الجمهورية اليمنية
وزارة التعليم العالي والبحث العلمي
جامعة الرازي
كلية العلوم الطبية
قسم الصيدلة

Program and Course`s Specifications of

Bachelor of Pharmacy (B. Pharm)

مواصفات البرنامج الأكاديمي و المقررات الدراسية

لبرنامج (بكالوريوس الصيدلة)

2013

Program Specifications

Study Plan

1st YEAR						
Semester (1)						
No.	Code	Course	اسم المقرر	Credit hours		
				T	P	Total
1.	RAZ 01	Arabic language	لغة عربية	2	-	2
2.	PHRT 01	Introduction to pharmacy profession	مقدمة في مهنة الصيدلة	2	-	2
3.	RAZ 02	English language	لغة انجليزية	4	-	4
4.	MSC 01	General Biology	أحياء عامة	2	1	3
5.	RAZ 03	Computer skills	مهارات حاسوب	2	1	3
6.	RAZ 04	Islamic culture	ثقافة اسلامية	2	-	2
7.	MSC 02	General chemistry	كيمياء عامة	2	1	3
		Total		16	3	**19**

1st YEAR						
Semester (2)						
No.	Code	Course	اسم المقرر	Credit hours		
				T	P	Total
1.	MSC 05	English for Medical Purposes	الانجليزية للأغراض الطبية	4	-	4
2.	MSC 06	Anatomy and histology	تشريح و انسجة	2	1	3
3.	PHRM 01	Organic Chemistry	كيمياء عضوية	3	1	4
4.	PHRT 02	Mathematics	رياضيات	2	-	2
5.	MSC 04	Physics	فيزياء	2	1	3
6.	PHRM 02	Drug Discovery and Development	اكتشاف و تطوير الدواء	2	-	2
7.	MSC 03	Communication skills	مهارات اتصال	2	-	2
Total				17	3	**20**

2nd YEAR						
Semester (3)						
No.	Code	Course	اسم المقرر	Credit hours		
				T	P	Total
1.	PHRM 03	Pharmaceutical Organic Chemistry	كيمياء عضوية صيدلانية	3	1	4
2.	MSC 08	Physiology I	علم وظائف الاعضاء 1	2	-	2
3.	PHRT 03	Physical pharmacy	فيزياء صيدلانية	2	1	3
4.	MSC 07	Psychology	علم نفس	2	-	2
5.	PHRG 01	Botany	علم نبات	2	1	3
6.	PHRT 04	Pharmaceutical calculations skills	مهارات الحسابات الصيدلانية	2	-	2
7.	MSC 09	Medical Biochemistry	كيمياء حيوية طبية	2	1	3
Total				15	4	**19**

2nd YEAR						
Semester (4)						
No.	Code	Course	اسم المقرر	Credit hours		
				T	P	Total
1.	PHRT 05	Pharmaceutics I	صيدلانيات 1	2	1	3
2.	PHRC 01	Physiology II	علم وظائف الاعضاء 2	2	-	2
3.	PHRM 04	Pharmaceutical Analytical Chemistry	كيمياء تحليلية صيدلانية	2	1	3
4.	PHRT 06	Pharmaceutical Microbiology	علم الاحياء الدقيقة الصيدلانية	2	1	3
5.	MSC 10	Pathology	علم الامراض	2	-	2
6.	PHRG 02	Pharmacognosy I	علم العقاقير 1	2	1	3
7.	PHRM 05	Medicinal chemistry I	كيمياء دوائية 1	2	1	3
8.	PHRC 02	Pharmacology I	علم أدوية 1	3	-	3
	Total			17	5	**22**

3rd YEAR						
Semester (5)						
No.	Code	Course	اسم المقرر	Credit hours		
				T	P	Total
1.	PHRO 01	Medical parasitology	علم الطفيليات الطبية	2	1	3
2.	PHRT 07	Pharmaceutics II	صيدلانيات 2	2	1	3
3.	PHRM 06	Medicinal Chemistry II	كيمياء دوائية 2	3	1	4
4.	PHRM 07	Pharmaceutical instrumental analysis I	تحليل الي صيدلاني 1	2	1	3
5.	PHRC 03	Pharmacology II	علم أدوية 2	3	-	3
6.	PHRG 03	Pharmacognosy II	علم العقاقير 2	2	1	3
7.	PHRC 04	Pathophysiology	علم وظائف الاعضاء المرضي	2	-	2
	Total			16	5	**21**

3rd YEAR						
Semester (6)						
No.	Code	Course	اسم المقرر	Credit hours		
				T	P	Total
1.	PHRG 04	Phytochemistry I	كيمياء عقاقير 1	2	1	3
2.	PHRC 05	Pharmacology III	علم أدوية 3	3	-	3
3.	PHRT 08	Pharmaceutics III	صيدلانيات 3	2	1	3
4.	PHRC 06	Pharmacotherapy I	معالجة أدوية 1	2	-	2
5.	PHRM 08	Pharmaceutical Instrumental analysis II	تحليل الي صيدلاني 2	2	1	3
6.	PHRM 09	Medicinal Chemistry III	كيمياء دوائية 3	3	1	4
7.	PHRT 09	Pharmaceutical Clinical Care I	رعاية صيدلانية سريرية 1	2	-	2
8.	PHRT 10	Integrated- case based learning I	التعلم القائم على الحالات 1	-	2	2
	Total			16	6	**22**

4th YEAR						
Semester (7)						
No.	Code	Course	اسم المقرر	Credit hours		
				T	P	Total
1.	PHRG 07	Experimental pharmacology	علم الادوية التجريبي	2	1	3
2.	PHRT 14	Integrated- case based learning II	التعلم القائم على الحالات	-	2	2
3.	PHRC 07	Pharmacotherapy II	معالجة دوائية 2	2	-	2
4.	PHRT 13	Pharmaceutical clinical care II	رعاية صيدلانية سريرية 2	2	-	2
5.	PHRG 05	Phytochemistry II	كيمياء العقاقير 2	2	1	3
6.	PHRT 15	Cosmetic Preparations	مستحضرات التجميل	2	1	3
7.	PHRM 10	Pharmaceutical instrumental analysis III	تحليل الي صيدلاني 3	2	1	3
		Total		12	6	**18**

4th YEAR							
Semester (8)							
No.	Code	Course	اسم المقرر	Credit hours			
				T	P	Training	Total
1.	PHRG 06	Complementary and alternative medicine	الطب المكمل و البديل	2	-		2
2.	PHRT 23	Advanced drug delivery systems	انظمة ايصال الدواء المتطوره	2	-		2
3.	PHRT 11	Biopharmaceutics	صيدلة حيوية	2	-		2
4.	PHRT 18	Industrial pharmacy	صيدلة صناعية	2	1		3
5.	PHRT 16	Hospital pharmacy	صيدلة مستشفيات	2	-		2
6.	PHRT 22	Pharmaceutical Quality Control	ضبط جودة صيدلانية	2	1		3
7.	PHRC 09	Toxicology	علم السموم	2	-		2
8.	PHRT 20	Pharmacy Training I	تدريب صيدلاني 1	-		2	2*
Total				14	2	2	**18**

* = 320 ساعة تدريب

Republic of Yemen
Ministry of Higher Education and Scientific Research
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Medical Sciences College
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5th YEAR							
Semester (9)							
No.	Code	Course	اسم المقرر	Credit hours			
				T	P	Training	Total
1.	MSC 11	Biostatistics	احصاء حيوي	2	-		2
2.	MSC 12	Research methodology	منهجية بحث	2	1		3
3.	PHRT 12	Pharmacy Practice skills	مهارات الممارسة الصيدلانية	2	1		3
4.	PHRC 10	Pharmacogenomics and gene therapy	جينوما دوائية و علاج جيني	2	-		2
5.	PHRT 24	Pharmacy Training II	تدريب صيدلاني 2	-		2*	2
6.	PHRT 17	Pharmacokinetics	حركية دواء	3	-		3
7.	PHRT 25	Nuclear Pharmacy	صيدلة نووية	2	-		2
8.	PHRT 21	Pharmaceutical Biotechnology	تقنية حيوية صيدلانية	2	-		2
		Total		15	2	*2*	**19**

* = 320 ساعة تدريب

5th YEAR						
Semester (10)						
No.	Code	Course	اسم المقرر	Credit hours		
				T	P	Total
1.	PHRT 26	Pharmaceutical Marketing	تسويق دوائي	2	-	2
2.	MSC 13	Professional ethics and regulations	تشريعات و اخلاقيات مهنية	2	-	2
3.	MSC 14	Graduation research	بحث تخرج	-	3	3
4.	PHRT 19	Pharmacoeconomics	اقتصاد صيدلاني	2	-	2
5.	PHRO 02	Public health and First aid	صحة عامة و اسعافات اولية	2	-	2
Total				8	3	**11**

