species**	**2**
12.	**Proteus species**	**2**
13.	**Escherichia coli**	**2**
14.	**Klebsiella species**	**2**
15.	**Candida albicans**	**2**

Reference text

Laboratory Manual for Practical Medical Microbiology adopted by the department.

Department of Pharmaceutical Chemistry

Title of the course:***Organic Chemistry - II***
Level: 2nd Class, 1st Semester
Course number:**213**
Code: Phpch21_213--
Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	**Aromatic Hydrocarbons (includes benzene, electrophilic aromatic, substitution, arenas and their derivatives)**	**10**
2.	**Carboxylic acids: properties and reactions**	**5**
3.	**Functional derivatives of carboxylic acids**	**7**
4.	**Amines I and II**	**6**
5.	**Aldehydes and ketones (include also aldol and Claisen condensation); Classification, reactions and properties**	**12**
6.	**Phenols**	**5**

Reference text

Morrison RT, Boyd RN. Organic Chemistry. 6th edition,2008.

Department of Pharmaceutical Chemistry

Title of the course:***Practical of Organic Chemistry - II***
Level: 2nd Class, 1st Semester
Course number:**213**
Code: Phpch21_213--

No.	Title	Hours
1.	**Determination of solubility class (known sample)**	**4**
2.	**Determination of solubility class (quiz and unknown)**	**2**
3.	**Identification of alcohols (known sample, quiz and unknown)**	**4**
4.	**Identification of phenols (known samples)**	**2**
5.	**Identification of phenols (quiz and unknown)**	**2**
6.	**Identification of aldehydes and ketons (explanation of concepts and quiz)**	**4**
7.	**Identification of aldehydes and ketons (known sample)**	**2**
8.	**Identification of aldehydes and ketons (quiz and unknown)**	**2**
9.	**Identification of carboxylic acid (explanation of concepts)**	**4**
10.	**Identification of carboxylic acid (known sample)**	**2**
11.	**Identification of carboxylic acid (quiz and unknown)**	**2**

Reference text

Laboratory Manual for Organic Chemistry adopted by the department.

Department of Pharmaceutics

Title of the course:***Physical Pharmacy–I***
Level: 2nd Class, 1st Semester
Course number:**214**
Code: Phind21_214--
Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	**States of matter, binding forces between molecules, gases, liquids, solid and crystalline matters; phase equilibria and phase rule; thermal analysis**	**10**
2.	**Thermodynamics, first law, thermochemistry, second law, third law, free energy function and applications**	**8**
3.	**Solutions of non-electrolytes, properties, ideal and real colligative properties, molecular weight determination**	**7**
4.	**Solution of electrolytes, properties, Arrhenius theory of dissociation, theory of strong electrolytes, ionic strength, Debye-Huchle theory, coefficients for expressing colligative properties**	**5**
5.	**Ionic equilibria, modern theories of acids, bases and salts, acid-base equilibria, calculation of pH, acidity constants, the effect of ionic strength and free energy**	**8**
6.	**Buffered and isotonic solutions: Buffer equation; buffer capacity; methods of adjusting tonicity and pH; buffer and biological system**	**7**

Reference

Alfred Martin et al,Physical Pharmacy,6th edition,2010.

Department of Pharmaceutics

Title of the course:***Practical of Physical Pharmacy–I***
Level: 2nd Class, 1st Semester
Course number:**214**
Code: Phind21_214--

No.	Lab. title	Hours
1.	**Intruduction to physical pharmacy**	**2**
2.	**Expression of concentrations in pharmaceutical preparations**	**4**
3.	**Two component systems containing liquid phases**	**4**
4.	**Three component systems**	**4**
5.	**Tie linear for three component systems**	**4**
6.	**Partition coefficient: Measurements and evaluation**	**2**
7.	**Solubility methods**	**4**
8.	**Buffer solutions**	**4**
9.	**Determination of solubility product constant of slightly soluble salts**	**2**

Reference

Laboratory Manual for Practical Pharmacology adopted by the department.

Department of Pharmacology and Toxicology

Title of the course:***Physiology- I***

Level: 2nd Class, 1st Semester

Course number:**215**

Code: Phpht21_215--

Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	**The general and cellular basis of medical physiology**	**5**
2.	**Physiology of nerves and muscles: Nerve cells; excitation and conduction; Properties of mixed nerves; glia; neurotrophins; Nerve fiber types and functions; Muscles: Skeletal muscle; smooth muscle; cardiac muscle. Synaptic transmission: Reflexes; cutaneous, deep and visceral sensations; alert behavior, sleep and electrical activity of the brain; control of posture and movement; higher function of the nervous system; central regulation of visceral function; the autonomic nervous system**	**16**
3.	**Respiration: Respiratory zones; Mechanics of respiration; air volumes; respiratory muscles; compliance of the lungs and chest wall; surfactants; differences in ventilation and blood flow in deferent parts of the lung; Dead space and uneven ventilation; Pulmonary circulation: Pressure, volume and flow. Gas transport between the lungs and tissue; Regulation of respiration: Neural control of breathing; Respiratory centers; Regulation of respiratory activity: Chemical factors; non chemical factors; Respiratory adjustment in health and disease; Effect of exercise; Hypoxia; Emphysema; Asthma**	**8**
4.	**Renal Physiology: Introduction; innervations of the renal vessels; renal clearance; renal blood flow; glomerular filtration rate (GFR): Measurements; factor affecting GFR; Filtration fraction; reabsorption of Na^+, Cl^- and glucose. Tubuloglomerular feedback and glomerulotubular balance; water excretion in: proximal tubules; loop of henle; distal tubules; collecting ducts; the counter current mechanism; role of urea; water diuresis and osmotic diuresis; acidification of the urine: H^+ secretion; reaction with buffers; ammonia secretion; factors affecting acid secretion; bicarbonate execration; regulation of Na^+, K^+ and Cl^- excretion; uremia; acidosis; micturition**	**8**
5.	**Cardiovascular system: origin and spread of cardiac excitation; the electrocardiogram; cardiac arrhythmias; electrographic findings in cardiac diseases; mechanical events of the cardiac cycle; cardiac output; cardiovascular regulatory mechanisms: Local regulatory mechanisms; systemic regulation by the nervous system; systemic regulation by hormones; Coronary circulation; Hypertension; Heart failure; Angina pectoris**	**8**

Reference text

Kibble JD, Halsey CR., Medical Physiology, 2009. McGraw-Hill

Department of Pharmacology and Toxicology

Title of the course:***Practical Physiology- I***
Level: 2nd Class, 1st Semester
Course number:**215**
Code: Phpht21_215--

No.	Title	Hours
1.	**Experiments on respiratory system (respiratory rate and volumes)**	**4**
2.	**Introduction to blood physiology**	**2**
3.	**Blood typing and blood transfusion**	**2**
4.	**Tutorial**	**2**
5.	**Packed cell volume**	**2**
6.	**Determination of hemoglobin concentration**	**2**
7.	**Blood indecies**	**2**
8.	**Determination of bleeding time and clotting time**	**2**
9.	**Tutorial**	**2**
10.	**Blood pressure**	**2**
11.	**Effect of exercise on blood pressure**	**4**
12.	**Electrocardiogram (ECG)**	**2**
13.	**Tutorial and review**	**2**

Reference text

Laboratory Manual for Practical Physiology adopted by the department.

Department of Clinical Laboratory Sciences

Title of the course: ***Practical of Computer Sciences***

Level: 2nd Class, 1st Semester

Course number:**216**

Code: Phcls21_216--

Credit (hours/week):Theory (0) Laboratory (2) Units: 1

Title	Hours
Introduction to Statistical Computing in Microsoft Excel	3
- Importing/Accessing Data	
- Data Analysis	3
- How to compute such statistics	
- formula errors in Excel	
- Accessing the data analysis tools	4
- Descriptive Statistics.	
- Histogram	
- Correlation.	2
- Regression	2
- Sampling	4
- T-test one sample	
- T-test paired	
- T- test Independent	
- Anova Test	6
- One sample	
- Anova: Two-Factor Without Replication	
- Anova: Two-Factor With Replication	
Practical Classes in Chemistry	6
- Introduction to Program BioChemOffice 2013	
The drawing of chemical formulae and reaction schemes is a repetitive task for chemists on all levels of their education. While hand-sketching is most efficiently used during discussions and learning, neat drawings are required for official reports, publications, and theses. Such drawings can be created with several computer programs, and we recommend using ChemDraw. ChemDraw is a simple-to-use program that allows to draw intuitively and efficiently simple two- dimensional representations of organic molecules.	

Department of Clinical Laboratory Sciences

Title of the course: ***English Langauge***

Level: 2nd Class, 1st Semester

Course number:**217**

Code: Phcls21_217--

Credit (hours/week):Theory (2) Laboratory (0) Units: 2

No.	Lecture title	Hours
1.	Getting to know you.	2
2.	The way we live	2
3.	It all went wrong	2
4.	Let's go shopping	2
5.	What do you want to do?	2
6	Tell me! What's it like?	2
7	Famous couples	2
8	Do's and Don'ts	2
9	Going places	2
10	Scared to death	2
11	Things that changed the word	3
12	Dreams and reality	3
13	Earning living	2
14	Love you and leave you	2

Reference text

English (John and Liz Soars, New Headway Plus, Oxford: Oxford).

Department of Clinical Laboratory Sciences

Title of the course:***Biosecurity & Biosafety***
Level: 2nd Class, 1st Semester
Course number:**2118**
Code: Phcls21_218--
Credit (hours/week):Theory (1) Laboratory (2) Units: 2

No.	Lecture title	Hours
1.	**Introduction to biosafety and biosecurity**	2
2.	**Biosafety Level**	2
3.	**Biological Agents**	2
4.	**Biorisk and Biohazard**	2
5.	**Containment Level**	2
6.	**Biorisk Management System : defination and concepts**	2
7.	**Types of Biological Wastes**	1
8.	**Transportation of biological material**	1
9.	**Accidant Response**	1

Reference text
Biological risk management handbook

Department of Clinical Laboratory Sciences

Title of the course: ***Practical Biosecurity & Biosafety***

Level: 2nd Class, 1st Semester

Course number:**2118**

Code: Phcls21_218—

No.	Lab. Title	Hours
1.	**Principls of Laboratory Biosecurity**	4
2.	**Principls of Laboratory Biosafety**	4
3.	**Overview of Biological Safety & Biosecurity Equipment**	4
4.	**Standard practices required in Bio Labs**	4
5.	**Risk assessment practice**	4
6.	**Biosafety rules stimulation 3D**	4
7.	**Biosafety training**	4

Reference text

World Health Organization. Laboratory biosafety manual.3ed edition, Geneva, World Health Organization, 2004

Department of Clinical Laboratory Sciences

Title of the course:***Medical Microbiology - II***
Level: 2nd Class, 2nd Semester
Course number:**229**
Code: Phcls21_229--

Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	**Introduction**	2
2.	**Intestinal protozoa (Amoeba, Balantidium, Giardia, Chilomastix)**	5
3.	**Haemoflagellates: Leshmania spp; Trypanosome spp**	4
4.	**Sporozoa: Malarial parasites of human; Toxoplasma**	4
5.	**Helminthes: Classification, Flukes: Hepatic flukes, Blood flukes (Schistosoma spp).Tap worms: Taenia spp., Echinococcus (Hydatid cyst).Nematods: Ascaris, Entrobius**	8
6.	**Virology: Introduction, Comparison between viruses and bacteria and other microbes; Classification of viruses; Replication; Chemotherapy; *Herpes viridae*; Orthomyxo viruses; Paramyxo viruses; Retro viruses; Hepato viruses; Oncogenic viruses**	7
7.	**-Immunology: General introduction, innate &adaptive immunity, B&Tcells.**	4
8.	**-Antigen characteristics, Complements , Hypersensitivity types**	4
9.	**Oncogenic immunity**	3
10.	**-Auto immune diseases**	2
11.	**Immune deficiency diseases**	2

Reference text

P.C. Beaver & R.C. Jung,Animal Agents and Vectors of Human Disease,4th edition, 1975.