مبررات تحديث الخطط الدراسية في برنامج (بكالوريوس الصيدلة) 2013

اولا: السير الزمني للخطط الدراسية

- **الخطة القديمة : الأولى (2009)**

تم افتتاح برنامج بكالوريوس الصيدلة في عام 2009 م الموافق 1430 هجرية كأول البرامج الأكاديمية الطبية ضمن المسمى القديم للمؤسسة الأكاديمية (**كلية الرازي للعلوم الطبية**) وتم إعداد مواصفات البرنامج (Program specifications)و الخطة الدراسية (Study plan) و توصيفات المقررات الدراسية (Courses specifications) من قبل المختصين في المجال و بدأت الدراسة في البرنامج في 2010/2009
و تم تطبيق هذه الخطة على الدفع الدراسية الاتية :

الدفعة	سنة الالتحاق	سنة التخرج
.1	2010/2009	2014/2013
.2	2011/2010	2015/2014
.3	2012/2011	2016/2015
.4	2013/2012	2017/2016

- **الخطة الثانية (2013)**

بعد استكمال البنية التحتية و الأكاديمية في 2013 تم تحويل المؤسسة الى (**جامعة الرازي**) و تم تحديث جميع برامجها الأكاديمية بما في ذلك برنامج بكالوريوس الصيدلة من قبل المختصين في المجال و تم اتخاذ قرار مجلس الجامعة بشأن " **مبادئ و الية تقييم و تحديث و تطوير البرامج الأكاديمية** " و شملت المبادئ إقرار التحديثات فقط عند وجود مبررات أكاديمية تخدم البرنامج., وتم تطبيق هذه الخطة 2013 على الدفع التالية

الدفعة	سنة الالتحاق	سنة التخرج
.5	2014/2013	2018/2017
.6	2015/2014	2019/2018
.7	2016/2015	2020/2019
.8	2017/2016	2021/2020
.9	2018/2017	2022/2021
.10	2019/2018	2023/2022
.11	2020/2019	2024/2023
.12	2021/2020	2025/2023
.13	2022/2021	2026/2025

ثانيا: مبررات التعديلات من الخطة القديمة (الأولى) 2009 الى خطة 2013 (الثانية)

أ- **المبررات العامة**

1- التوافق مع معايير الاعتماد الأكاديمي الدولية و المحلية والمرجعيات الجامعية الإقليمية و الدولية لكل برنامج
2- التوافق مع مستجدات و المتطلبات الجديدة في سوق العمل
3- تطوير الجانب العملي المهارى Practical skills و التدريبي Professional skills في البرنامج

ب- **مبررات التعديلات في التدريب الميداني والمقررات الدراسية**

1 – خطة التدريب الميداني : زيادة عدد ت الساعات الفعلية للتدريب في حقول التدريب الصيدلاني المختلفة (صيدليات المجتمع – صيدليات المستشفى – الصيدلة السريرية - المصانع الدوائية) من 288 ساعة الى 640 ساعة

2- المقررات الدراسية

التعديل	المبرر
مستوى الأول – الفصل الأول	
ديل مسمى (لغة انجليزية)1 و عدد ساعاتها الاسبوعية 2 ى (اللغة الانجليزية) و عدد ساعاتها الاسبوعية 4	زيادة تكثيف عدد الساعات المقررة في اللغة الانجليزية لتحسين مستوى الطالب فيها نظرا لأهميتها كونها لغة الدراسة
ديل مسمى (مقدمة في الحاسوب) الى (مهارات حاسوب) مع تعديل المحتوى في اتجاه الجانب المهارى و التطبيقي	• التوافق مع المرجعيات الدولية • تحسين مهارات الطالب في استخدام البرامج الحاسوبية
ل مقرر (رياضيات) الى الفصل الثاني	• التوافق مع المرجعيات الدولية
المستوى الأول – الفصل الثاني	
ديل مسمى مقرر (اللغة الانجليزية 2) الى (الانجليزية للأغراض الطبية)	• التوافق مع المرجعيات الدولية
ل مقرر (مقدمة الى مهنة الصيدلة) من الفصل الثاني الى الفصل الأول	• التوافق مع المرجعيات الدولية • تمكين الطالب من التعرف على تخصصه المستقبلي من أول فصل دراسي يدرسه
ديل مسمى (فيزياء حيوية) الى (فيزياء)	• التوافق مع المرجعيات الدولية • تحوير المحتوى لدراسة الأسس و المبادئ العامة في الفيزياء – كمقدمة لدراسة أسس و تطبيقات الفيزياء في الصيدلة في مقرر اخر (صيدلة فيزيائية)
ل مقرر (إحصاء حيوي) الى الفصل التاسع	للاستفادة منها بشكل أفضل في بحث التخرج الفصل العاشر
ل مقرر (صيدلة فيزيائية) الى المستوى الثاني – الفصل الأول	ضمان التسلسل العلمي حيث يدرس (الفيزياء) كمقرر سابق في الفصل الأول , و (صيدلانيات 1) في الفصل الثالث
ل مقرر (علم النفس) الى المستوى الثاني – الفصل الأول	• التوافق مع المرجعيات الدولية

التعديل	المبرر
ضافة مقرر جديد (مهارات اتصال)	• اكتساب مهارة الاتصال التي سيحتاجها الطالب للتواصل الجيد مع أقرانه و معلميه أثناء فترة الدراسة و الاخرين بعد التخرج التوافق مع المرجعيات الدولية • التوافق مع المرجعيات الدولية
ضافة مقرر جديد (اكتشاف و تطوير الدواء)	• المقرر مقدمة في الكيمياء الدوائية و هو مقرر يسبق (كيمياء دوائية 1) و مهم للتعرف على مصادر الأدوية و مراحل اكتشافها و تطويرها • التوافق مع المرجعيات الدولية
ضافة مقرر جديد (تشريح و أنسجة)	• المقرر كان مفصولا في مقررين و تم دمجهما لإتاحة الفرصة لمقررات جديدة اخرى اكثر افادة في التخصص • التوافق مع المرجعيات الدولية

التعديل	المبرر
مستوى الثاني – الفصل الثالث	
ل مقرر (صيدلانيات 1) الى الفصل الرابع	لضمان التسلسل العلمي المنطقي حيث يسبقه مقرر (صيدلة فيزيائية) في الفصل الثالث
ديل مسمى (كيمياء عضوية صيدلانية 1) الى (كيمياء عضوية صيدلانية) و زيادة ساعاتها من 3 الى 4	- المقرر يسبقه مقرر اخر باسم (كيمياء عضوية) و هو مقرر عام – بينما هذا المقرر اكثر تخصصية حيث يركز على المجموعات الوظيفية العضوية الشائعة في البناء الكيميائي للأدوية
ل مقرر (صحة عامة) الى المستوى الخامس الفصل العاشر و تعديل المسمى الى (صحة عامة و اسعافات أولية)	• التوافق مع المرجعيات الدولية
ل مقرر (كيمياء تحليلية صيدلانية 1) الى الفصل الرابع و تعديل المسمى الى (كيمياء تحليلية صيدلانية)	• المقرر تم تعديل مسميات أجزائه 2 و 3 الى (تحليل الي صيدلاني) بما يوافق المرجعيات الدولية
المستوى الثاني – الفصل الرابع	
نقل مقرر (صيدلانيات 2) الى الفصل الخامس	لضمان التسلسل العلمي المنطقي حيث يسبقه مقرر (صيدلانيات 1) في الفصل الرابع
نقل مقرر (كيمياء تحليلية صيدلانية 2) الى الفصل الخامس و تعديل المسمى الى (تحليل الي صيدلاني 1)	• التوافق مع المرجعيات الدولية
ل مقرر (علم نبات) الى الثالث	لضمان التسلسل العلمي المنطقي حيث أنه يسبق مقرر (علم العقاقير 1) في الفصل الرابع

التعديل	المبرر
مستوى الثالث – الفصل الخامس	
نقل مقرر (عقاقير عامه 1) الى الفصل الرابع و تعديل المسمى الى (علم العقاقير 1)	• التوافق مع المرجعيات الدولية
نقل مقرر (كيمياء تحليلية صيدلانية 3) الى الفصل السادس و تعديل المسمى الى (تحليل الي صيدلاني 2)	• التوافق مع المرجعيات الدولية
تعديل مسمى مقرر (علم الأحياء الدقيقة الصيدلانية 1) الى (علم الأحياء الدقيقة الصيدلانية) و نقله الى الفصل الرابع	• التوافق مع المرجعيات الدولية
ل مقرر (صيدلانيات 3) الى الفصل السادس	لضمان التسلسل العلمي المنطقي حيث يسبقه مقرر (صيدلانيات 2) في الفصل الخامس
نقل مقرر (كيمياء حيوية) الى الفصل الثالث و تعديل المسمى الى (كيمياء حيوية طبية)	• التوافق مع المرجعيات الدولية • توجيه المحتوى باتجاه التخصص الطبي
ل مقرر (علم الأمراض) الى الفصل الثالث	لضمان التسلسل العلمي المنطقي حيث يسبقه مقرر (علم وظائف الأعضاء 1) في الفصل الثاني و يلحقه مقرر (علم وظائف الأعضاء المرضي) في الفصل الرابع
المستوى الثالث – الفصل السادس	
ديل مسمى مقرر (صيدلانيات 4) الى (أنظمة أيصال دواء متقدمة) و نقلها الى الفصل الثامن	• التوافق مع المرجعيات الدولية • التحديث الجديد أكثر حداثة في التسمية و المحتوى من التسمية القديمة
ل مقرر (علم الأدوية 1) الى الفصل الرابع وزيادة الساعات من 2 الى 3	زيادة عدد الساعات نظرا لأهمية المقرر في التخصص
ل مقرر (اسعافات اولية) الى الفصل العاشر و ضمها في مقرر (صحة عامة و اسعافات اولية)	• التوافق مع المرجعيات الدولية
ل مقرر (عقاقير عامه 2) الى الفصل الخامس و تعديل المسمى الى (علم العقاقير 2)	• التوافق مع المرجعيات الدولية
ضافة مقرر جديد (التعلم القائم على الحالات 1)	• التوافق مع المرجعيات الدولية • زيادة اكتساب المهارات السريرية حيث يركز المقرر على مهارة اتخاذ القرارات السريرية بعد تحليل المشكلة بطريقة حل المشكلات • يعتبر الجزء العملي المكمل لمقرر (رعاية صيدلانية سريرية 1)
ضافة مقرر جديد (معالجة دوائية 1)	• التوافق مع المرجعيات الدولية