Department of Clinical Laboratory Sciences

Title of the course:***Practical of Medical Microbiology - II***

Level: 2nd Class, 2nd Semester

Course number:**229**

Code: Phcls21_229--

No.	Lab. Title	Hours
1.	**Introduction and classification of the human parasites**	2
2.	**Intestinal protozoa: Entamoeba histolytica**	2
3.	**Commensal amoeba; Entamoeba coli; Endolimax nana; Iodomoeba buetschillii**	2
4.	**Flagellate of digestive tract: Giardia lamblia; Chilomastix mesenili**	2
5.	**Flagellate of genital organs: Trichomonas vaginalis; Ciliate protozoa; Balantidium coli**	2
6.	**Flagellate of blood and tissues: Leishmania donovani; Leishmania tropica**	2
7.	**Trypanosoma gambiens; Trypanosome rhodesiense; Trypanosoma cruzi**	2
8.	**Malarial parasite: Life cycle of Plasmodium species; Plasmodium vivax; Plasmodium falciparum**	2
9.	**Plasmodium malariae; Plasmodium ovali**	2
10.	**Toxoplasma gondii; Cestoidea; Taenia saginata; Taenia solium**	2
11.	**Hymenolepis nana; Echinococcus granulosus; Echinococcus multilocularis**	2
12.	**Trematoda: Life cycle of Schistoma species; Schistoma japonicum; Schistoma mansoni; Schistoma haematobium**	2
13.	**Nematoda: Trichurs trichuira; Entrobius vermicularis**	2
14.	**Ascaris lumbricoides; Ancylostoma duodenale**	2
15.	**Methods of diagnosis of parasites**	2

Reference text

Laboratory Manual for Practical Virology and Parasitology adopted by the department.

Department of Pharmaceutical Chemistry

Title of the course:***Organic Chemistry- III***
Level: 2nd Class, 2nd Semester
Course number:**2210**
Code: Phpch21_2210--
Credit (hours/week):Theory (2) Laboratory (2) Units: 3

No.	Lecture title	Hours
1.	**Heterocyclic system: Classes of heterocyclic systems; general structures; properties; Occurrence in nature and in medicinal products**	5
2.	**Five-membered ring heterocyclic compounds: pyrrole; furan and thiophen**	3
3.	**Source of pyrrole, furan and thiophen**	2
4.	**Electrophilic substitution in pyrrole, furan and thiophen: Reactivity and orientation**	5
5.	**Six-membered ring heterocyclic compounds: Structure and reactions of pyridine**	4
6.	**Saturated five-membered heterocyclic compounds**	6
7.	**Heterocyclic of five & six member rings with two and three heteroatoms**	5

Reference text
Morrison RT, Boyd RN. Organic Chemistry. 6th edition,2008.

Department of Pharmaceutical Chemistry

Title of the course:***Practical of Organic Chemistry- III***
Level: 2nd Class, 2nd Semester
Course number:**2210**
Code: Phpch21_2210--

No.	Lab. Title	Hours
1.	**Salts of carboxylic acids (known sample)**	**2**
2.	**Salts of carboxylic acids (quiz and unknown)**	**2**
3.	**Classification of reactions of amines (known sample)**	**2**
4.	**Classification of reactions of amines (quiz and unknown)**	**2**
5.	**Identification of aryl and alkyl halides**	**4**
6.	**Preparation of benzimidazole**	**4**
7.	**Preparation of 6-methyle-4-oxo-1,2,3,4-tetrahydro-2-thiopyridine**	**4**

Reference text

Laboratory Hand book for Practical Organic Chemistry adopted by the department.

Department of Pharmacognosy

Title of the course:***Pharmacognosy–I***
Level: 2nd Class, 2nd Semester
Course number:**2211**
Code: Phcog21_2211--
Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	General Introduction: The Scope of Pharmacognosy, definitions and basic principles	3
2.	Drugs from natural sources, crud drugs, official and non-official drugs	1
3.	Classification of natural products	2
4.	Plant nomenclature and taxonomy	2
5.	Production of crude drugs: Cultivation, collection, drying and storage	3
6.	Deterioration of crude natural products	1
7.	Pharmacological activities of natural products	3
8.	Chemistry of natural drug products	5
9.	Quality control: Evaluation of natural products; macroscopical evaluation; physical evaluation; chemical evaluation; biological evaluation; spectroscopical evaluation	4
10.	Phytochemical investigation of herbal products: Extraction of the plant material; Separation and isolation of constituents; characterization of the isolated compounds	5
11.	Separation technique: Introduction; Mechanisms of separation and classification based on the type of technique; paper chromatography; Thin layer chromatography; Ion-exchange chromatography; Gel filtration chromatography; Column chromatography; Gas chromatography; HPLC; Electrophoresis; Affinity chromatography	7
12.	Traditional plant medicines as a source of new drugs. Bioassay-guided fractionation	4
13.	Tissue culture of medicinal plant: Introduction and history; laboratory of the plant tissue culture; aseptic techniques Application of the plant tissue culture; environmental and biological control; plant growth regulators.	5

Reference text

Trease, and Evans,W.C., Pharmacognosy,16th edition,2009,Elsevier Health Sciences.

Department of Pharmacognosy

Title of the course:***Practical Pharmacognosy–I***
Level: 2nd Class, 2nd Semester
Course number:**2211**
Code: Phcog21_2211--

No.	Lab. Title	Hours
1.	**Micro measurement and magnification**	**2**
2.	**Microscopical identification of crude drugs and cell contents**	**4**
3.	**Extraction and separation techniques**	**4**
4.	**Chromatography**	**4**
5.	**Paper chromatography (circular and horizontal paper chromatography)**	**4**
6.	**Introduction to tin-layer chromatography**	**2**
7.	**TLC on microscope slides**	**4**
8.	**Partition chromatography for the separation of volatile oils**	**4**
9.	**Effect of activity of adsorbents on Rf values**	**2**

Reference text

Special curriculum prepared for this purpose.

Department of Pharmaceutics

Title of the course:***Physical Pharmacy- II***
Level: 2nd Class, 2nd Semester
Course number:**2212**
Code: Phind21_2212--
Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	**Solubility and distribution phenomena, solvent-solute interactions, solubility of gases in liquids, solubility of liquids in liquids, solubility of non-ionic solids in liquids, distribution of solutes between immiscible solvents**	**10**
2.	**Complexation, classification of complexes, methods of analysis, thermodynamic treatment of stability constants**	**5**
3.	**Kinetics, rate and orders of reactions, influence of temperature and other factors on reactions rate, decomposition of medicinal agents and accelerated stability analysis**	**9**
4.	**Interfacial phenomena, liquid interfaces, surface free energy, measurement of interfacial tension, spreading coefficient, surface active agents and wetting phenomena**	**5**
5.	**Colloids, dispersed system and its pharmaceutical application, types of colloidal systems, kinetic properties, diffusion, zeta potential, solubilization**	**5**
6.	**Micrometrics, particle size, methods of determining particle size, particle shape and surface area, porosity, density**	**3**
7.	**Rheology, Newtonian systems, thixotropy measurement, negative thixotropy, determination of thixotropy**	**5**
8.	**Polymer science, definitions pharmaceutical applications, molecular weight averages**	**3**

Reference text

Alfred Martin et al,Physical Pharmacy,6th edition,2010.

Department of Pharmaceutics

Title of the course:***Practical of Physical Pharmacy- II***
Level: 2nd Class, 2nd Semester
Course number:**2212**
Code: Phind21_2212--

No.	Lab. title	Hours
1.	**Solubilization of components of pharmaceutical preparations**	4
2.	**Solubilization of Aspirin**	4
3.	**Determination of partition coafficient**	2
4.	**Surface tension: measurements and calculations**	4
5.	**Rate kinetic: Application in stability of pharmaceutical stability**	4
6.	**Review and tutorial**	2
7.	**Viscosity: Measurements and calculation**	6
8.	**Adsorption isotherm**	4

Reference text

Laboratory Manual for Practical Pharmacology adopted by the department.

Department of Pharmacology and Toxicology

Title of the course:***Physiology- II***
Level: 2nd Class, 2nd Semester
Course number:**2213**
Code: Phpht21_2213--
Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	**Gastrointestinal function: Digestion and absorption of carbohydrates; proteins; lipids; absorption of water and electrolytes; vitamins and minerals; regulation of gastrointestinal function: Introduction; gastrointestinal hormones; mouth and esophagus; stomach; exocrine portion of the pancreas; liver and biliary system; small intestine; colon**	**10**
2.	**Circulatory body fluid: Introduction; blood; bone marrow; white blood cells; immunity; platelets; red blood cells; anemia; polycythemia; blood group and Rh factor; hemostasis: The clotting mechanism / blood coagulation tests; anti clotting mechanism; the plasma; the lymph; abnormalities of hemostasis**	**15**
3.	**Endocrinology: Introduction; energy balance, metabolism and nutrition; the pituitary gland; the thyroid gland; the gonads: development and function of the reproductive system; the adrenal medulla and adrenal cortex; hormonal control of calcium metabolism and the physiology of the bone; endocrine functions of the pancreas and regulation of carbohydrate metabolism**	**20**

Reference text

Kibble JD, Halsey CR. Medical Physiology. 2009. McGraw-Hill.

Department of Pharmacology and Toxicology

Title of the course:***Practical Physiology- II***
Level: 2nd Class, 2nd Semester
Course number:**2213**
Code: Phpht21_2213--

No.	Lab. title	Hours
1.	**Differential W.B.C count**	4
2.	**Total W.B.C. count**	2
3.	**Tutorial**	4
4.	**Red blood cell counting**	2
5.	**Platelets counting**	2
6.	**Erythrocyte sedimentation rate (ESR)**	2
7	**Tutorial**	4
8.	**Insulin regulation of blood glucose**	2
9	**Renal physiology**	2
10.	**Some experiments on vision**	2
11.	**Tutorial and review**	4

Reference text

Manual for Practical Physiology adopted by the department.

Department of Clinical Laboratory Sciences

Title of the course: ***Practical of Computer Sciences***

Level: 2nd Class, 2nd Semester

Course number:**2214**

Code: Phcls21_2214--

Credit (hours/week):Theory (0) Laboratory (2) Units: 1

Title	Hours
1-Introduction	5
Introduction to SPSS	
Data analysis with SPSS: general aspects, workflow, critical issues	
SPSS: general description, functions, menus, commands	5
SPSS file management	
2 -Input and data cleaning	6
Defining variables	
Manual input of data	
Automated input of data and file import	
Data manipulation	
Data Transformation	
Syntax files and scripts	
Output management	
3-Descriptive analysis of data	6
Frequencies	
Descriptive	
Explore	
Crosstabs	
Charts	
4-Statistical tests	4
Means	
T-test	
One-way ANOVA	
Non parametric tests	
Normality tests	
Correlation and regression	
Linear correlation and regression	
Multiple regression (linear)	
5-Multivariate analysis	4
Factor analysis	
Cluster analysis	
Software used SPSS 21	
Suggested bibliography	
Field A., Discovering Statistics Using SPSS, Fourth Edition , SAGE, 2013	

Third Year

Department of Clinical Laboratory Sciences

Title of the course: ***Biochemistry-I***
Level: 3rd Class, 1st Semester

Course number: 311
Code: Phcls21_311--
Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	**Introduction to the macromolecules biochemistry: Definitions and terms; proteins, enzymes, DNA; Clinical value**	**2**
2.	**Amino acids: Structures of A.A (table of standard A.A abbreviation and side chain); Classification, properties, isomerism**	**3**
3.	**Amino acids: Chemical reactions, Zwitter ions, titration curve calculating isoelectric point values. Examples and questions. Non standards A.A: Structures, existence and clinical value**	**3**
4.	**Peptides: Peptide bond, resonance forms, isomers, physical properties and chemical reactions. Essential poly peptides in human body, structures, roles and clinical values**	**3**
5.	**Proteins: Structure and conformations of proteins, Primary structure, Secondary structure (α helix, β sheet), tertiary structure, quaternary structure. Classification, synthesis, cellular functions (Enzymes, cell signaling, and ligand transport, structural proteins), protein in nutrition**	**3**
6.	**Denaturation of proteins and protein sequencing: Determining A.A composition, N- terminal A.A analysis, C- terminal A.A analysis, Edman degradation, prediction protein sequence from DNA/ RNA sequences. Methods of protein study: Protein purification, cellular localization, proteomics and bioinformatics, structure predication and simulation**	**3**
7.	**Carbohydrates: Chemistry and classification, biomedical importance, classification of CHO, Stereochemistry of monosaccharides, metabolism of CHO; Physiologically important monosaccharides, glycosides, disaccharides, polysaccharides**	**3**
8.	**Lipids: Introduction, classification of lipids, fatty acids (F.A), nomenclature of F.A, saturated F.A, unsaturated F.A, physical and physiological properties of F.A, metabolism of lipids. Phospholipids, lipid peroxidation and antioxidants, separation and identification of lipids, amphipathic lipids**	**3**
9.	**Enzymes: Structures and mechanism, nomenclature, classification, mechanisms of catalysis, thermodynamics, specificity, lock and key model, induced fit model, transition state stabilization, dynamics and function, allosteric modulation. Biological function, cofactors, coenzymes, involvement in disease**	**3**
10.	**Kinetics: General principles, factors effecting enzyme rates (substrate conc., pH, temperature, etc), single-substrate reaction (Michaelis-Menten kinetics), kinetic constants. Examples of kinetic questions and solutions.**	**2**

To be continued .....