التعديل	المبرر
	• زيادة اكتساب المهارات السريرية حيث يركز المقرر على مهارات اختيار الدواء المناسب بقياس نسبى المنفعة الى الضرر Benefit: Risk • يعتبر مكمل لمقرر (رعاية صيدلانية سريرية 1)

التعديل	المبرر
مستوى الرابع – الفصل السابع	
تل مقرر (علم الأدوية 2) الى الفصل الخامس وزيادة الساعات من 2 الى 3	زيادة عدد الساعات نظرا لأهمية المقرر في التخصص
نقل مقرر (علم السموم) الى الفصل الثامن	تسبقه مقررات (علم الأدوية 1 و 2و 3)
ديل مسمى مقرر (تقنية حيوية) الى (تقنية حيوية صيدلانية) و نقلها الى الفصل التاسع	توجيه المسمى و المحتوى باتجاه التخصص
ديل مسمى مقرر (صيدلة حيوية و حركية دواء 1) الى (صيدلة حيوية) و نقلها الى الفصل الثامن	• التوافق مع المرجعيات الدولية
تل مقرر (كيمياء دوائية 1) الى الفصل الرابع و زيادة عدد ساعاتها من 3 الى 4	• لضمان التناسق مع مقرر علم الأدوية 1 في نفس الفصل • زيادة عدد الساعات نظرا لأهمية المقرر في التخصص
ديل مسمى مقرر (فسيولوجيا الأمراض) الى (علم وظائف الأعضاء المرضي) و نقلها الى الفصل الخامس	المسمى الجديد أكثر دقة
ديل مسمى مقرر (كيمياء عقاقير 1) الى كيمياء العقاقير 1) و نقلها الى الفصل السادس	• المسمى الجديد أكثر دقة • النقل : لضنان التسلسل العلني بعد مقرري (علم العقاقير 1 و 2) في الفصل الرابع و الخامس
إضافة مقرر جديد (علم الأدوية التجريبي)	• يركز المقرر الجديد على مهارات إجراء التجارب الدوائية على حيوانات التجارب مع الأخذ بالاعتبار الجانب الشرعي لديننا الحنيف و كذلك الجوانب الأخلاقية في التعامل الرحيم
ضافة مقرر جديد (التعلم القائم على الحالات 2)	• التوافق مع المرجعيات الدولية • زيادة اكتساب المهارات السريرية حيث يركز المقرر على مهارة اتخاذ القرارات السريرية بعد تحليل المشكلة بطريقة حل المشكلات • يعتبر الجزء العملي المكمل لمقرر (رعاية صيدلانية سريرية 2)
ضافة مقرر جديد معالجة دوائية 2)	• التوافق مع المرجعيات الدولية

التعديل	المبرر
	• زيادة اكتساب المهارات السريرية حيث يركز المقرر على مهارات اختيار الدواء المناسب بقياس نسبى المنفعة الى الضرر Benefit: Risk • يعتبر مكمل لمقرر (رعاية صيدلانية سريرية 2)
ضافة مقرر جديد مستحضرات التجميل)	• التوافق مع المرجعيات الدولية • اكتساب مهارة تحضير و تصنيع و ضبط جودة مستحضرات التجميل كجزء من المهام الحديثة للصيدلي
المستوى الرابع – الفصل الثامن	
ل مقرر (طفيليات) الى الفصل الخامس و تعديل المسمى الى (علم الطفيليات الطبية)	توجيه المسمى و المحتوى باتجاه التخصص
ل مقرر (علم الأدوية 3) الى الفصل السادس وزيادة الساعات من 2 الى 3	زيادة عدد الساعات نظرا لأهمية المقرر في التخصص
ل مقرر (كيمياء دوائية 2) الى الفصل الخامس و زيادة عدد ساعاتها من 3 الى 4	• لضمان التناسق مع مقرر علم الأدوية 2 في نفس الفصل • زيادة عدد الساعات نظرا لأهمية المقرر في التخصص
ديل مسمى مقرر (صيدلة حيوية و حركية دواء 2) الى (حركية دواء) و نقلها الى الفصل التاسع	التوافق مع المرجعيات الدولية
ديل مسمى مقرر (كيمياء عقاقير 2) الى كيمياء العقاقير 2) و نقلها الى الفصل السابع	المسمى الجديد أكثر دقة • النقل : لضنان التسلسل العلمي بعد مقرر كيمياء العقاقير 1
التعديل	**المبرر**
ضافة مقرر جديد (تدريب صيدلاني 1)	اكتساب مهارات العمل في بيئة العمل الحقيقة : المستشفيات – المصانع – صيدليات المجتمع

التعديل	المبرر
المستوى الخامس – الفصل التاسع	
تعديل مسمى مقرر (صيدلة سريرية 1) الى (رعاية صيدلانية سريرية 1) و نقلها الى الفصل السادس	• التوافق مع المرجعيات الدولية • المسمى الجديد + تعديل المحتوى : يشمل المبادئ السريرية الأساسية + المهارات السريرية + خدمات الرعاية الصيدلانية السريرية
تعديل مسمى مقرر (طرق بحث) الى (منهجية بحث)	المسمى أكثر دقة
تعديل مسمى مقرر (ضبط جودة) الى (ضبط جودة صيدلانية)	توجيه المسمى و المحتوى باتجاه التخصص
تعديل مسمى مقرر (صيدلة صناعية 1) الى (صيدلة صناعية) و نقلها الى الفصل الثامن و زيادة عدد الساعات من 2 الى 3	زيادة عدد الساعات نظرا لأهمية المقرر في التخصص
نقل مقرر (صيدلة مستسقيات) الى الفصل الثامن	• التوافق مع المرجعيات الدولية • يسبقه مقرر ي (رعاية صيدلانية سريرية 1و 2) • يؤخذ بالتزامن مع (تدريب صيدلاني 1)
قل مقرر (كيمياء دوائية 3) الى الفصل السادس و زيادة عدد ساعاتها من 3 الى 4	زيادة عدد الساعات نظرا لأهمية المقرر في التخصص
تعديل مسمى مقرر (علم عقاقير تطبيقي 1) الى (الطب المكمل و البديل) و تعديل المحتوى ليشمل كل الطرق البديلة في المعالجة	• التوافق مع المرجعيات الدولية • و تعديل المحتوى ليشمل كل الطرق البديلة في المعالجة سواء منها العشبية Phytotherapy أو غيرها كالطرق الفيزيائية Physiotherapy
إضافة مقرر جديد (جينوما دوائية و علاج جيني)	• التوافق مع المرجعيات الدولية • المقرر من أحدث المقررات في الصيدلة و يهتم بشرح تأثير الجينات على فعالية و حركية الأدوية و كذلك استبدال الجينات المريضة بالسليمة كأحد طرق المعالجة للأمراض
إضافة مقرر جديد (تدريب صيدلاني 2)	اكتساب مهارات العمل في بيئة العمل الحقيقة : المستشفيات – المصانع – صيدليات المجتمع
إضافة مقرر جديد (صيدلة نووية)	• التوافق مع المرجعيات الدولية • المقرر يهتم بدراسة الأدوية المشعة التي تستخدم في تشخيص و علاج السرطان
المستوى الخامس – الفصل العاشر	
تعديل مسمى (صيدلة مجتمع) الى (مهارات الممارسة الصيدلانية)	• التوافق مع المرجعيات الدولية • توجيه المسمى و المحتوى لمهارات العمل في صيدليات المجتمع مثل صرف الوصفات الطبية و مهارات التشاور مع المرضى و اختيار الأدوية دون وصفات OTC

تعديل مسمى (تسويق) الى (تسويق دوائي)	توجيه المسمى و المحتوى باتجاه التخصص
تعديل مسمى مقرر (صيدلة سريرية 2) الى (رعاية صيدلانية سريرية 2) و نقلها الى الفصل السابع	• التوافق مع المرجعيات الدولية • المسمى الجديد + تعديل المحتوى : يشمل المبادئ السريرية الأساسية + المهارات السريرية + خدمات الرعاية الصيدلانية السريرية
إضافة مقرر جديد (اقتصاد صيدلاني)	مقرر صيدلاني حديث للتمكين من اكتساب مهارة الاختيار بناء على أسس اقتصادية من خلال تقييم التكلفة و الجدوى ل : نوعين أو أكثر من الأدوية و الطرق العلاجية