Biochemistry-I

No.	Lecture title	Hours
11.	Enzyme inhibition: Reversible inhibitors, competitive and non competitive inhibition, mixed-type inhibition, Irreversible inhibition. Inhibition kinetics and binding affinities (*k*i), questions and solutions	1
12.	Control of activity and uses of inactivators; multi-substrate reactions, ternary-complex mechanisms, ping-pong mechanisms, non-Michaelis-Menten kinetics, pre-steady-state kinetics, chemical mechanisms	1
13.	Nucleic Acid: Chemical structure, nucleic acid components, nucleic acid bases, nucleotides and deoxynucleotides (Properties, base pairing, sense and antisense, super-coiling, alternative structures, quadruple structures	3
14.	Biological functions of DNA: Genes and genomes, transcription and translation, replication	2
15.	Biochemistry of extracellular and intracellular communication: Plasmamembrane structure and function; Biomedical importance, membrane proteins associated with lipid bilayer, membranes protein composition, dynamic structures of membranes, a symmetric structures of membranes	3
16.	Artificial membranes model, the fluid mosaic model, membrane selectivity, physiological functions of plasma membranes	1
17.	Biochemistry of the endocrine system: Classification of hormones, biomedical importance, the target cell concept and hormone receptors, biochemistry of hormone signal transduction	3
18.	Special topics:Nutrition, digestion, and absorption. Biomedical importance, digestion and absorption of carbohydrates, lipids, proteins, vitamins and minerals; energy balance. Biochemistry of hemostasis and clot formation	3

Reference text

Robert Murray, David Bender, Kathleen M. Botham, Peter J. Kennelly, Victor Rodwell,P. Anthony Weil,Harpers Illustrated Biochemistry, 29th edition,2012.

Department of Clinical Laboratory Sciences

Title of the course: ***Practical Biochemistry-I***
Level: 3rd Class, 1st Semester

Course number: 311
Code: Phcls21_311--

No.	Lab. Title	Hours
1.	**Effects of acids on carbohydrates: Molish test; Bials test; Anthron test; Seliwanoffs test; Mucic acid test**	2
2.	**Classification of carbohydrates according to reducing properties: Benedicts test; Fehlings test; Barfoed test**	2
3.	**Classification of carbohydrates according to reducing properties: Iodine test; Ozasone test**	2
4.	**Determination of unknown carbohydrates sample**	2
5.	**Color reactions of proteins: Biuret test; Ninhydrin test**	2
6.	**Color reactions of proteins: Millons test; Hopkins-Cole test; unoxidized sulfur test**	2
7.	**Solubility of proteins (effects of acid, neutral salts, heavy metals, and alkaloidal reagents)**	2
8.	**Determination of unknown sample of proteins**	2
9.	**Experiments on solubility of lipids**	2
10.	**Acrolin test for lipids; Soap; Studying properties of soap**	2
11.	**Determination of saponification number**	2
12.	**Properties of lipids: Iodine test for lipids**	2
13.	**Properties of enzymes: Effects of heat on enzymes**	2
14.	**Properties of enzymes: Effect of concentration of enzyme (salivary amylase) on reaction velocity**	2
15.	**Properties of enzymes: Effect of pH on enzymatic activity**	2

Reference text

Laboratory Manual for Practical Biochemistry adopted by the department.

Department of Pharmaceutical Chemistry

Title of the course:***Inorganic Pharmaceutical Chemistry***
Level: 3rd Class, 1st Semester

Course number:**312**
Code: Phpch21_312--
Credit (hours/week):Theory (2) Laboratory (2) Units: 3

No.	Lecture title	Hours
1.	Atomic and molecular structure/ Complexation	6
2.	Essential and trace ions: Iron, copper, sulfur, iodine	3
3.	Non essential ions: Fluoride, bromide, lithium, gold, silver and mercury	2
4.	Gastrointestinal agents: Acidifying agents	1
5.	Antacids	2
6.	Protective adsorbents	1
7.	Topical agents	2
8.	Dental agents	1
9.	Radiopharmaceutical preparations	6
10.	Radio opaque and contrast media	6

Reference text

1. Block, Roche Soine and Wilson, Inorganic Medicinal and Pharmaceutical Chemistry,1986.
2. Wilson and Gisvold; Textbook of Organic medicinal and Pharmaceutical chemistry; DelgadoJN, Remers WA, 10th edition, 1998.

Department of Pharmaceutical Chemistry

Title of the course:
Practical of Inorganic Pharmaceutical Chemistry
Level: 3rd Class, 1st Semester

Course number:**312**
Code: Phpch21_312--

No.	Lab title	Hours
1.	**Preparation and standardization of 1N HCl (known sample)**	**2**
2.	**Preparation and standardization of 1N HCl (quiz and unknown)**	**2**
3.	**Preparation and standardization of 1N 1NaOH (known sample)**	**2**
4.	**Preparation and standardization of 1N NaOH (quiz and unknown)**	**2**
5.	**Assay of NaOH solution (known sample)**	**2**
6.	**Assay of NaOH solution (unknown sample)**	**2**
7.	**Assay of sodium benzoate (known sample)**	**2**
8.	**Assay of sodium benzoate (quiz and unknown)**	**2**
9.	**Assay of Borax (explanation of basic concepts)**	**2**
10.	**Assay of Borax (quiz and unknown)**	**2**
11.	**Assay of citric acid (known sample)**	**2**
12.	**Assay of citric acid (unknown sample)**	**2**
13.	**Assay of magnesium hydroxide (known sample)**	**2**
14.	**Assay of magnesium hydroxide (quiz and unknown)**	**2**
15.	**Assay of ammoniated mercury (unknown sample)**	**2**

Reference text

Laboratory Handbook for Practical Inorganic Pharmaceutical Chemistry adopted by the department.

Department of Clinical Laboratory Sciences

Title of the course: ***Pathophysiology***
Level: 3rd Class, 1st Semester
Course number: 313
Code: Phcls21_313--
Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	**Introduction.**	1
2.	**Cell injury and tissue response; Degeneration; Necrosis; Atrophy; Hypertrophy; Metaplasia and Calcification; Inflammation and Repair**	6
3.	**Disorders of electrolytes and water and acid–base balances: Hyper and Hyponatremia; Hyper and Hypokalemia; Syndrome of inappropriate secretion of ADH; Diabetes insipidus; Metabolic acidosis and alkalosis; Respiratory acidosis and alkalosis**	4
4.	**Disorders of cardiovascular system: Hyperemia; Congestion and edema; Thrombosis; embolism and infarction; Shock; Coronary heart disease and MI; Rheumatic heart disease; Heart failure; Acute pulmonary edema; Essential hypertension; Secondary hypertension; Malignant hypertension; Hypotension; Aneurysm versus varicose veins**	5
5.	**Disorders of respiratory system: Pneumonias; Tuberculosis; Respiratory distress syndrome; Bronchial asthma; Emphysema and bronchiectasis; Cystic fibrosis; Pulmonary embolism; Pulmonary hypertension**	3
6.	**Disorders of the renal system: Nephrotic syndrome; Glomerulonephritis; Diabetic glomerulosclerosis; Hypertensive glomerular disease; Pyelonephritis; Drug related nephropathies; Acute renal failure; Chronic renal failure**	4
7.	**Disorders of GI and hepatobiliary systems: Peptic ulcer and Zollinger – Ellison syndrome; Irritable bowel syndrome; Crohn's disease; Diarrhea; Celiac disease; Viral hepatitis; Primary biliary cirrhosis; Liver failure; Cholelithiasis**	4
8.	**Disorders of thyroid function: Hypothyroidism, Hyperthyroidism, Graves's disease, Thyrotoxicosis**	2
9.	**Disorders of adrenal function: Cushing syndrome. Adrenal cortical insufficiency (primary and secondary). Congenital adrenal hyperplasia. Pheochromocytoma**	2
10.	**Diabetes mellitus and metabolic syndrome; Dyslipoproteinemia**	5
11.	**Neoplasia.**	4
12.	**Metabolic and rheumatic disorders of skeletal system: Osteoporosis; Osteomalacia and rickets; Rheumatoid arthritis; Systemic lupus erythematosus; Ankylosing spodylitis; Gout; Osteoarthritis syndrome.**	2
12	**Alteration in immune response: Hypersensitivity disorders; Autoimmune disease; Transplantation immunopathology; Immunodeficiency disorders**	3

Reference text

Carol Mattson Porth ,Essentials in Pathophysiology,3rd edition,2010.

Department of Clinical Laboratory Sciences

Title of the course: ***Practical Pathophysiology***
Level: 3rd Class, 1st Semester
Course number: 313
Code: Phcls21_313--

No.	Lab. Title	Hours
1.	**General introduction and slide preparation**	2
2.	**Cell injury and degenerations**	2
3.	**Growth disturbances**	2
4.	**Inflammation**	2
5.	**Thrombosis**	2
6.	**Neoplasia**	2
7.	**Disorders of respiratory system**	2
8.	**Disorders of the cardiovascular system**	2
9.	**Disorders of renal system**	2
10.	**Liver disorders.**	2
11.	**Disorders of the gastrointestinal tract**	2
12	**Disorders of the central nervous system**	2
13	**Disorders of the reproductive system**	2
14.	**Disorders of skeletomuscular system**	2
15.	**Disorders of endocrine system**	2

Reference text
Laboratory Manual for Practical Pathophysiology adopted by the department.

Department of Pharmaceutics

Title of the course:***Pharmaceutical Technology-I***
Level: 3rd Class, 1st Semester

Course number:**314**
Code: Phind21_314--
Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	**Dispersed systems: their classification; comparisons between different systems**	2
2.	**Solutions and types of solutions**	2
3.	**Solubility: Factors affecting solubility; expression of dissolution; dissolution rate versus solubility; preparation of solutions containing non-volatile materials**	4
4.	**Official solutions; classification of official solutions; preparation and uses**	4
5.	**Aqueous solutions containing aromatic principles; aromatic waters; methods of preparations; stability**	4
6.	**Syrups: sugar based syrups; artificial and sorbitol based syrups; stability of syrups**	4
7.	**Definition and methods of clarification; filter aids in clarification**	3
8.	**Preparation of solutions using mixed solvent systems; spirits, and elixirs**	3
9.	**Extraction; maceration and percolation**	3
10.	**Tinctures; fluid extracts; extracts of resins and oleoresins.**	4
11.	**Colloidal dispersions; lyophilic; lyophobic**	6
12.	**Coarse dispersion; suspensions**	6

Reference text

Haward A. Ansel,Pharmaceutical Dosage forms and Drug Delivery Systems,Sprowel's American Pharmacy; 9th edition,2010.

Department of Pharmaceutics

Title of the course:
Practical of Pharmaceutical Technology-I
Level: 3rd Class, 1st Semester

Course number:**314**
Code: Phind21_314--

No.	Lab. Title	Hours
1.	**Solutions (Into body cavity, oral and external use)**	4
2.	**Syrups: Preparation techniques and quality evaluation**	6
3.	**Elixirs: Preparation techniques and quality evaluation**	4
4.	**Spirits: Preparation techniques and quality evaluation**	6
5.	**Suspensions: Preparation techniques and quality evaluation**	6
6.	**Dispersion of oils in inhalations**	4

Reference text

Laboratory Manual for Practical Pharmacology adopted by the department.

Department of Pharmacognosy

Title of the course:***Pharmacognosy–II***
Level: 3rd Class, 1st Semester

Course number:**315**
Code: Phcog21_315--
Credit (hours/week):Theory (2) Laboratory (2) Units: 3

No.	Lecture title	Hours
1.	**Introduction: General biosynthesis pathways of secondary metabolites**	**2**
2.	**Carbohydrates**	**2**
3.	**Glycosides: Biosynthesis, physical and chemical properties; cardiac glycosides; saponin glycosides; anthraquinone glycosides; flavonoid glycosides; cyanophore lycosides**	**5**
4.	**Glycosides: Isothiocyanate glycosides; aldehyde glycosides; alcoholic glycosides; phenolic glycosides; lactone glycosides; coumarins and chromones**	**5**
5.	**Resins and resin combination; tannins**	**2**
6.	**Lipids: fixed oils and waxes**	**3**
7.	**Volatile oils: Introduction; chemistry of volatile oils; biosynthesis of volatile oils; hydrocarbons as volatile oils; alcohols as volatile oils; aldehydes as volatile oils**	**4**
8.	**Ketones as volatile oils; Phenols as volatile oils; Oxides as volatile oils; Ester as volatile oils; Phenolic ethers as volatile oils**	**3**
9.	**Non- medicinal toxic plants**	**2**
10.	**Vitamins and Amino acids**	**2**

Reference text

Robbers JE, Speedie MK, Tyler VE , Pharmacognosy and Pharmacobiotechnology; 2nd edition,2008.

Department of Pharmacognosy

Title of the course:***Practical Pharmacognosy–II***
Level: 3rd Class, 1st Semester

Course number:**315**
Code: Phcog21_315--

No.	Lab. Title	Hours
1.	**Cardio-active glycosides**	2
2.	**Anthraquinone glycosides**	2
3.	**Saponin glycosides**	2
4.	**Tannins**	2
5.	**Volatile oils**	2
6.	**Isolation of pipenine from black pepper**	2
7.	**Isolation of belladonna alkaloids and their identification**	2
8.	**Isolation of caffeine from tea**	2
9.	**Isolation of *Peganum harmala* alkaloids**	2
10.	**Preparation of Khellin**	2
11.	**Flavonoids of *Ruta graveolens***	2
12.	**Extraction of hesperidin**	2
13	**Isolation of pectin**	2
14	**Isolation of citric acid from lemon juice**	2
15.	**Isolation of Podophyllotoxin from *Podophyllum emodi*; Isolation of Rotenone from *Lonchocarpus* Spp**	2

Reference text

Special curriculum prepared for this purpose.

Department of Clinical Laboratory Sciences

Title of the course: ***English Langauge***
Level: 3rd Class, 1st Semester

Course number:**316**
Code: Phcls21_316--
Credit (hours/week):Theory (2) Laboratory (0) Units: 2

No.	Lecture title	Hours
1.	It's a wonderful world	3
2.	Get happy	3
3.	Telling tales	3
4.	Doing the right thing	3
5.	On the move	3
6.	I just love it	3
7.	The world of work	3
8.	Just imagine	3
9.	Tell me about it	3
10.	Life's great events	3

Reference text
New Headway Intermediate Student's Book

Department of Clinical Laboratory Sciences

Title of the course: ***Biochemistry-II***
Level: 3rd Class, 2nd Semester

Course number: 327
Code: Phcls21_327--
Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	Bioenergetic	2
2.	Biologic oxidation	2
3.	The respiratory chain and oxidative phosphorylation.	2
4.	Over view of metabolism	2
5.	Citric acid Cycle	2
6.	Glycolysis	2
7.	Metabolism of glycogen	4
8.	Gluconeogenesis	3
9.	Pentose phosphate pathway and other pathways of hexose metabolism	3
10.	Biosynthesis of fatty acids	3
11.	Oxidation of fatty acids	2
12.	Metabolism of acylglycerol and sphingolipids	2
13	Lipid transport and storage	2
14	Cholesterol synthesis, transport, and excretion	2
15.	Biosynthesis of the Nutritionally Nonessential Amino Acids	3
16.	Catabolism of Proteins & of Amino Acid Nitrogen	3
17.	Catabolism of the Carbon Skeletons of Amino Acids	2
18.	Conversion of Amino Acids to Specialized Products	2
19.	Porphyrins & Bile Pigments	2

Reference text

Robert Murray, David Bender, Kathleen M. Botham, Peter J. Kennelly, Victor Rodwell,P. Anthony Weil,Harpers Illustrated Biochemistry, 29th edition,2012.

Department of Clinical Laboratory Sciences

Title of the course: ***Practical Biochemistry-II***
Level: 3rd Class, 2nd Semester

Course number: 327
Code: Phcls21_327--

No.	Lab. Title	Hours
1.	General urine examination: Physical properties	2
2.	General urine examination: Chemical properties; Protein in urine; Sugar in urine	2
3.	General urine examination: Ketone bodies in urine (Rothera test); Bile salts in urine (Hays test); Bilirubin in urine	2
4.	General urine examination: Evaluation of unknown urine sample	2
5.	Cerebrospinal fluid analysis: Measurement of glucose in CSF	2
6.	Cerebrospinal fluid analysis: Measurement of chloride in CSF	2
7.	Cerebrospinal fluid analysis: Measurement of proteins in CSF	
8.	Serum calcium measurement	2
9.	Blood phosphorus measurement (inorganic phosphate)	2
10.	Serum total proteins (quantitative analysis)	2
11.	Estimation of urea level in the blood	2
12.	Measurement of serum uric acid level	2
13	Measurement of serum ascorbic acid level	
14	Gastric juice analysis: Detection of free hydrochloric acid concentration	2
15.	Gastric juice analysis: detection of free acid, total acid content	2

Reference text

Laboratory Manual for Practical Biochemistry adopted by the department.

Department of Clinical Pharmacy

Title of the course: ***Pharmacy Ethics***
Level: 3rd Class, 2nd Semester

Course number: 328
Code: Phclp21_328--
Credit (hours/week):Theory (1) Laboratory (0) Units: 1

No.	Lecture title	Hours
1.	**Introduction to Pharmacy Ethics (Theoretical considerations)**	**2**
2.	**Code of Ethics for Pharmacists**	**1**
3.	**Common Ethical Considerations in Pharmaceutical Care Practice (Beneficence, Autonomy, Honesty, Informed Consent, Confidentiality, Fidelity ……)**	**3**
4.	**Inter-professional Relations**	**2**
5.	**Making ethical decisions**	**1**
6.	**Ethical issues related to clinical pharmacy research**	**1**
7.	**Ethical problems in the pharmacist's clinical practice**	**1**
8.	**Preventing misuse of medicines**	**1**
9.	**Case studies in pharmacy ethics**	**3**

Reference text

1- Ruth Rodgers, (ed.); fast track: Law and Ethics in Pharmacy Practice. Pharmaceutical Press, 2010.
2-Joy Wingfield and David Badcott . Pharmacy Ethics and Decision Making. Pharmaceutical Press,2007
3-Robert J. Cipolle, Linda M. Strand, Peter C. Morley.Pharmaceutical Care Practice: The clinician's Guide, 2nd Edition.
4- Robert m. Veatch and Amy Haddad. Case Studies in Pharmacy Ethics. second edition.Copyright © 2008 by Oxford University Press, Inc.

Department of Pharmaceutical Chemistry

Title of the course: ***Organic Pharmaceutical Chemistry- I***
Level: 3rd Class, 2nd Semester

Course number: 329
Code: Phpch21_329--
Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	Drug distribution	4
2.	Acid- base properties	3
3.	Statistical prediction of pharmacological activity	3
4.	QSAR models	2
5.	Molecular modeling (Computer aided drug design)	1
6.	Drug receptor interaction: force involved	1
7.	Steric features of drugs	2
8.	Optical isomerism and biological activity	1
9.	Calculated conformation	1
10.	10. Three- dimensional quantitative structure activity relationships and databases	1
11.	Isosterism	1
12.	Drug-receptor interaction and subsequent events	1
13	General pathways of drug metabolism: Sites of drug biotransformation; Role of cytochrome P450 mono-oxygenases in oxidative biotransformation; Oxidative reactions; Reductive reactions; Hydrolytic reactions; Phase II reactions	22
14	Factors affecting drug metabolism	2

Reference text

Wilson and Gisvold Textbook of Organic medicinal and Pharmaceutical chemistry, Delgado JN, Remers WA, (Eds); 12thedition,2010.

Department of Pharmaceutical Chemistry

Title of the course:
Practical of Organic Pharmaceutical Chemistry- I
Level: 3rd Class, 2nd Semester

Course number: 329
Code: Phpch21_329--

No.	Lab. Title	Hours
1.	**Preparation and standardization of 0.1N $KMnO_4$ (known sample)**	2
2.	**Preparation and standardization of 0.1N $KMno_4$ (quiz and unknown)**	2
3.	**Assay of hydrogen peroxide solution (known sample)**	2
4.	**Assay of hydrogen peroxide solution (quiz and unknown sample)**	2
5.	**Assay of ferrous sulfate (known sample)**	2
6.	**Assay of ferrous sulfate (unknown sample)**	2
7.	**Preparation and standardization of 0.1$Na_2S_2O_4$ solution (known sample)**	2
8.	**Preparation and standardization of 0.1$Na_2S_2O_4$ solution (quiz and unknown sample)**	2
9.	**Assay of copper sulfate (known sample)**	2
10.	**Assay of copper sulfate (unknown sample)**	2
11.	**Assay of Chlorinated Lime (known sample)**	2
12.	**Assay of Chlorinated Lime (quiz and unknown)**	2
13.	**Preparation and assay of Lugol's Solution (known sample)**	2
14.	**Preparation and assay of Lugol's Solution (quiz and unknown)**	2
15.	**Assay of Alum (unknown sample)**	2

Reference text

Laboratory Handbook for Practical Pharmaceutical Chemistry adopted by the department.

Department of Pharmaceutics

Title of the course:***Pharmaceutical Technology-II***
Level: 3rd Class, 2nd Semester

Course number: 3210
Code: Phind21_3210--
Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	**Emulsions; purpose of emulsification; methods of emulsification; emulsifying agents; HLB system; stability of emulsions**	**10**
2.	**Lotions; liniments and collodions**	**5**
3.	**Suppositories**	**6**
4.	**Powdered dosage forms**	**10**
5.	**Semisolid dosage forms**	**10**
6.	**Incompatibilities in pharmaceutical dosage forms**	**4**

Reference text

Haward A. Ansel, Pharmaceutical Dosage forms and Drug Delivery Systems, Sprowel's American Pharmacy; 9th edition,2010.

Department of Pharmaceutics

Title of the course:
Practical of Pharmaceutical Technology-II
Level: 3rd Class, 2nd Semester

Course number: 3210
Code: Phind21_3210--

No.	Lab. Title	Hours
1.	**Emulsions: Preparation techniques and quality evaluation**	6
2.	**Suppositories: Preparation techniques and quality evaluation**	6
3.	**Powders: Preparation techniques and quality evaluation**	6
4.	**Capsules: Preparation techniques and quality evaluation**	6
5.	**Semisolid dosage forms: Preparation techniques and quality evaluation**	6

Reference text
Laboratory Manual for Practical Pharmacology adopted by the department.

Department of Pharmacognosy

Title of the course:***Pharmacognosy–III***
Level: 3rd Class, 2nd Semester

Course number:**3211**
Code: Phcog21_3211--
Credit (hours/week):Theory (2) Laboratory (2) Units: 3

No.	Lecture title	Hours
1.	**Alkaloids: Introduction; Physical and chemical properties; pyridine, piperidine alkaloids; tropane alkaloids**	5
2.	**Alkaloids: Quinoline tropan alkaloids; iso-quinoline alkaloids; imidazole alkaloids; indole alkaloids**	5
3.	**Alkaloids: Steroidal alkaloids; lupinane alkaloids; alkaloidal amines; purine alkaloids**	4
4.	**Antibiotics: Natural sources; biosynthetic pathways, isolation and purification**	6
5.	**Tissue culture of medicinal plant: Introduction and history; laboratory of the plant tissue culture; aseptic techniques**	4
6.	**phytotherapy :Introduction , principles,medicinal plants in selected health care systems.Important natural products & phytomecines used in pharmacy & medicine.**	6

Reference text

Robbers JE, Speedie MK, Tyler VE , Pharmacognosy and Pharmacobiotechnology, 2nd edition,2008.

Department of Pharmacognosy

Title of the course:***Practical Pharmacognosy–III***
Level: 3rd Class, 2nd Semester

Course number:**3211**
Code: Phcog21_3211--

No.	Lab. title	Hours
1.	**Isolation of *Peganum harmala* alkaloids**	4
2.	**Preparation of Khellin**	4
3.	**Flavonoids of *Ruta graveolens***	4
4.	**Extraction of hesperidin**	4
5.	**Isolation of pectin**	2
6.	**Isolation of citric acid from lemon juice**	4
7.	**Isolation of Podophyllotoxin from *Podophyllum emodi*; Isolation of Rotenone from *Lonchocarpus* Spp**	4
8.	**Isolation of *Peganum harmala* alkaloids**	4

Reference text

Lab. Manual for Practical Pharmacognosy Adopted by the Department.