1. General and Basic Information on The Program	
Name of the program	Bachelor of Pharmacy (B. Pharm)
The institute responsible for the program	Department of pharmacy- medical sciences college- Al-Razi University
Certificate & Specialty awarded	Bachelor degree in Pharmacy (B. Pharm)
Requirements for admission	High School certificate (Scientific section) with overall grade at least 70% or as determined by the ministry of Higher education and scientific research-Yemen.
Duration of the study	**5** academic years. Each year is composed of **2** semesters. Each semester is composed of 16 weeks (including exams periods)
Study mode	Attendance (at least **75 %**)
Total Credit Hours of the study	**189** credit hours
Total number of courses	**72** courses
Field training contact hours	A total of **640** contact training hours at pharmacy fields
Regulations of the study	All academic regulations adopted by the university and ministry of High education-Yemen

The Committee of Program Preparation

- **Prof. Nabil Al-Rabiei** ; Dean of the medical science college ; Chief of the committee
- **Dr. Rashad Al-namer** ; Assistant professor of pharmacology and toxicology ; Head of pharmacy department
- **Dr. Jamal Al-mahwetii** ; Assistant professor of pharmacognosy
- **Dr. Abdullah Shumailah** ; Assistant professor of analytical chemistry
- **Anes Abdulwahed** ; MSc. Pharm. "Pharmaceutics" ; the secretary of the committee

3. Study Plan

1st YEAR						
Semester (1)						
No.	Code	Course	اسم المقرر	Credit hours		
				T	P	Total
1.	RAZ 01	Arabic language	لغة عربية	2	-	2
2.	PHRT 01	Introduction to pharmacy profession	مقدمة في مهنة الصيدلة	2	-	2
3.	RAZ 02	English language	لغة انجليزية	4	-	4
4.	MSC 01	General Biology	أحياء عامة	2	1	3
5.	RAZ 03	Computer skills	مهارات حاسوب	2	1	3
6.	RAZ 04	Islamic culture	ثقافة اسلامية	2	-	2
7.	MSC 02	General chemistry	كيمياء عامة	2	1	3
		Total		16	3	**19**

1st YEAR						
Semester (2)						
No.	Code	Course	اسم المقرر	Credit hours		
				T	P	Total
1.	MSC 05	English for Medical Purposes	الانجليزية للأغراض الطبية	4	-	4
2.	MSC 06	Anatomy and histology	تشريح و انسجة	2	1	3
3.	PHRM 01	Organic Chemistry	كيمياء عضوية	3	1	4
4.	PHRT 02	Mathematics	رياضيات	2	-	2
5.	MSC 04	Physics	فيزياء	2	1	3
6.	PHRM 02	Drug Discovery and Development	اكتشاف و تطوير الدواء	2	-	2
7.	MSC 03	Communication skills	مهارات اتصال	2	-	2
Total				17	3	**20**

2nd YEAR						
Semester (3)						
No.	Code	Course	اسم المقرر	Credit hours		
				T	P	Total
1.	PHRM 03	Pharmaceutical Organic Chemistry	كيمياء عضوية صيدلانية	3	1	4
2.	MSC 08	Physiology I	علم وظائف الاعضاء 1	2	-	2
3.	PHRT 03	Physical pharmacy	فيزياء صيدلانية	2	1	3
4.	MSC 07	Psychology	علم نفس	2	-	2
5.	PHRG 01	Botany	علم نبات	2	1	3
6.	PHRT 04	Pharmaceutical calculations skills	مهارات الحسابات الصيدلانية	2	-	2
7.	MSC 09	Medical Biochemistry	كيمياء حيوية طبية	2	1	3
Total				15	4	**19**

2nd YEAR						
Semester (4)						
No.	Code	Course	اسم المقرر	Credit hours		
				T	P	Total
1.	PHRT 05	Pharmaceutics I	صيدلانيات 1	2	1	3
2.	PHRC 01	Physiology II	علم وظائف الاعضاء 2	2	-	2
3.	PHRM 04	Pharmaceutical Analytical Chemistry	كيمياء تحليلية صيدلانية	2	1	3
4.	PHRT 06	Pharmaceutical Microbiology	علم الاحياء الدقيقة الصيدلانية	2	1	3
5.	MSC 10	Pathology	علم الامراض	2	-	2
6.	PHRG 02	Pharmacognosy I	علم العقاقير 1	2	1	3
7.	PHRM 05	Medicinal chemistry I	كيمياء دوائية 1	2	1	3
8.	PHRC 02	Pharmacology I	علم أدوية 1	3	-	3
	Total			17	5	**22**

3rd YEAR						
Semester (5)						
No.	Code	Course	اسم المقرر	Credit hours		
				T	P	Total
1.	PHRO 01	Medical parasitology	علم الطفيليات الطبية	2	1	3
2.	PHRT 07	Pharmaceutics II	صيدلانيات 2	2	1	3
3.	PHRM 06	Medicinal Chemistry II	كيمياء دوائية 2	3	1	4
4.	PHRM 07	Pharmaceutical instrumental analysis I	تحليل الي صيدلاني 1	2	1	3
5.	PHRC 03	Pharmacology II	علم أدوية 2	3	-	3
6.	PHRG 03	Pharmacognosy II	علم العقاقير 2	2	1	3
7.	PHRC 04	Pathophysiology	علم وظائف الاعضاء المرضي	2	-	2
	Total			16	5	**21**

3rd YEAR						
Semester (6)						
No.	Code	Course	اسم المقرر	Credit hours		
				T	P	Total
1.	PHRG 04	Phytochemistry I	كيمياء عقاقير 1	2	1	3
2.	PHRC 05	Pharmacology III	علم أدوية 3	3	-	3
3.	PHRT 08	Pharmaceutics III	صيدلانيات 3	2	1	3
4.	PHRC 06	Pharmacotherapy I	معالجة أدوية 1	2	-	2
5.	PHRM 08	Pharmaceutical Instrumental analysis II	تحليل الي صيدلاني 2	2	1	3
6.	PHRM 09	Medicinal Chemistry III	كيمياء دوائية 3	3	1	4
7.	PHRT 09	Pharmaceutical Clinical Care I	رعاية صيدلانية سريرية 1	2	-	2
8.	PHRT 10	Integrated- case based learning I	التعلم القائم على الحالات 1	-	2	2
	Total			16	6	**22**

4th YEAR						
Semester (7)						
No.	Code	Course	اسم المقرر	Credit hours		
				T	P	Total
1.	PHRG 07	Experimental pharmacology	علم الادوية التجريبي	2	1	3
2.	PHRT 14	Integrated- case based learning II	التعلم القائم على الحالات	-	2	2
3.	PHRC 07	Pharmacotherapy II	معالجة دوائية 2	2	-	2
4.	PHRT 13	Pharmaceutical clinical care II	رعاية صيدلانية سريرية 2	2	-	2
5.	PHRG 05	Phytochemistry II	كيمياء العقاقير 2	2	1	3
6.	PHRT 15	Cosmetic Preparations	مستحضرات التجميل	2	1	3
7.	PHRM 10	Pharmaceutical instrumental analysis III	تحليل الي صيدلاني 3	2	1	3
		Total		12	6	**18**

4th YEAR							
Semester (8)							
No.	Code	Course	اسم المقرر	Credit hours			
				T	P	Training	Total
1.	PHRG 06	Complementary and alternative medicine	الطب المكمل و البديل	2	-		2
2.	PHRT 23	Advanced drug delivery systems	انظمة ايصال الدواء المتطوره	2	-		2
3.	PHRT 11	Biopharmaceutics	صيدلة حيوية	2	-		2
4.	PHRT 18	Industrial pharmacy	صيدلة صناعية	2	1		3
5.	PHRT 16	Hospital pharmacy	صيدلة مستشفيات	2	-		2
6.	PHRT 22	Pharmaceutical Quality Control	ضبط جودة صيدلانية	2	1		3
7.	PHRC 09	Toxicology	علم السموم	2	-		2
8.	PHRT 20	Pharmacy Training I	تدريب صيدلاني 1	-		2	2*
		Total		14	2	2	**18**

* = 320 ساعة تدريب

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5th YEAR							
Semester (9)							
No.	Code	Course	اسم المقرر	Credit hours			
				T	P	Training	Total
1.	MSC 11	Biostatistics	احصاء حيوي	2	-		2
2.	MSC 12	Research methodology	منهجية بحث	2	1		3
3.	PHRT 12	Pharmacy Practice skills	مهارات الممارسة الصيدلانية	2	1		3
4.	PHRC 10	Pharmacogenomics and gene therapy	جينوما دوائية و علاج جيني	2	-		2
5.	PHRT 24	Pharmacy Training II	تدريب صيدلاني 2	-		2*	2
6.	PHRT 17	Pharmacokinetics	حركية دواء	3	-		3
7.	PHRT 25	Nuclear Pharmacy	صيدلة نووية	2	-		2
8.	PHRT 21	Pharmaceutical Biotechnology	تقنية حيوية صيدلانية	2	-		2
		Total		15	2	*2*	**19**

* = 320 ساعة تدريب

5th YEAR						
Semester (10)						
No.	Code	Course	اسم المقرر	Credit hours		
				T	P	Total
1.	PHRT 26	Pharmaceutical Marketing	تسويق دوائي	2	-	2
2.	MSC 13	Professional ethics and regulations	تشريعات و اخلاقيات مهنية	2	-	2
3.	MSC 14	Graduation research	بحث تخرج	-	3	3
4.	PHRT 19	Pharmacoeconomics	اقتصاد صيدلاني	2	-	2
5.	PHRO 02	Public health and First aid	صحة عامة و اسعافات اولية	2	-	2
		Total		8	3	**11**

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4. Mission & Objectives of The Program

Mission

Providing outstanding educational and research service in the field of Pharmacy matching the academic accreditation requirements to prepare pharmacists qualified scientifically, practically, professionally and ethically able to compete in the labor market and contribute in improving the pharmacy services provided to the community.