Department of Pharmacology and Toxicology

Title of the course:***Pharmacology -I***
Level: 3rd Class, 2nd Semester

Course number:**3212**
Code: Phpht21_3212--
Credit (hours/week):Theory (3) Laboratory (0) Units: 3

No.	Lecture title	Hours
1.	General introduction to Pharmacology	2
2.	Pharmacokinetics	4
3.	Drug Receptor interaction and Pharmacodynamics	4
4.	The autonomic nervous system (ANS)	2
5.	Cholinergic system	6
6.	Adrenergic system	6
7.	Principal of antimicrobial therapy	2
8.	β- lactam and other cell wall synthesis inhibitor antibiotics	4
9.	Protien synthesis inhibitors	4
10.	Quinolones, Folate antagonists, and urinary tract antiseptics	3
11.	Antimycobacterium drugs	2
12.	Antifungal drugs	2
13	Antiprotozoal drugs	1
14	Anthelmintic drugs	2
15.	Antiviral drugs	1

Reference text

Howland RD, Mycek MJ. Lipincotts Illustrated Reviews Pharmacology, 6th edition, 2013, Lippincott William and Wilkins, Philadelphia.

Fourth Year

Department of Pharmaceutics

Title of the course:***Biopharmaceutics***
Level: 4th Class, 1st Semester
Course number:**411**
Code: Phind21_411--
Credit (hours/week):Theory (2) Laboratory (2) Units: 3

No.	Lecture title	Hours
1.	**Introduction to biopharmaceutics**	**2**
2.	**Biopharmaceutic aspects of products; drug absorption; mechanisms of absorption; physicochemical factors; dissolution rate; effects of excipients; type of dosage forms**	**6**
3.	**One compartment open model**	**2**
4.	**Multicompartment models**	**2**
5.	**Pharmacokinetics of drug absorption**	**2**
6.	**Bioavailability and bioequivalence**	**2**
7.	**Clearance of drugs from the biological systems**	**2**
8.	**Hepatic elimination of drugs**	**2**
9.	**Protein binding of drugs**	**2**
10.	**Intravenous infusion**	**2**
11.	**Multiple dosage regimens**	**2**
12.	**Non-linear pharmacokinetics**	**2**
13	**Dosage adjustment in renal diseases**	**2**

Reference text

Shargel L, Yu AB, (Eds.), Applied Biopharmaceutics and Pharmacokinetics; 6th edition,2012.

Department of Pharmaceutics

Title of the course:***Practical of Biopharmaceutics***
Level: 4th Class, 1st Semester
Course number:**411**
Code: Phind21_411--

No.	Lab. title	Hours
1.	**Preparation of calibration curve of salicylic acid**	2
2.	***In vitro* evaluation of bulk laxative**	2
3.	***In vitro* evaluation of antacids**	2
4.	**Dissolution of tablets**	4
5.	**Review and tutorial**	2
6.	**Determination of pharmacokinetic parameters from CP-time by residual method**	4
7.	**Determination of pharmacokinetic parameters from CP-time by trapezoidal method**	4
8.	**Determination of pharmacokinetic parameters from urine excretion samples**	4
9.	**Hydrolysis of aspirin in buffer pH 6.8**	4
10.	**Review and tutorial**	2

Reference text: Lab Manual for Practical Biopharmaceutics Adopted by the Department.

Department of Clinical pharmacy

Title of the course:***Clinical pharmacy - I***
Level: 4th Class, 1st Semester
Course number:**412**
Code: Phclp21_412--

Credit (hours/week):Theory (2) Laboratory (2) Units: 3

No.	Lecture title	Hours
1.	Introduction to community pharmacy	1
2.	Respiratory problems: Cough, Common cold, allergic rhinitis, Otitis media, Laryngitis and Pharyngitis	3
3.	G.I.T problems: Diarrhea, Constipation, Heart burn and indigestion, IBS and Hemorrhoids	4
4.	Pediatric care practice : Oral thrush, pinworms and head lice	2
5.	Skin conditions: Acne, Scabies, Psoriasis, Hair loss, Fungal infection, Eczema and Dermatitis, Dandruff, Cold sore, Cornsand Callus	5
6.	Women's' health care: Cystitis and vaginal thrush, primary dysmenorrhea and Premenstrual syndrome	2
7.	CNS related problems: Headache, Insomnia, Motion sickness, Nausea and vomiting	3
8.	- Eye problems	1
9.	ENT problems	1
10.	Oral hygiene, mouth ulcer	1
11.	Obesity and body weight control	1
12.	- Pain and musculoskeletal disorders	1
13	Nicotine replacement therapy (NRT)	1
14	Dietary supplements	1
15.	An update in reclassification of OTC drugs (simvastatin, Tamusotisin & azithromycin)	2
16.	Medication adherence and errors	1

Reference text

1- Paul Rutter; Community Pharmacy; Symptoms, Diagnosis and Treatment,3rd edition,2013.
2- Roger Walker, Clive Edwards (Eds), Clinical Pharmacy and Therapeutics, Churchill Livingstone, London, 5th edition,2011.

Department of Clinical pharmacy

Title of the course:***Practical of Clinical pharmacy - I***
Level: 4th Class, 1st Semester
Course number:**412**
Code: Phclp21_412--

No.	Practice Title	Hours
1	**Communication with patients.**	**2**
2	**Respiratory system in practice (part I): Cough.**	**2**
3	**Respiratory system in practice (part II): Common cold.**	**2**
4	**G.I.T system in practice (part I): Constipation.**	**2**
5	**G.I.T system in practice (part II): Diarrhea and IBS.**	**2**
6	**GIT system in practice (part III): GERD& indigestion.**	**2**
7	**Skin conditions in practice (part I): Hair loss; cold sore and athlete's foot.**	**2**
8	**Skin conditions in practice (part II): Dandruff, Eczema and mouth ulcer.**	**2**
9	**Skin conditions in practice (part III): warts and scabies.**	**2**
10	**Pediatrics in practice: Oral thrush; colic; pinworm and napkin rash.**	**2**
11	**Minor eye disorders in practice.**	**2**
12	**CNS system: Insomnia, motion sickness, obesity and nicotine replacement therapy (NRT).**	**2**
13	**Drug Information sources for pharmacist.**	**2**
14	**An update in reclassification of OTC drugs.**	**2**
15	**Collective practice.**	**2**

Reference text

Symptoms in Pharmacy: A guide to the management of common illness; Blenkinsopp A, Paxton P, (Eds); 6th edition,2008.

Department of Pharmaceutical Chemistry

Title of the course:***Organic Pharmaceutical Chemistry - II***
Level: 4th Class, 1st Semester
Course number:**413**
Code: Phpch21_413--
Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	Cholinergic agents, cholinergic receptors and their subtypes	3
2.	Cholinergic agonists; stereochemistry and structure-activity relationships (SAR); products; cholinesterase inhibitors	5
3.	Cholinergic blocking agent; structure-activity relationships (SAR); Solanaceous alkaloid and analogues; synthetic cholinergic blocking agents and products; ganglionicblocking agents (neuromuscular blocking agents)	5
4.	Analgesic agents (SAR of morphine, SAR of meperidine type molecules; SAR of methadone type compounds; N-methylbezomorphans, antagonist type analgesics in benzomorphans)	5
5.	Analgesic receptors, endogenous opioids; Products; Antitusive agents; Anti-inflammatory analgesics	5
6.	Adrenergic agents (Adrenergic neurotransmitters); Adrenergic receptors; Drugs affecting Adrenergic neurotransmission; Sympathomimetic agents; Adrenergic receptor antagonists	8
7.	CNS depressant; Benzodiazepines and related compounds; Barbiturates; CNS depressant with skeletal muscle relaxant properties; Antipsycotics; Anticonvulsants.	7
8.	CNS Stimulants.	3
9.	Steroidal & nonsteroidal hormones.	4

Reference text

Wilson and Gisvold Textbook of Organic Medicinal and Pharmaceutical Chemistry; Delgado JN, Remers WA, (Eds.); 12th edition,2010.

Department of Pharmaceutical Chemistry

Title of the course:

Practical of Organic Pharmaceutical Chemistry - II

Level: 4th Class, 1st Semester

Course number:**413**

Code: Phpch21_413--

No.	Lab. Title	Hours
1.	**Preparation of salicylic acid**	2
2.	**Re-crystallization of salicylic acid**	2
3.	**Synthesis of aspirin**	2
4.	**Re-crystallization of aspirin**	2
5.	**Assay of aspirin (known sample)**	2
6.	**Assay of aspirin (unknown sample)**	2
7.	**Preparation of nitrobenzene**	2
8.	**Preparation of aniline**	2
9.	**Preparation of acetanilide**	2
10.	**Re-crystallization of acetanilide**	2
11.	**Chlorosulfonation of acetanilide**	2
12.	**Amination of *p*-chlorobenzene sulfonyl chloride**	2
13.	**Hydrolysis of *p*-chlorobenzene sulfonyl chloride to sulfanilamide**	2
14.	**Assay of sulfa drugs (known sample)**	2
15.	**Assay of sulfa drugs (unknown sample)**	2

Reference text

Lab. Handbook for Practical Pharmaceutical Chemistry adopted by the department.

Department of Pharmacology and Toxicology

Title of the course:***Pharmacology- II***
Level: 4th Class, 1st Semester
Course number:**414**
Code: Phpht21_414--
Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	Introduction to CNS pharmacology	2
2.	CNS stimulants	2
3.	Anxiolytic and Hypnotic drugs	3
4.	General and Local Anesthetics	3
5.	Antidepressant drugs	3
6.	Antipsychotic (neuroleptic) drugs	2
7.	Opioid analgesics and antagonists	3
8.	Treatment of neurodegenerative diseases	3
9.	Antiepileptic Drugs	2
10.	Diuretics	2
11	The treatment of heart failure (HF)	2
12	Antiarrhythmic drugs	2
13.	Antianginal Drugs	2
14.	Antihypertensive drugs	3
15.	Drugs affecting the blood	3
16.	Antihyperlipidemic drugs	2
17.	Gastrointestinal and antiemetic drugs	3
18.	Drugs acting on the respiratory system	3

Reference text

Howland RD, Mycek MJ. Lipincotts Illustrated Reviews Pharmacology, 6th edition, 2013, Lippincott William and Wilkins, Philadelphia.

Department of Pharmacology and Toxicology

Title of the course:***Practical Pharmacology- II***
Level: 4th Class, 1st Semester
Course number:**414**
Code: Phpht21_414--

No.	Lab. title	Hours
1.	**Routs of drug administration**	4
2.	**Onset and duration of drugs (Barbiturates)**	2
3.	**Absorption and excretion of drugs**	2
4.	**Effect of parasympathomimetics on gland secretions**	2
5.	**Drugs and human eye.**	4
6.	**The effects of drugs on IOP rabbits**	2
7.	**Evaluation of opioid analgesics**	2
8.	**Evaluation of NSAIDs**	4
9.	**Evaluation of anti-parkinsonian drugs**	2
10.	**Evaluation of anti- convulsant drugs**	2
11.	**The effects of drugs and their antagonists on isolated rats ileum**	2
12.	**The effects of drugs and their antagonists on isolated rabbits ileum**	2

Reference text

Laboratory Manual for Practical Pharmacology adopted by the department

Department of Clinical Laboratory Sciences

Title of the course:***Public Health***

Level: 4th Class, 1st Semester

Course number:**415**

Code: Phcls21_415--

Credit (hours/week):Theory (2) Laboratory (0) Units: 2

No.	Lecture title	Hours
1.	Concepts and principles of public health and preventive medicine	1
2.	General items &ICD10	2
3.	Communicable diseases: Infections through the gastro-intestinal tract	2
4.	Infections through skin and mucous membranes	2
5.	Infections through the respiratory tract	1
6.	Arthropod-borne infections	2
7.	Non-communicable disease: Health in transition	2
8.	Nutritional disorders	1
9.	Family health,Familyplaninig include maternal infections, vaccination	1
10.	Sexually transmitted diseases	1
11	Introduction: a historic background of pharmacy practice	1
12	Pharmacy practice and the health care system	3
13	Health promotion in community pharmacy	1
14	Intoduction to pharmaceutical care	1
15	Pharmaceutical care planning	2
16	Community pharmacy management	1
17	Hospital pharmacy service	1
18	Biosafety in pharmacy practice	2
19	Formulary management and regulatory affairs	2
20	Rational use of drugs	2

Reference text

1-Lucas AO, Gilles HM, (Eds), Short Textbook of Public Health Medicine for the Tropic, 3rd edition,2003.