Objectives

1. Deliver competent pharmacists supplied with knowledge, skills and ethical values and are capable to compete in the work market.
2. Provide , develop & update pharmacy education , training and research to serve the community and meet its needs and advancement in pharmacy profession and meet the local and international standards.
3. Augment the relationship with the local, regional and international pharmaceutical academic and research institutes and other entities related to Pharmacy profession.

5. Program Benchmarks

I. Regulations adopted by the Council for Accreditation & Quality Assurance– Ministry of Higher education & scientific research, Yemen.

II. National Academic Reference Standards (**NARS**) For Pharmacy Education adopted by the National Authority for Quality Assurance and Accreditation of Education, 2010, Egypt.

III. Educational Outcomes for First Professional Degree Programs in Pharmacy in Canada adopted by **AFPC** (Association of Faculties of Pharmacy of Canada) **,** 2010

IV. Curriculum of similar programs of pharmacy Bachelor programs awarded by :

1. King Saud University, Saudi Arabia
2. Cairo university, Egypt
3. Beirut Arab University, Lebanon
4. University of sciences & technology(UST) , Yemen

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6. Intended Learning Outcomes (ILOs)

At the end of this program, the graduate should be able to:

Cognitive (Knowledge and Intellectual) Outcomes	
1	Describe the pharmacy as a profession and the pharmacists as professional.
2	Discuss the long history of pharmacy development.
3	Define the carriers opportunities offered by pharmacy.
4	Demonstrate the functions of pharmacists as drug experts.
5	Describe the chemical structure and reactions for materials including drugs
6	Demonstrate the preparation of drugs chemically
7	Explain the correlation between chemical structures of drugs to theirpharmacological actions and kinetics in the body
8	Compare between various physical properties of drugs and their roles in preparation and manufacturing of drug products
9	Define the components and function of cell as basic structural unit of living organisms and Illustrate the histological and anatomical structures of human being body
10	Identify the functions of body organs and the factors affecting them
11	Demonstrate the mechanisms of biosynthesis and biotransformation of compounds in human body.
12	Identify the mechanisms of diseases , their causes andthe pathophysiological changes occurring during diseases
13	Explain the roles of genes and the immunological changes in causing diseasesand the exacerbating their risk factors and complications
14	Enumerate the main components of human personality and demonstrate its development phases and the relation between diseases and psychological situations
15	Illustrate the morphology and microscopical feature of medicinal plants
16	Determine the consecutive phases of drug discovery and development
17	Determine the types and uses of pharmaceutical excipients in dosage forms andthe methods of formulations and manufacturing of dosage forms
18	Compare between techniques used for quality control of raw materials, drugs and dosage forms
19	Distinguish between pathogenic microorganism and parasites and show the methods of sterilization and preservation in pharmaceutical dosage forms
20	Elucidate the mechanisms of drugs action and establish the biological, pharmaceutical and drug-interaction factors that affect drugs bioavailability
21	Interpret the genetic influence on response of patients to drugs
22	Expound the criteria and methods of gene therapy and its medical applications.

23	Enumerate the types of evidence-based alternative medicine includingphytotherapy.
24	Evaluate the cost medical services including drugs and compare them with their alternatives.
25	Explicate the differences between biotechnology drug products and radiopharmaceuticals and classical drugs
26	Illuminate the advanced drug delivery systems including targeted-systems and compare them with classic systems
27	Determine the community health problems and their prevention.
28	Define the necessary procedures of first-aid in case of accidents
Psychomotor (Professional and practical Skills) outcomes :	
1	Use the medical and pharmaceutical terms for communicating with health care tem
2	Carry out the experiments of qualitative and quantitative tests for quality controlof materials (including drugs) and dosage forms
3	Operate instruments and equipments used in pharmaceutical analysis and manufacturing
4	Prepare drugs chemically and compound pharmaceutical dosage forms inpharmacy lab and drug plants
5	Extract drugs and isolate them from natural sources
6	Prepare the biological, chemical, pharmaceutical, plant and microbial samples for analysis
7	Practice the pharmacy administration process e.g. selling, purchasing and documentation
8	Market the pharmaceutical drug products
9	Read, interpret and evaluate the medical prescription and dispense them methodologically.
10	provide drug counseling services to patients
11	Examine the pharmacological actions of drugs on living organisms
12	Provide clinical pharmaceutical care services to patients in hospitals and health centers including drug therapy monitoring and designing therapeutic regimen
13	Detect the source of drug therapy failure and drug adverse effects and work to eliminate them
14	Study the cases patient`s cases and interpret the physical, laboratory and patient history data and use them to select the best drug for those cases.
15	Execute, write and present scientific researches using modern models
16	Provide the pharmaceutical care services to patients in hospital pharmaciesincluding dispensing of prescriptions, preparation of extemporaneous products and IV-admixtures and drug distribution to hospital wards

17	Provide pharmaceutical care services to patients in community pharmacies including dispensing, extemporaneous preparations and drug counseling
18	Perform all necessary pharmaceutical calculations in preparation and dispensingof drug products
19	Estimate the pharmacokinetic parameters and use them to determine the drug dose and to evaluate bioavailability of drugs and bioequivalence of drug products
20	Find out the professional information using different resources including the internet and consider the quick changes in those information
21	Apply the statistical methodology to interpret and comparing of data
Affective (feelings, attitudes) outcomes	
1	Show respect to human life.
2	Share and collaborate actively in a team-work in the various activities related to his/her profession.
3	Communicate successfully with his/her colleagues, physicians and patients.
4	Lead a team to accomplish various pharmacy works
5	Obey the local and international pharmacy laws
6	Comply the criteria of good practices and quality control in preparation, manufacturing and storage of dosage forms
7	Practice the pharmacy profession ethically in discipline and to commit tocommunity service.

7. Learning and Teaching Specifications

Medium of Instruction and Examination:	English
Learning environment	- The program shall offer an appropriate learning environment including. - Proper-sized class for theoretical parts of the courses supplied with comfortable setting chairs. - Proper-sized Experimentation Laboratories.
Teaching strategies	* The major teaching methods, in theoretical parts of courses, are: 1) Active Lecture: lectures uses modern techniques such as brainstorming, concepts map, etc; and delivered using modern media and aids such as smart boards 2) Seminars 3) Assignments and Feedback learning (FBL)

7. Learning and Teaching Specifications	
	Other methods are also welcome whenever necessary; including: Group system, Presentation , Role play, etc. * The teaching method, in practical parts of courses, is supervised Laboratory work : Practical experimentations in laboratories * For field training courses: Supervised Filed-training strategy is applied
Learning Aids	▪ Boards, markers ▪ Overhead projectors ▪ Data show ▪ Smart Boards and displays ▪ Computers, Internet ▪ Enriched Libraries (textbooks, journals) ▪ Equipped Laboratories ▪ Virtual Pharmacy

8. Students Assessment

(i) For courses involving no practical part:

Item	Weight	Schedule
Attendance	5%	15th week
Assignments and Quizzes	5%	5th and 12th week
Mid-term exam (Writing)	20%	7th or 8th week
Final-exam (Writing)	70 %	16th week
Total Weight of the Course	100 %	

(ii) For courses involving a theoretical and practicalparts

Theoretical part		
Item	**Weight**	**Schedule**
Attendance	5 %	15th week
Assignments and Quizzes	5 %	5th and 12th week
Mid-term exam (Writing)	10 %	7th or 8th week

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Final-exam (Writing)	40 %	16th-17th week
Total Theor. Weight	**60 %**	
Practical part		
Item	**Weight**	**Schedule**
Attendance	5 %	11th week
Lab. Attitude	5 %	Weekly ; average
Reporting	5 %	Weekly; average
Final exam (theory or oral)	5 %	11th week
Final exam (practical)	20 %	11th week
Total Pract. Weight	**40 %**	
Total Weight of the Course	**100 %**	