2- Lilian M Azzopardi, Lecture Notes in Pharmacy Practice, 1st edition, 2010.

Department of Clinical Laboratory Sciences

Title of the course: ***English Language***

Level: 4th Class, 1st Semester

Course number:**416**

Code: Phcls21_416--

Credit (hours/week):Theory (2) Laboratory (0) Units: 2

No.	Lecture title	Hours
1.	**The best days of your life**	**3**
2.	**Literature**	**3**
3.	**What is normal?**	**3**
4.	**War and peace**	**3**
5.	**A sense of taste**	**3**
6.	**Story time**	**3**
7.	**A sense of place**	**3**
8.	**Them and us**	**3**
9.	**The brain**	**3**
10.	**The meaning of life**	**3**

Reference text

New Headway Advanced Student's Book

Department of Clinical Pharmacy

Title of the course:***Communication Skills***
Level: 4th Class, 2nd Semester
Course number:**427**
Code: Phclp21_427--

Credit (hours/week):Theory (2) Laboratory (0) Units: 2

No.	Lecture title	Hours
1.	**Patient-Centered Communication in Pharmacy Practice**	**2**
2.	**Principles and Elements of Interpersonal Communication**	**2**
3.	**Nonverbal type of communication**	**2**
4.	**Barriers to communication**	**2**
5.	**Listening and empathic responding during communication**	**2**
6.	**Assertiveness**	**2**
7.	**Interviewing and assessment**	**2**
8.	**Helping patients to manage therapeutic regimens**	**2**
9.	**Patient counseling; counseling check list; point-by-point discussion; counseling scenario**	**2**
10.	**Medication safety and communication skills**	**2**
11.	**Strategies to meet specific needs**	**2**
12.	**Communicating with children and elderly about medications**	**2**
13	**Communication skills and inter-professional collaboration**	**2**
14	**Electronic communication in healthcare**	**2**
15	**Ethical behavior when communicating with patients**	**2**

Reference text

1-Robert S. B., Carole L. K., William N. T.,Communication Skills in Pharmacy Practice, 5th edition,2007,Lippincott Williams & Wilkins.

2-Bruce A. B., Communication Skills for Pharmacists; American Pharmacists Association; 2nd edition, 2005.

Department of Clinical Pharmacy

Title of the course:***Clinical Pharmacy - II***
Level: 4th Class, 2nd Semester
Course number:**428**
Code: Phclp21_428--

Credit (hours/week):Theory (2) Laboratory (2) Units: 3

No.	Lecture title	Hours
1.	**Introduction to the concept of clinical pharmacy- its activities and professional responsibilities.(including current state of clinical pharmacy in Iraq)**	**1**
2.	**An overview of pharmaceutical care practice (the patient care process)**	**1**
3.	**Hematologic disorders: Anemia and sickle cell disease**	**2**
4.	**Hypertension**	**2**
5.	**Ischemic heart diseases**	**2**
6.	**Heart failure**	**2**
7.	**Peripheral vascular diseases**	**1**
8.	**- Asthma**	**2**
9.	**Chronic obstructive pulmonary disease (COPD)**	**1**
10.	**Diabetes mellitus & Diabetic ketoacidosis (DKA)**	**2**
11.	**Peptic ulcer disease**	**2**
12.	**Tuberculosis**	**1**
13	**Infective meningitis**	**1**
14	**Respiratory tract infections**	**2**
15.	**GIT infections**	**1**
16.	**Gout and hyperuricemia**	**1**
17	**Rheumatoid arthritis (RA) and osteoarthritis (OA)**	**2**
18	**Osteoporosis and other metabolic bone disease**	**1**
19	**Infectious Endocarditis**	**1**
20	**Surgical antibiotic prophylaxis**	**1**
21	**Urinary tract infection (UTI)**	**1**

Reference text

1- Roger Walker, Clive Edwards (eds), Clinical Pharmacy and Therapeutics, Churchill Livingstone, London, Latest edition.
2- Mary Anne koda-kimble (ed.), Applied Therapeutics: The clinical use of drugs, Walter Klumer, Latest edition.

Department of Clinical Pharmacy

Title of the course:***Practical of Clinical Pharmacy - II***
Level: 4th Class, 2nd Semester
Course number:**428**
Code: Phclp21_428--

No.	Practice Title	Hours
1	**Communication with physician and patient counseling**	2
2	**Drugs for anemia and related disorders**	2
3	**Cardiovascular drugs in practice part I: diuretics, β_ blockers, ACE- inhibitors and Ag II receptor blockers**	2
4	**Cardiovascular drugs in practice part II: nitrates, Ca^{2+}-channel blockers, α-blockers, and anti-hyperlipidemic drugs**	2
5	**Drugs for asthma and COPD in practice**	2
6	**Antimicrobial drugsin practice part I: β-lactam antibiotics, tetracyclines and aminoglycosides**	2
7	**Antimicrobial drugs in practice part II: macrolides, sulphonamides, quinolones, and other miscellaneous antibiotics**	2
8	**Antimicrobial drugs in practice part III: antivirals and antifungals**	2
9	**Drugs for endocrine system part I (Diabetes Mellitus)**	2
10	**Drugs for endocrine system part II: thyroid disorders, corticosteroids, and hormones used in gynecological disorders**	2
11	**Drugs acting on CNS (antimigraine drugs, analgesics and antiemetics) and musculoskeletal disorders (NSAIDS and bisphosphonates)**	2
12	**Drugs for GI disorders: peptic ulcer disease and inflammatory bowel disorders**	2
13	**Drugs for ENT and skin disorders**	2
14	**Contraception**	2
15	**Collective practice**	2

Reference text

Current edition of the British National Formulary (BNF)

Department of Pharmacology and Toxicology

Title of the course:***General Toxicology***
Level: 4th Class, 2nd Semester
Course number:**429**
Code: Phpht21_429--
Credit (hours/week):Theory (2) Laboratory (2) Units: 3

No.	Lecture title	Hours
1.	**Introduction: general consideration; host factor, environmental factors of toxic effects**	**3**
2.	**Carcinogenesis**	**2**
3.	**Target organs and systemic toxicology; Respiratory system, Liver, Kidney, Nervous system, cardiovascular system, Blood**	**12**
4.	**Toxic substances: Food additive and contaminants, Pesticides, Metals, Solvents**	**10**
5.	**Environmental toxicology: Air pollution, water and soil pollutants, Gases (Tear gas, Pepper spray), CO, Cyanide (H2S).**	**2**
6.	**Mutagenesis.**	**1**

Reference text

Klassen C.Casarett and Doulls, Toxicology, The Basic Science of Poisons, 8th edition 2013, McGraw-Hill.

Department of Pharmacology and Toxicology

Title of the course:***Practical of General Toxicology***
Level: 4th Class, 2nd Semester
Course number:**429**
Code: Phpht21_429--

No.	Lab. Title	Hours
1.	**General introduction to practical toxicology**	**2**
2.	**Acute toxicity study, determination of LD50**	**4**
3.	**Drug toxicity on liver**	**4**
4.	**Nicotine toxicity**	**4**
5.	**Pesticide toxicity**	**4**
6.	**Metal toxicity**	**4**
7.	**Blood toxicity**	**4**
8.	**Drug-induced toxicity**	**4**

Reference text

Laboratory Manual for Practical General Toxicology adopted by the department.

Department of Pharmaceutics

Title of the course:***Industrial Pharmacy –I***
Level: 4th Class, 2nd Semester
Course number:**4210**
Code: Phind21_4210--
Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	**Principles of pharmaceutical processing; mixing; fluid mixing; flow characteristics; mechanisms of mixing; mixing equipments; batch and continuous mixing; mixer selection; solid mixing theory and particulate solid variables; forces and mechanisms**	**7**
2.	**Milling; pharmaceutical application; size measurement methods; theory and energy of commenution; types of mills; factors influencing milling; selection of mill techniques; specialized drying methods**	**7**
3.	**Drying: definition; purpose; humidity measurement; theory of drying; drying of solids, and classification of dryer; specialized drying methods**	**7**
4.	**Clarification and filtration: Theory; filter media; filter aids; selection of drying method; non-sterile and sterile operations; integrity testing; equipments and systems (commercial and laboratory)**	**7**
5.	**Sterilization; validation of methods; microbial death kinetics; methods of sterilization (thermal and non-thermal); mechanisms; evaluation**	**7**
6.	**Pharmaceutical dosage form design; pre-formulation; preliminary evaluation; bulk characterization; solubility and stability analysis**	**3**
7.	**Pharmaceutical dosage forms; sterile products; development; formulation; production; processing; quality control**	**7**

Reference text
Leon Lachman et al.,The Theory and Practice of Industrial Pharmacy, 4th edition,2013 .

Department of Pharmaceutics

Title of the course:***Practical ofIndustrial Pharmacy –I***
Level: 4th Class, 2nd Semester
Course number:**4210**
Code: Phind21_4210--

No.	Lab. title	Hours
1.	**Introduction in industrial pharmacy and pre-formulation**	**2**
2.	**Effervescent granules: Preparation and characterization**	**4**
3.	**Flow properties and rheology of granules**	**4**
4.	**Tablet dosage form: Preparation and characterization**	**4**
5.	**Evaluation of tablets**	**4**
6.	**Preparation of children aspirin by wet granulation method**	**4**
7.	**Sustained release dosage forms: Preparation and characterization**	**4**
8.	**Coating techniques of tablets**	**4**

Reference text

Laboratory Manual for Practical Pharmacology adopted by the department.

Department of Pharmaceutical Chemistry

Title of the course:***Organic Pharmaceutical Chemistry- III***
Level: 4th Class, 2nd Semester
Course number:**4211**
Code: Phpch21_4211--
Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	**β-Lactam antibiotics (Penicillins); β-Lactamase inhibitors; Cephalosporins and Monobactams**	**9**
2.	**Aminoglycosides and Chloramphenicol; Tetracylines; Macrolides; Lincomycins and Polypeptides; Antiviral agents (properties of viruses, viral classification, products)**	**9**
3.	**Sulfonamides (chemistry, nomenclature, mechanism of action, resistance, toxicity, side effects, metabolism, protein binding, distribution and SAR); products; Sulfones**	**4**
4.	**Anti-neoplastic agents: Alkylating agents; Antimetabolites; Antibiotics; Plant products; Miscellaneous compounds**	**17**
5.	**Hormones and related compounds; Future anti-neoplastic agents; Monoclonal antibodies; Gene therapy of cancer**	**6**

Reference text

Wilson and Gisvold Textbook of Organic Medicinal and Pharmaceutical Chemistry; Delgado JN, Remers WA, (Eds.),12th edition,2010.

Department of Pharmaceutical Chemistry

Title of the course:

Practical of Organic Pharmaceutical Chemistry- III

Level: 4th Class, 2nd Semester

Course number:**4211**

Code: Phpch21_4211--

No.	Lab. Title	Hours
1.	**Cannizaro reaction (part I)**	**2**
2.	**Cannizaro reaction (part II)**	**2**
3.	**Re-crystallization of benzoic acid**	**2**
4.	**Assay of ascorbic acid (known sample)**	**2**
5.	**Assay of ascorbic acid (unknown sample)**	**2**
6.	**Synthesis of Phenol**	**4**
7.	**Assay of phenol (known sample)**	**2**
8.	**Assay of phenol (unknown sample)**	**2**
9.	**Synthesis of chlorbutanol**	**4**
10.	**Synthesis of paracetamol**	**4**

Reference text

Laboratory Handbook for Practical Organic Pharmaceutical Chemistry adopted by the department

Department of Pharmacology and Toxicology

Title of the course:***Pharmacology- III***
Level: 4th Class, 2nd Semester
Course number:**4212**
Code: Phpht21_4212--
Credit (hours/week):Theory (2) Laboratory (0) Units: 2

No.	Lecture title	Hours
1.	**Hormones of the pituitary and thyroid glands**	3
2.	**Insulin and oral hypoglycemic drugs**	4
3.	**Adreno-corticosteroids**	3
4.	**The gonadal hormones and inhibitors**	3
5.	**Autacoids and autacoid antagonists**	3
6.	**Non-steroidal anti-inflammatory drugs (NSAIDs) and other anti-inflammatory agents**	3
7.	**Drugs used in erectile dysfunction**	2
8.	**Drugs used in osteoporosis**	2
9.	**Drugs used in the management of obesity**	2
10.	**Cancer Chemotherapy: Anticancer drugs and immunosuppressants.**	5

Reference text

Howland RD, Mycek MJ. Lipincotts Illustrated Reviews Pharmacology, 6th edition, 2013, Lippincott William and Wilkins, Philadelphia.