Questions format in writing exams		
Question pattern	**Details**	**%***
Essay:	Types of this pattern include: short note, enumerate, mention, explain,compare, define, complete, draw, whatquestions, etc.. • At least 4 – 6 types of this pattern of questions should be included in the exam	50 %
Multiple choice (MCQ)	• 10 -20 article • 6- 10 of choices of each article	30 %
Others	Types include: True and False and Match questions.	20 %

* : of the weight of the exam

(iii) Graduation project assessment

Each project will be assessed by a committee of three member as follows

Items	Weight
Project supervisor	70 %
Internal examiner : a member of the department teaching stuff.	15 %
external examiner : a qualified external examiner (either from other departments of the college orfrom another university)	15 %
Total	**100**

Assessment of the project by the project supervisor	
Items	**Weight**
Attendance	50 %
Attitude and collaboration	50%
Total	**100 %***

* : to be converted to % 50%

Assessment of the project by the other discussion member	
Items	**Weight**
Research methodology	30 %
Research writing	30 %
Presentation	25 %
Discussion	15 %
Total	**100 %**

(iv) Terms of Degrees

Standard	Grade
From 90% to 100% from total marks.	**Excellent**
From 80% to less than 90% from total marks.	**Very good**
From 65% to less than 79% from total marks.	**Good**

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From 50% to less than 65% from total marks.	**Pass**
Less than 50% from total marks.	**Failed**

9. Study Regulations

Admission

1- The original certificate of High school graduation – scientific department- with at least 70 % or as determined by the ministry of Higher education and scientific research-Yemen
2- A photocopy of personal or family identity card.
3- 10 frontal personal photocopies with a white background
4- A copy of the first 8 pages of the passport (for non-Yemeni students)
The passport should be valid for at least one year to come.
5- A copy for health fitness certificate (for non-Yemeni students)

Registration

Application for admission and registration should be done at the times specified by the university. The person who desire to admit this program should do the following:

1. Review the study system , regulations and the admission requirements (he/she can get a copy from the unit of admission and registration (UAR) in the university).
2. Review the admission application papers offered by the university and fill it by him/herself and deliver it to the (UAR) in the university.
3. Deliver all the required certificates and papers required for admission to the UAR.
4. The administration of the UAR will revise the applier delivered papers to ensure their validation.
5. The UAR inform of the applier that his/her application is accepted/rejected.
6. If the application is accepted .he/she must pay the registration fee and deliver him/her a receipt for that.

Attendance

- Attendance of the student is Compulsory in this program.
- At least he/she must attend at least 75 % of the study in both parts (theoretical and practical , if any)
- The student who fails to attend 75 % of each part will not be allowed to enter the final exams and will be considered "Failed" in the course. He/she also will not be allowed to attend the complementary exam either.

Proceeding to next levels

- The student will processing to the next level (academic year) of the study if he/she passes all the level courses.
- After performing the final exams and the complementary exams:
  - The student who has failed in a total of two courses (in that level or in the previous levels) can proceed to the next level only if one of these courses is a university-required courses.
  - The student who has failed in a total of three courses (in that level or in the previous levels) can proceed to the next level only if one of these courses is a university-required courses.
  - If the student failed in a non-practical based course, he has no need to attend that course in the next year.
  - If the student failed in a -practical based course, he has to attend the whole course again (both theoretical and practical part of the course) in the next year.
  - The student who has passed a course will not be allowed to re-study that course again.

Outage and suspension of the study

- The study outage is a state when the student stopped attending the study and has not deliver a request to suspend it. The outage period allowed is maximum of three academic years.
- The new curriculum (if any) of the program is applied to the outage student when he/she re-joins the study.
- The maximum allowed period of suspension is a maximum of two academic years or four academic semesters either consecutive or not.
- The new curriculum (if any) of the program is applied to the suspending student when he/she re-joins the study.
- The student who wants to suspend the study must himself/herself (or a person authorized by him/her) deliver a written request to the dean of the College associated with a reasonable excuse for suspension.
- If the first semester has started , It is not permitted to accept requests of suspension.

Withdrawal from the study

- The student who wants to withdraw from the study must himself/herself (or a person authorized by him/her) deliver a written request to the dean of the College.
  He/she must pay all financial fees of the study and must be free from demands from all related units of the university.

10. Program Evaluation

Evaluation Target	Evaluation period and tool	Samples
Final year students	Annual Questionnaire	50 % of the final-year students
Program Graduates	Every 2 years Questionnaire	50 % of the graduates
Employment entities	Every 3 years (Questionnaire & Meeting)	• Supervisors of med. Representatives in a marketing Drug company • Manager of a local drug factory • Head pharmacist in a private hospital • Head pharmacist in a public hospital • Manager of the Quality control lab. in the supreme board of drugs

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Academic Courses Specifications

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Courses Per Requirement

1. Courses required by the university

No.	Code	Course	Credit hours
1.	RAZ 01	Arabic language	**2**
2.	RAZ 02	English language	4
3.	RAZ 03	Computer skills	3
4.	RAZ 04	Islamic culture	2
		Total	11

2. Courses required by the College

No.	Code	Course	Credit hours
1.	MSC 01	General Biology	3
2.	MSC 02	General chemistry	3
3.	MSC 03	Communication skills	2
4.	MSC 04	Physics	3
5.	MSC 05	English for medical purposes	4
6.	MSC 06	Anatomy and histology	3
7.	MSC 07	Psychology	2
8.	MSC 08	Physiology I	2
9.	MSC 09	Medical biochemistry	3
10.	MSC 10	Pathology	2
11.	MSC 11	Biostatistics	2
12.	MSC 12	Research methodology	3
13.	MSC 13	Professional ethics and regulations	2
14.	MSC 14	Graduation Research Project	3
Total			**37**

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Courses required by the Department/Program

No.	Code	Course	Credits Hours
Pharmaceutics and Pharmacy practice courses			
1.	PHRT 01	Introduction to pharmacy profession	2
2.	PHRT 02	Mathematics	2
3.	PHRT 03	Physical pharmacy	3
4.	PHRT 04	Pharmaceutical calculations skills	2
5.	PHRT 05	Pharmaceutics I	3
6.	PHRT 06	Pharmaceutical microbiology	3
7.	PHRT 07	Pharmaceutics II	3
8.	PHRT 08	Pharmaceutics III	3
9.	PHRT 09	Clinical pharmacy I	2
10.	PHRT 10	Integrated- case based learning I	2
11.	PHRT 11	Biopharmaceutics	2
12.	PHRT 12	Pharmacy practice skills	3
13.	PHRT 13	Clinical pharmacy II	2
14.	PHRT 14	Integrated- case based learning II	2
15.	PHRT 15	Cosmetic preparations	3
16.	PHRT 16	Hospital pharmacy	2
17.	PHRT 17	Pharmacokinetics	3
18.	PHRT 18	Industrial pharmacy	3
19.	PHRT 19	Pharmacoeconomics	2
20.	PHRT 20	Pharmacy Training I	2
21.	PHRT 21	Pharmaceutical biotechnology	2
22.	PHRT 22	Pharmaceutical Quality control	3
23.	PHRT 23	Advanced drug delivery systems	2
24.	PHRT 24	Pharmacy Training II	2
25.	PHRT 25	Nuclear Pharmacy	2
26.	PHRT 26	Pharmaceutical marketing	2
Total			**62**

Medicinal chemistry and related courses			
27.	PHRM 01	Organic chemistry	4
28.	PHRM 02	Drug Discovery and Development	2
29.	PHRM 03	Pharmaceutical Organic chemistry	4
30.	PHRM 04	Pharmaceutical analytical chemistry	3
31.	PHRM 05	Medicinal chemistry I	3
32.	PHRM 06	Medicinal chemistry II	4
33.	PHRM 07	Pharmaceutical instrumental analysis I	3
34.	PHRM 08	Pharmaceutical instrumental analysis II	3
35.	PHRM 10	Pharmaceutical instrumental analysis III	3
36.	PHRM 09	Medicinal chemistry III	4
Total			**33**
Pharmacognosy and related courses			
37.	PHRG 01	Botany	3
38.	PHRG 02	Pharmacognosy I	3
39.	PHRG 03	Pharmacognosy II	3
40.	PHRG 04	Phytochemistry I	3
41.	PHRG 05	Phytochemistry II	3
42.	PHRG 06	Complementary and alternative medicine	2
43.	PHRG 07	Experimental pharmacology	3
Total			**20**
Pharmacology and related courses			
44.	PHRC 01	Physiology II	2
45.	PHRC 02	Pharmacology I	3
46.	PHRC 03	Pharmacology II	3

47.	PHRC 04	Pathophysiology	2
48.	PHRC 05	Pharmacology III	3
49.	PHRC 06	Pharmacotherapy I	2
50.	PHRC 07	Pharmacotherapy II	2
51.	PHRC 09	Toxicology	2
52.	PHRC10	Pharmacogenomics and gene therapy	2
Total			21
Other assisting medical sciences			
53.	PHRO 01	Medical parasitology	3
54.	PHRO 02	Public health and first aid	2
Total			**5**
Overall Total			141