Fifth Year

Department of Clinical Pharmacy

Title of the course:***Applied Therapeutics - I***
Level: 5th Class, 1st Semester
Course number:**511**
Code: Phclp21_511--
Credit (hours/week):Theory (3) Laboratory (0) Units: 3

No.	Lecture title	Hours
1.	Interpretation of Lab. data.	2
2.	Acute coronary syndrome.	2
3.	Arrhythmias	2
4.	Thrombosis	2
5.	Dyslipidemia	1
6.	Stroke	1
7.	Shock	2
8.	Liver cirrhosis	2
9.	Viral hepatitis	1
10.	Inflammatory bowel diseases	2
11.	Acute renal failure (ARF)	1
12.	Chronic renal failure (CRF)	2
13.	Hemodialysis and peritoneal dialysis	1
14.	Systemic lupus erythematosis (SLE)	1
15.	Benign prostatic hyperplasia (BPH)	1
16.	Acid – base disorders	2
17.	Disorders of fluid and electrolytes	2
18.	Urinary incontinence and pediatric enuresis	1
19.	Epilepsy and status epilepticus	2
20.	Fungal infections	1
21.	Parkinson's disease	2
22.	Pain management	1

To be continue .....

Applied Therapeutics - I

No.	Lecture title	Hours
23.	Headache disorders	1
24.	Tobacco use and dependence	1
25.	Parasitic infections	1
26.	Viral diseases	1
27.	Parenteral nutrition	1
28.	Enteral nutrition	1
29.	Evidence-based pharmacy practice and medicine.	1
30.	Drug distribution systems	2
31.	Pharmacovigilance	2

Reference text:

1- Roger Walker, Clive Edwards (eds), Clinical Pharmacy and Therapeutics, Churchill Livingstone, London, 5th edition,2011.

2- Barbara G. Wells & Joseph T. Diriro. Pharmacotherapy hand book,8th edition,2011.

Department of Clinical Laboratory Sciences

Title of the course:***Clinical Chemistry***
Level: 5th Class, 1st Semester
Course number:**512**
Code: Phcls21_512--
Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	**Disorders of Carbohydrates metabolism, Hyperglycemia & Diabetes mellitus, Hypoglycemia**	3
2.	**Disorders of lipid metabolism**	3
3.	**Liver Function Tests**	4
4.	**Kidney Function Tests**	4
5	**Diagnostic enzymology**	4
6	**Hypothalamus & pituitary endocrinology, disorders of anterior pituitary hormones, disorders of adrenal gland, hypopituitrism.**	8
7.	**Reproductive system, disorders of gonadal function in males & females, biochemical assessment during pregnancy**	5
8.	**Tumor markers**	4
9.	**Drug interaction with laboratory Tests**	3
10	**Disorders of calcium metabolism**	3
11.	**Acid- Base Disorders**	4

Reference text

1-Crook,Clinical Chemistry & Metabolic Medicine, 8th edition,2012.
2- Kaplan,Clinical Chemistry, 5th edition,2009.

Department of Clinical Laboratory Sciences

Title of the course:***Practical of Clinical Chemistry***
Level: 5th Class, 1st Semester
Course number:**512**
Code: Phcls21_512--

No.	Lab. Title	Hours
1.	**Specimen collection and preservation**	**2**
2.	**Estimation of blood glucose (enzymatic method)**	**2**
3.	**Oral Glucose Tolerance Test (OGTT)**	**2**
4.	**Determination of blood urea nitrogen**	**2**
5	**Determination of Creatine and Creatinine**	**2**
6	**Estimation of serum uric acid**	**2**
7.	**Estimation of serum Bilirubin**	**2**
8.	**Estimation of serum Phosphate**	**2**
9.	**Total lipid profile: Estimation of serum cholesterol**	**2**
10	**Total lipid profile: Estimation of LDL**	**2**
11.	**Total lipid profile: Estimation of HDL**	**2**
12.	**Total lipid profile: Estimation of Triglycerides**	**2**
13.	**Estimation of AST activity**	**2**
14.	**Estimation of ALT activity**	**2**
15.	**Estimation of CK activity**	**2**

Reference text

Laboratory Manual for Practical Clinical Chemistry adopted by the department

Department of Clinical Laboratory Sciences

Title of the course:***Clinical Laboratory Training***
Level: 5th Class, 1st Semester
Course number:**513**
Code: Phcls21_513--
Credit (hours/week):Theory (0) Laboratory (4) Units: 2

No.	Lecture title	Hours
1.	**Diagnostic test basics, collecting &transporting specimens, venipuncture, urine specimen, stool specimen**	**4**
2.	**Biochemical tests: Fasting blood glucose, Post-prandial glucose, Oral glucose tolerance test**	**4**
3.	**Blood urea, Blood creatinine, Creatinine clearance, Uric acid**	**4**
4.	**Cholesterol, Lipoproteins, triglycerides**	**4**
5.	**Blood proteins, Bilirubin**	**4**
6.	**Calcium, Inorganic phosphate, Serum chloride**	**4**
7.	**Alkaline phosphatase, Acid phosphatase, Alanine amiotransferase, Aspartate aminotransferase, Lactate dehydrogenase, Creatine phosphokinase**	**4**
8.	**Serological tests: VDRL, ASO- Titer, Hepatitis tests**	**4**
9.	**C-reactive protein test, Rheumatic factor test, Rosebengal test, Typhoid fever test(Widal test), Pregnancy Test**	**4**
10.	**General urine examination, urine specimen collection**	**4**
11.	**Hematological tests: RBC count, Hb, PCV, RBC indices, WBC count, Platelets count**	**4**
12.	**Blood typing, Coombs test, Bleeding time, ESR**	**4**
13	**Microbiological tests: culture and sensitivity tests, Staining methods**	**4**
14.	**Culture media, Enriched culture media for general use**	**4**
15.	**Tests for identification of bacteria, Disk diffusion tests of sensitivity to antibiotics, Choice of drugs for disk test, bacterial disease and their laboratory diagnosis**	**4**

Reference text
Manual for Laboratory Training adopted by the department.

Department of Pharmacology and Toxicology

Title of the course:***ClinicalToxicology***
Level: 5th Class, 1st Semester
Course number:**514**
Code: Phpht21_514--
Credit (hours/week):Theory (2) Laboratory (2) Units: 3

No.	Lecture title	Hours
1.	**Initial Evaluation and Management of the Poisoned Patient. Including pediatric poisoning and special consideration in the geriatric patient**	**3**
2.	**Drug Toxicity: Over the counter drugs; caffeine; theophylline; antihistamine and decongestant; non-steroidal anti-inflammatory drugs; vitamins**	**3**
3.	**Toxicity of Prescription Medications: Cardiovascular drugs; beta blockers; ACE inhibitors; Digoxin; Calcium channel blocker; Antiarrhythmic agents; hypoglycemic drugs; Opiods; CNS depressants; tricyclic antidepressants; anti-cholinergic phenothiazines; CNS stimulant**	**13**
4.	**Drug of Abuse: Opioids; Cocaine; phencyclidine; marijuana; Lysergic acid**	**4**
5.	**Chemical and Environmental Toxins: Hydrocarbones; Household toxins; Antiseptic; Disinfectants; Camphor; moth repellents**	**3**
6.	**Botanicals and plants-derived toxins: Herbal preparation; Toxic plants; Poisonous mushrooms**	**4**

Reference text

1-Gossel TA, Bricker TD, (Eds.); Principles of Clinical Toxicology; 3rd edition,1994.
2-Viccellio P, (Ed.); Handbook of Medicinal Toxicology; 1st edition,1993.

Department of Pharmacology and Toxicology

Title of the course:***Practical of Clinical Toxicology***
Level: 5th Class, 1st Semester
Course number:**514**
Code: Phpht21_514--

No.	Lab. Title	Hours
1.	**Laboratory Principles or Toxicological Screening**	2
2.	**Over the counter drugs: Case on Acetaminophen poisoning; Salicylates; evaluation of urine salicylates**	4
3.	**Urine analysis of toxins and chemicals**	4
4.	**Cardiac glycosides toxicity: Digitalis**	2
5.	**Cases on toxicity with foods and dietary supplements**	4
6	**Identification of some common poisons in biological samples: Arsenic; cyanide; strychnine; Salicylates; Phenothiazine derivatives; barbiturates**	6
6.	**Evaluation of cases of toxicity with anti-Parkinsonian drugs**	4
7.	**Evaluation of drug toxicity on human**	4

Reference text

1-Gossel TA, Bricker TD, (Eds.); Principles of Clinical Toxicology; 3rd edition,1994.
2-Viccellio P, (Ed.); Handbook of Medicinal Toxicology; 1st edition,1993.

Department of Pharmaceutics

Title of the course:***Industrial Pharmacy -II***
Level: 5th Class, 1st Semester
Course number:**515**
Code: Phind21_515--
Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	**Pharmaceutical dosage forms: Tablets; role in therapy; advantages and disadvantages; formulation; properties; evaluation; machines used in tableting; quality control; problems; granulation, and methods of production; excipients, and types of tablets**	**10**
2.	**Tablet coating; principles; properties; equipments; processing; types of coating (sugar and film); quality control, and problems**	**4**
3.	**Capsules: Hard gelatin capsules; materials; production; filling equipments; formulation; special techniques**	**3**
4.	**Soft gelatin capsules: Manufacturing methods; nature of capsule shell and content; processing and control; stability**	**2**
5.	**Micro-encapsulation; core and coating materials; stability; equipments and methodology**	**2**
6.	**Modified (sustained release) dosage forms; theory and concepts; evaluation and testing; formulation**	**3**
7.	**Liquids: Formulation; stability and equipments**	**3**
8.	**Suspensions: Theory; formulation and evaluation**	**3**
9.	**Emulsions: Theory and application; types; formulation; equipments and quality control**	**3**
10.	**Semisolids: Percutaneouse absorption; formulation; types of bases (vehicles) preservation; processing and evaluation**	**3**
11.	**Suppositories: Rectal absorption; uses of suppositories; types of bases; manufacturing processes; problems and evaluation**	**3**
12.	**Pharmaceutical aerosols: Propellants; containers; formulation; types and selection of components; stability; manufacturing; quality control and testing**	**6**

Reference text

Leon Lachman et al.,The Theory and Practice of Industrial Pharmacy, 4th edition,2013 .

Department of Pharmaceutics

Title of the course:
Practical of Industrial Pharmacy -II
Level: 5th Class, 1st Semester
Course number:**515**
Code: Phind21_515--

No.	Lab. title	Hours
1.	**Direct compression method for preparation of tablets**	**6**
2.	**Wet granulation method for preparation of tablets**	**6**
3.	**Dry granulation method for preparation of tablets**	**6**
4.	**Evaluation of tablets**	**4**
5.	**Capsules dosage form: Preparation and evaluation**	**4**
6.	**Parenteral dosage forms**	**4**

Reference text

Laboratory Manual for Practical Pharmacology adopted by the department.

Department of Pharmaceutical Chemistry

Title of the course:***Organic Pharmaceutical Chemistry-IV***
Level: 5th Class, 1st Semester
Course number:**516**
Code: Phpch21_516--
Credit (hours/week):Theory (2) Laboratory (0) Units: 2

No.	Lecture title	Hours
1.	**Basic concept of prodrugs; Covalent bonds (cleavable); Prodrugs of functional groups; Types of prodrugs**	6
2.	**Chemical delivery systems; Polymeric prodrugs; Types and structure of polymers; Cross-linking reagents**	6
3.	**Drug targeting**	4
4.	**Project**	4
5.	**Combinatorial chemistry; Peptides and other linear structures; Drug like molecules; Support and linker; Solution-phase combinatorial chemistry**	5
6.	**Detection, purification and analgesics; Encoding combinatorial libraries; High-throughput screening; Virtual screening; Chemical diversity and library design**	5

Reference text

Wilson and Gisvold Textbook of Organic Medicinal and Pharmaceutical Chemistry; Delgado JN, Remers WA, (Eds.); 12th edition,2010.