Academic year	**Credit hours**						
	First semester			**Second semester**			**Annual Total**
	Theor.	**Pract.**	**Total**	**Theor.**	**Pract.**	**Total**	
1st	14	5	19	15	5	20	39
2nd	15	4	19	17	5	22	41
3rd	16	5	21	18	4	22	43
4th	12	6	18	15	3	18	36
5th	17	2	19	8	3	11	30
Total	74	22	96	73	20	93	189

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Course coding System

Code	Meaning
RAZ	Courses required by Al-Razi university
MSC	Courses required by the medical sciences college
PHRT	Courses required by pharmacy department ; related to pharmaceutics and pharmacy practice
PHRC	Courses required by pharmacy department ; related to pharmacology
PHRM	Courses required by pharmacy department ; related to medicicinal chemistry
PHRG	Courses required by pharmacy department ; related to pharmacognosy
PHRO	Courses required by pharmacy department ; related to other medical assisting sciences

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توصيف المقررات الدراسية:

COURSES SPECFICATIONS

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1st YEAR					
First semester					
No.	Code	Course	Credit hours		
			T	P	Total
1.	RAZ 01	Arabic language	2	-	2
2.	PHRT 01	Introduction to pharmacy profession	2	-	2
3.	RAZ 02	English language	4	-	4
4.	MSC 01	General Biology	2	1	3
5.	RAZ 03	Computer skills	2	1	3
6.	RAZ 04	Islamic culture	2	-	2
7.	MSC 02	General chemistry	2	1	3
Total			16	3	19

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مقرر: اللغة العربية

Course title	
اللغة العربية	
مواصفات المقرر	
السنة الاكاديمية	الأولى
الفصل الاكاديمي	الأول
رمز المقرر	RAZ01
الساعات المعتمدة	ساعتين أسبوعيا لمدة 12 اسبوع
وصف المقرر:	
صمم هذا المقرر ليزود الطالب بالمعارف والمهارات والاتجاهات السلوكية اللازمة في مجال اللغة العربية والتي تمكنه من تفادي الأخطاء في الكتابة حتى يتسنى له الكتابة الصحيحة عند تعلمه وكتابته للاختبارات والمحاضرات.	
مخرجات التعلم:	
عند نهاية دراسة هذا المقرر سيكون الطالب قادرا على أن:	
1. يعدد أقسام الكلام والأخطاء الاملائية الشائعة. 2. يستخرج أسلوب الاستثناء والحال والتمييز. 3. يقوم بالبحث في المعاجم عن أصول الكلمات. 4. يستطيع رسم الهمزة وعلامة الترقيم. 5. يفرق بين المبتدأ والخبر. 6. يحدد النواحي الأدبية في الجوانب الشعرية. 7. يستخرج التوابع اللغوية. 8. يتمكن من كتابة وقراءة التقارير والرسائل العلمية بصورة بلاغية ووضوح تام.	
المفردات:	
المواضيع	الأسبوع
-1 مقدمة عامة عن المادة الدراسية (أهدافها، أهميتها، محتواها، مناشطها، خطة تدريسها). -2 الفرق بين القدرة والمهارة. -3 مقدمة عن مهارة الاستماع.	1
تطبيقات على مهارة الاستماع.	2
-1 مهارة التحدث. -2 عرض نماذج جيدة عن مهارات التحدث (حوارات فكرية، خطب وعظية، ...، الخ، لتحليلها ونقدها. -3 المشاركة في التحدث من قبل الطلاب. -4 تطبيقات على مهارة الاستماع. تكليف منزلي/ إعداد موضوعات مختلفة (حرة) للتحدث.	5-3
-1 التدرب على مهارات التحدث من قبل الطلاب في شكل مجموعات " تعلم تعاوني" بإشراف مدرس المقرر. تطبيقات على مهارة الاستماع.	6

امتحان نصف الفصل	7
1- مقدمة عن مهارات القراءة. 2- التطبيق الأول (احترام المرأة) مع تحليله. 3- مواصلة التدريبات المكثفة على مهارات التحدث من قبل الطلاب أمام زملائهم. (في شكل موضوعات حرة يلقيها بعض الطلاب أمام زملائهم) • تكليف منزلي/ التدرب على مهارات القرائية.	9-8
1- التدرب على مهارات القراءة الجهرية. 2- مواصلة التدريبات المكثفة على مهارات التحدث من قبل الطلاب أمام زملائهم. 3- تطبيقات على مهارة الاستماع.	10
1- التدرب على السرعة القرائية من قبل الطلاب. 2- التدرب على المهارات القرائية المتقدمة. 3- مواصلة التدريبات المكثفة على مهارات القراءة الجهرية والسرعة القرائية. 4- تطبيقات على مهارة الاستماع.	12-11
طرق التدريس	
المحاضرات. المناقشات الجماعية	
الوسائل المستخدمة:	
السبورة. جهاز العرض.	
المراجع	
1- اللغة العربية (نصوص أدبية وتطبيقات نحوية) (د/الحميري، د/ الحذيفي، د/الزمر، د/ الخربي، د/العبيدي). 2- قواعد اللغة العربي، فؤاد نعمة.	

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Course title

INTRODUCTION TO PHARMACY PROFESSION

Course specification	
Academic year	First
Academic semester	1st
Course code	PHRT 01
Credit hours	Theor. (2) ; Pract. (-) ; Total : 2 Theor. (15 weeks)

COURSE DESCRIPTION:

The course provides the student with introduction to the profession of pharmacy in the past (History) present and future. The course focuses on different aspects of the profession in these eras: including missions of pharmacy, local regional and international foundations of pharmacy, the relation of pharmacists with other health care professionals, types of pharmacy educations and the pharmacy career opportunities.

Intended learning outcomes of the course (CILOs)
1. Alignment CILOs
A: Knowledge & Understanding: Upon successful completion of the course, students will be able to:
a1. Enumerate the current missions of pharmacy profession and the duties of pharmacists as drug experts.
a2. Identify the basic pharmacy sciences, academic programs and the foundations that control pharmacy laws
a3. Discuss the progress of pharmacy throughout history and its current and future development and fields.
a4. Describe the current carriers of pharmacy profession and the new
B: Intellectual skills: Upon successful completion of the course, students will be able to:
b1. Classify drug risks benefits.
C: Professional & practical skills: Upon successful completion of the course, students will be able to:
c1. Use the media technologies to communicate, search and present thoughts

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D: Transferable skills: Upon successful completion of the course, students will be able to:
d1. Demonstrate the ability to work effectively within a team.
d2. Demonstrate the ability to community and patients serving through understanding of his/her mission as drug experts.

COURSE CONTENT	
Topics	Weeks
1- Pharmacy and pharmacists: definitions (pharmacy, pharmacist,drugs, medications, drug products) , pharmacy motto, pharmacistsmissions in the patient`s health care, foundations of pharmacy (world , Asian, Arabic and Yemeni), Relation of pharmacists with other health care professionals.	1, 2
2- Current pharmacy practices : career opportunities (academic, industrial, researcher , developer, hospital, clinical and communitypharmacists)	3, 4
3- Education of pharmacy: basic pharmacy sciences, academic Baccalaureate programs, higher programs.	5
4- Pharmacists as drug experts: drugs risks and benefits, sources of information (primary, secondary, tertiary).	6
Mid-semester exam	7
5- History of pharmacy in Sumerian, Egyptian, Chinese, Indian, Roman, Greek, Arabic and Islamic and Western civilization	8-12
6- Future aspects of pharmacy: factors influencing future development of pharmacy; newer pharmacy disciplines e.g. Complementary and alternative therapy, gene therapy and Radiopharmacy	13, 14
Course review and discussion session	15
TEACHING & LEARNING METHODS	
1) Lecture	

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2) Brainstorming 3) Seminar 4) Concepts map 5) Assignments and Feedback
LEARNING AIDS
• White board & Markers. • Data show
REFERENCES
1.Howard C. Ansel. Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, , 2011, Lippincott Williams & Wilkins. 2.Lillian M. Azzorpardi . Lecture notes in pharmacy practice, 2010, pharmaceutical press. 3.Kevin M.G.Taylor. Pharmacy Practice, 2001, Taylor & Francis

Course title

English language

Course specification	
Academic year	First
Academic semester	1st
Course code	RAZ 02
Credit hours	Theor. (4) , Practical (-) , Total : 4
COURSE DESCRIPTION:	
This course provides the student with basic structure and grammars in English language.	
INTENDED LEARNING OUTCOMES (ILOS):	
At the end of this course, the student shall have been able to:	
I. Cognitive (knowledge & thinking) outcomes	1) Distinguish between the basic types of English words and phrases. 2) Recognize basic grammars in English Develop his/her ability to understand English
II. Psychomotor (practical and professional skills) outcomes	3) Write and read in English correctly. 4) Speak English properly.

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III. Affective (feelings, attitudes) outcomes	5) Share and collaborate actively in a team-work .