Graduation Project

Level: 5th Class
Course number:**517**

Credit (hours/week):Theory (1) Laboratory (0) Units: 1

Department of Pharmaceutical Chemistry

Title of the course:***Advanced Pharmaceutical Analyses***
Level: 5th Class, 2nd Semester
Course number:**528**
Code: Phpch21_528--
Credit (hours/week):Theory (3) Laboratory (2) Units: 4

No.	Lecture title	Hours
1.	**UV / visible spectroscopy; Sample handling and instrumentation; Characteristic absorption of organic compounds; Rules for calculation of lambda max and application; Application of UV/visible; spectroscopy; Problems and solutions**	**6**
2.	**Infra Red spectroscopy (theory and H-bonding effect; Sampling techniques and interpretation of spectra; Characteristic group frequencies of organic compounds; Application of IR spectroscopy; Problems and solutions**	**14**
3.	**H^1 –Nucleomagnetic Resonance (NMR) and C^{13}-NMR spectroscopy; Introduction, the nature of NMR absorption, chemical shifts and factors affecting them, information obtained from NMR spectra, more complex spin-spin splitting patterns, application of H^1-NMR spectroscopy; C^{13}-NMR spectroscopy: introduction and characteristics, DEPT C^{13}-NMR spectroscopy**	**12**
4.	**Mass spectroscopy: Introduction and interpreting Mass spectra; interpreting Mass spectra fragmentation patterns, Mass behavior of some common functional groups.**	**11**
4.	**Elemental microanalysis CHNSO**	**2**

Reference text

1. **Silverstein, Basslerand Morrill,Spectrometric Identification of Organic Compound,8th edition,2014.**
2. **Dyer JR ,Applications of absorption spectroscopy of organic compounds,19th edition,1965.**

3. McMurry; Thomason learning CA, USA; Organic Chemistry,8th edition,2011.

Department of Pharmaceutical Chemistry

Title of the course:

Pracyical of Advanced Pharmaceutical Analyses

Level: 5th Class, 2nd Semester

Course number:**528**

Code: Phpch21_528--

No.	Lab. Title	Hours
1.	**Introduction &demonstration to visible spectrophotometry**	**2**
2.	**Absorption spectra of known colored solution**	**2**
3.	**Absorption spectra of unknown colored solution**	**2**
4.	**Beer's law plot of known solution**	**2**
5.	**Beer's law plot of unknown solution**	**2**
6.	**Colorimetric assay of tetracycline ($FeCl_3$), known sample**	**2**
7.	**Colorimetric assay of tetracycline ($FeCl_3$), unknown sample**	**2**
8.	**Colorimetric assay of tetracycline (acid), known sample**	**2**
9.	**Colorimetric assay of tetracycline (acid), unknown sample**	**2**
10.	**Colorimetric assay of streptomycin (maltol, known sample)**	**2**
11.	**Colorimetric assay of streptomycin (maltol, unknown sample)**	**2**
12.	**Colorimetric assay of streptomycin (oxidized, known sample)**	**2**
13.	**Colorimetric assay of streptomycin (oxidized, unknown sample)**	**2**
14.	**Colorimetric assay of tetracycline (basic, known sample)**	**2**
15.	**Colorimetric assay of tetracycline (basic unknown sample)**	**2**

Reference text

Lab. Handbook for Advanced Pharmaceutical Analyses adopted by the department.

Department of Clinical Pharmacy

Title of the course:***Applied Therapeutics - II***
Level: 5th Class, 2nd Semester
Course number: **529**
Code: Phclp21_529--

Credit (hours/week):Theory (2) Laboratory (0) Units:2

No.	Lecture title	Hours
1	Thyroid and parathyroid disorders	2
2	Contraception	1
3	Endometriosis	1
4	Menstruation related disorders	1
5	Hormonal replacement therapy (HRT)	1
6	Cancer treatment and chemotherapy	2
7	Leukemias	2
8	Lymphomas and Multiple myeloma	2
9	Breast and prostate cancers	2
10	Adverse effects of chemotherapy	1
11	Human immunodeficiency viruse	1
12	Adrenal gland disorders	1
13	Pituitary gland disorders	1
14	Alzheimer's disease	1
15	Schizophrenia	2
16	Depressive disorders	2
17	Anxiety disorders	1
18	Sleep disorders	1
19	Bipolar disorders	1
20	Gluacoma	1
21	HSCT(Hematop. Stem- cell- Transplantion).	1
22	Multiple seclerosis	1
23	Adverse drug reactions	1

Reference text

1-Roger Walker, Clive Edwards (eds), Clinical Pharmacy and Therapeutics, Churchill Livingstone, London,1st edition,2012.
2-Barbara G.Wells & Joseph T. Diriro, Pharmacotherapy hand book 8thedition,2011.

Department of Pharmaceutics

Title of the course: ***Dosage Form Design***
Level: 5th Class, 2nd Semester
Course number:**5210**
Code: Phind21_5210--
Credit (hours/week):Theory (2) Laboratory (0) Units: 2

No.	Lecture title	Hours
1.	**Pharmaceutical consideration: The need for the dosage form**	1
2.	**General consideration for the dosage form**	3
3.	**Pre-formulation; physical description, microscopic examination**	2
4.	**Melting point; phase rule; particle size; polymorphism; solubility**	2
5.	**Permeability; pH; partition coefficient; pka; stability; kinetics; shelf life**	2
6.	**Rate reaction; enhancing stability**	2
7.	**Formulation consideration: Excipients; definition and types; appearance; palatability; flavoring**	2
8.	**Sweetening; coloring pharmaceuticals; preservatives; sterilization; preservatives selection**	2
9.	**Biopharmaceutical considerations: Principle of drug absorption; dissolution of the drugs**	4
10.	**Bioavailability and bioequivalancy; FDA requirements**	3
11.	**Assessment of bioavailability; bioequivalence among drug products**	3
12.	**Pharmacokinetic principles: Half life; clearance; dosage regimen considerations**	4

Reference text

Haward A. Ansel ,Pharmaceutical Dosage Forms and Drug Delivery Systems,9th edition,2010.

Department of Clinical Pharmacy

Title of the course:***Hospital Training***
Level: 5th Class, 2nd Semester
Course number: **5211**
Code: Phclp21_5211--
Credit (hours/week):Theory (0) Laboratory (4) Units:2

No.	Practice title	Hours
1.	**Clinical Pharmacy Practice in Internal Medicine: Clinical observation of cases; evaluation of the case sheets; case presentation; discussion and evaluation**	**20**
2.	**Clinical Pharmacy Practice in Surgery wards: Clinical observation of cases; evaluation of the case sheets; case presentation; discussion and evaluation**	**10**
3.	**Clinical Pharmacy Practice in Gynecology and Obstetrics Ward: Clinical observation of cases; evaluation of the case sheets; case presentation; discussion and evaluation**	**10**
4.	**Clinical Pharmacy Practice in Pediatric Ward: Neurology , Cardiology , GIT , Birth defects , Sepesis , Meningitis**	**20**

Reference text:

Manuals for Clinical Training adopted by the department.

Department of Clinical Pharmacy

Title of the course:***Pharmacoeconomic***
Level: 5th Class, 2nd Semester
Course number: **5212**
Code: Phclp21_5212--
Credit (hours/week):Theory (2) Laboratory (0) Units:2

No.	Lecture title	Hours
1	**Course overview & basic principle of pharmacoeconomics**	**2**
2	**Cost determination**	**6**
3	**Cost effectiveness analyses (CEA)**	**2**
4	**1st mid-term examination**	**2**
5	**Cost utility analyses (CUA)**	**2**
6	**Cost-benefit analysis (CBA)**	**2**
7	**Critical assessment of economic evaluation**	**4**
8	**2nd mid-term examination**	**2**
9	**Drug-focused versus disease-focused frame work for conducting pharmacoeconomic analyses**	**2**
10	**Introduction to epidemiology**	**2**
11	**Project presentation**	**2**
12	**Project presentation**	**2**

References

1-Main Reference Text: Drummond MF, O'Brien B, Stoddart GL, Torrance GW. Methods for the economic evaluation of health care programmes. 3rd ed. Oxford: Oxford University Press, 2005.
2-Supplementary Reference text: Bootman JL, Townsend RJ, McGhan WF, (Eds.), Principles of Pharmacoeconomics, 2nd ed., Harvey Whitney Books Company, Cincinnati, Oh,1996.

Department of Clinical Pharmacy

Title of the course:***Therapeutic Drug Monitoring (TDM)***
Level: 5th Class, 2nd Semester
Course number: **5213**
Code: Phclp21_5213--
Credit (hours/week):Theory (2) Laboratory (2) Units:3

No.	Lecture title	Hours
1.	**Review of basic pharmacokinetic (PK) and pharmacodynamic (PD)**	**2**
2.	**Clinical PK equations and calculations**	**3**
3.	**Clinical PK in special population and cases**	**3**
4.	**Clinical PK/PD for Aminoglycosides**	**2**
5.	**Clinical PK/PD for Vancomycin**	**2**
6.	**Clinical PK/PD for Digoxin**	**2**
7.	**Clinical PK/PD for Phenytoin**	**3**
8.	**Clinical PK/PD for other Anticonvulsants (e.g., Carbamazepine, Valproic Acid, Phenobarbitone/Primidone, Ethosuxsimide**	**3**
9.	**Clinical PK/PD for Theophylline**	**2**
10.	**Clinical PK/PD for Immunossprasants (e.g., Cyclosporine, Tacrolimus**	**2**
11.	**Clinical PK/PD for other Cardiovascular agents (e.g., Lidocaine, Procainamide/N-Acetyl Procainamide**	**2**
12.	**Clinical PK/PD of other drugs (e.g., Lithium), Anticancer agents, and Anticoagulats**	**4**

Reference text

1-Bauer LA (Ed.), Applied Clinical Pharmacokinetics. McGraw Hill, New York, 2008
2-Malcolm Rowland and Thomas Tozer,Clinical Pharmacokinetics Concepts and applications, 3rd edition, 1995.

Department of Clinical Pharmacy

Title of the course:

Practical of Therapeutic Drug Monitoring (TDM)

Level: 5th Class, 2nd Semester

Course number: **5213**

Code: Phclp21_5213—

No.	Lab. title	Hours
1	**TDM practice in hospitals (overview of the process of requesting serum level monitoring, TDM request form, TDM lab facilities and instrument, TDM team and their own responsibilities**	**2**
2	**Problems in basic Pharmacokinetics (PK) and pharmacodynamic (PD)**	**2**
3	**Clinical PK equations and calculations**	**2**
4	**Clinical PK in special population and cases**	**2**
5	**Problems in Clinical PK for Aminoglycosides**	**2**
6	**Problems in Clinical PK for Vancomycin**	**2**
7	**Problems in Clinical PK for Digoxin**	**2**
8	**Problems in Clinical PK for Phenytoin**	**2**
9	**Problems in Clinical PK/PD for other Anticonvulsants (e.g., Carbamazepine, Valproic Acid, Phenobarbitone/Primidone, Ethosuxsimide)**	**4**
10	**Problems in Clinical PK for Theophylline**	**2**
11	**Problems in Clinical PK/PD for Immunossprasants (e.g., Cyclosporine, Tacrolimus)**	**2**
12	**Problems in Clinical PK/PD for Cardiovascular agents (e.g., Lidocaine, Procainamide/N-Acetyl Procainamide)**	**2**
13	**Clinical PK/PD of other drugs (e.g., Lithium), Anticancer agents, and Anticoagulats**	**4**

Reference text

1-Larry A. Bauer,Applied Clinical Pharmacokinetics, 2nd edition, 2008.

2- Malcolm Rowland and Thomas Tozer,Clinical Pharmacokinetics Concepts and applications, 3rd edition, 1995 by;

3-Laboratory Manual for Practical Pharmacology adopted by the department.

Department of Pharmaceutics

Title of the course:***Pharmaceutical Biotechnology***
Level: 5th Class, 2nd Semester
Course number:**5214**
Code: Phind21_5214--
Credit (hours/week):Theory (1) Laboratory (0) Units: 1

No.	Lecture title	Hours
1	**Biotechnology - introduction**	1
2	**Formulation of biotechnology product (biopharmaceutical consideration) Microbial consideration- sterility-pyrogen viral decontamination Excipients of parentral products - solubility enhancer-anti adsorption agents buffer components-preservatives – osmotic agents.**	4
3	**Route of administration Parentral route Oral route Alternative routes (nasal-pulmonary-rectal-buccal transdermal) .**	5
4	**Pharmacokinetic of peptides and proteins , Elimination of proteins (proteolysis-excretion-metabolism(**	5

Reference

Pharmaceutical biotechnology J.A. Crommelin, Robert D. Synider