COURSE CONTENT	
Topics	Weeks
1. Basic English • English letters : A to Z, capitals, small letters • Classification of words . - Nouns - Articles - Pronouns - Quantity - Adjective - Adverbs - Prepositions. - verbs : Be, have, do , Modal auxiliaries and relatedverbs	1- 3
2. The sentence • Simple, compound, complex • Passive and causative • Questions, answers, negatives. • Conditional sentences	4 -6
Mid-semester exam	7
3. The sentence - Direct and indirect speech. - The infinitive and the "ing" form	8
4. Tenses • Past simple • Past perfect • Past continuous (progressive) • Present simple • Present perfect. • Present continuous(progressive) • Future simple • Future perfect • Future continuous (progressive)	9 - 13

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5. Common errors in English	14
Course review and discussion session	15

TEACHING & LEARNING METHODS

1) Lecture
2) Seminar
3) Assignments and Feedback
4) Group system

LEARNING AIDS

- White board & Marker
- Overhead projector
- Data show

REFERENCES

1. L.G. Alexander, Longman English grammar practice, Longman Group, UK
2. Longman dictionary of common errors, Longman Group, UK

Course title
General Biology

Course specification	
Academic year	First
Academic semester	1st
Course code	MSC 01
Credit hours	Theor. (2) , Practical (1) , Total : 3

COURSE DESCRIPTION:

The course is designed to provide students with principles and concepts of biology. The course covers topics including introduction, basic biological chemistry, cell structure and function, cell division, metabolism and energy transformation, genetics, protein synthesis, tissue, evolution, and other related topics. In addition, the course will provide students with scientific knowledge on experimental skills in biological sciences as well as develop their skills in interpreting the results and reporting findings and information in a clear, and accurate.

Course Intended Learning Outcomes (CILOs) :

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A. Knowledge and Understanding: Upon successful completion of the course, students will be able to:	
a1	Recognize the components and function of a cell as a basic structural unit of living organisms.
a2	Explain the chemical basis of life, cell structure and division, molecules of the cell, genetics, and evolution of organisms in nature.
B. Intellectual Skills: Upon successful completion of the course, students will be able to:	
b1	Differentiate between different forms of living organisms based on their structural and functional characterizations.
b2	Summarize processes of metabolism pathways of essential molecules and how living cells convert these molecules into energy.
C. Professional and Practical Skills: Upon successful completion of the course, students will be able to:	
c1	Applying scientific knowledge in practical situations.
c2	Operates and uses the compound microscope efficiently to observe microstructures.
D. Transferable Skills: Upon successful completion of the course, students will be able to:	
d1	Develop critical thinking and communication skills through the accomplishment of group tasks.

COURSE CONTENT

Topics	Weeks
1- Scope of Biology: a) Definition and brief history of biology b) Living organisms and Non-Living things c) Chemical context of life d) Biological structures of living organisms: cell, tissue, organ,system. e) Common features of Life process. Energy sources in living organisms	1- 4
2- The cell : the basic unit of life	5 , 6

a) Function of Micro and macro molecules of cell andenzymes b) Chemical constituents of the protoplasm c) cell membranes : types, Functions and properties d) basic process in the cell (respiration, nutrition, etc.)	
Mid-semester exam	7
• **The cell : the basic unit of life** a) life cycle of the cell b) differences between animal and plant cell.	8
• **Animal Kingdoms** a) classification : Genera and species; common features b) animal diversity c) animal reproduction	9 - 12
• **Inheritance** a) Mendel and the Gene Idea b) Molecular basis of inheritance chromosome, DNA, genes	13, 14
Course Review and discussion session	15

- **Practical part**

NO.	TOPICS	HRS
1	The use of microscope	**4**
2	Classification of living organism	**4**
3	The Eukaryotic and prokaryotic cell	**4**
4	The type of epithelial cell	**4**
5	Gram positive and gram negative bacteria	**4**
6	Rickettsia and fungi prepared slide	**4**
7	Tests for proteins, carbohydrates, fats, lipids and starches.	**8**
8	Cell division mitosis and meiosis	**4**
9	.Dissection of frogs and rabbits	**4**
10	To visualize the digestive system, blood, circulation, heart, urino-genetal system, pancreas and liver	**8**
	Total	**48**
TEACHING & LEARNING METHODS		
1- Lecture 2- Brainstorming 3- Seminar 4- Concepts map		

5-	Assignments and Feedback
6-	Lab work
LEARNING AIDS	
•	White board & Markers.
•	Over head projector.
•	Data show
•	Lab with animals and materials
REFERENCES	
1.	Sardana. A text book of pharmaceutical biology
2.	Parthasarathi. Molecular biology of the cell

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Course title
Computer skills

Course specification	
Academic year	First
Academic semester	1st
Course code	RAZ 03
Credit hours	Theor. (2) , Practical (1) , Total : 3 Theor. (15 weeks) ; Pract. (15 weeks)

COURSE DESCRIPTION:

The course is designed to provide knowledge and skills regarding the optimal use of computer.

INTENDED LEARNING OUTCOMES (ILOS):

At the end of this course, the student shall have been able to:	
I. Cognitive (knowledge & thinking) outcomes	1)Understand the basic components ofcomputer. 2)Recognize the various aspects of dataprocessing in computer.
II. Psychomotor (practical and professional skills) outcomes	3)Operate the computer correctly. 4)Use the computer Microsoft programs effectively in writing, calculating and presentation. 5)Search for information effectively using the internet.
III. Affective (feelings, attitudes) outcomes	6) Share and collaborate actively in a team- work .

COURSE CONTENT

Topics	Weeks
1. The basic structure of the computer	1
2. Windows	2 - 4
3. Microsoft Word	5, 6
Mid-semester exam	7

4. Microsoft Excel	8, 9
5. PowerPoint	10 , 11
6. Internet	12-14
Course review and discussion session	15

TEACHING & LEARNING METHODS
1- Lecture 2- Brainstorming 3- Seminar 4- Concepts map 5- Assignments and Feedback 6- Lab work
LEARNING AIDS
• White board & Markers. • Data show • Disk Computers
REFERENCES
2. Computer books for MS DOS and Windows 3. Thakur. Computers in pharmacy

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Course title
Islamic culture

مواصفات المقرر	
السنة الاكاديمية	الأولى
الفصل الاكاديمي	الأول
رمز المقرر	RAZ04
الساعات المعتمدة	ساعتين أسبوعيا لمدة 15 أسبوع

وصف المقرر:

صمم هذا المقرر ليزود الطالب بالمعارف والمهارات والاتجاهات السلوكية اللازمة في مجال الثقافة والأخلاقيات الإسلامية المهنية، والتي تمكنه من التحلي بأخلاقيات الإسلام، والصفات التي تميزه عن غيره – في هذا المجال – والابتعاد عن المفسدات، ومحاولة تعزيز الثوابت، وإزالة السلبيات.

الأهداف التعليمية:

1- اسهام الجامعة في تكوين الفرد المسلم القادر على تطبيق مفاهيم الإسلام كما نص عليه القرآن الكريم وبينته السنة النبوية وأحكام الشريعة.
2- تربية الطلبة وحسن إعدادهم وتوجيههم، وتكوين شخصيتهم على أسس المثل العربية الإسلامية.
3- تعريف الطلبة برأي الإسلام في بعض القضايا المعاصرة، وكيفية التعامل معها.
4- إكساب الطلبة بعض المفاهيم العامة للأخلاقيات الإسلامية، وأثرها في حياة الأفراد.
5- التحلي بالأخلاقيات التي يدعو الإسلام إليها وتطبيقها في الحياة العملية.
6- تثقيف أفراد المجتمع حول العادات السيئة والضارة التي ظهرت وانتشرت فيه.
7- الالمام بالقوانين الطبية واللوائح المنظمة للمهنة.
8- إدراك أهمية تجنب الأخطاء في المهنة وعقوبتها في الشرع والقانون.
9- استشعار عظمة الله عز وجل في تنظيم الحياة للإنسان في هذه المعمورة.

المفردات:

المواضيع	الأسبوع
1- تعريف: الثقافة – الثقافة الإسلامية – الحضارة- الفرق بين الثقافة والحضارة- مصادر الثقافة الإسلامية، وخصائصها. 2- النظام العقدي في الإسلام: تعريف العقيدة – أركان العقيدة الإسلامية – أثرها على الفرد والمجتمع. 3- النظام الأخلاقي في الإسلام: - تعريف الأخلاق ومكانتها في الإسلام. - الاخلاق كما وردت في القرآن والسنة. - أخلاقيات المهنة الصيدلانية. - الإهمال الصيدلاني.	4-1
4- النظام الاجتماعي في الإسلام: - تعريف النظام الاجتماعي.	5-6

- تعريف الاسرة وأهميتها. - مظاهر اهتمام الإسلام بالأسرة - مبادئ الإسلام في تأسيس الأسرة واستمرارها: - مبادئ تراعى قبل الاقدام على الزواج. - مبادئ تراعى بعد الزواج. - مبادئ تراعى عند حصول زعزعة أو خلاف أسري.	
امتحان نصف الفصل	7
5- النظام السياسي في الإسلام: - تعريف النظام السياسي. - أسس النظام السياسي في الإسلام. - واجبات الحاكم وحقوقه في النظام السياسي. 6- هدي الإسلام في الصحة والحفاظ عليها. 7- أحكام شرعية وأخلاقية في بعض القضايا: - الإجهاض – عمليات الجميل – نقل الدم – زراعة الأعضاء. - الاستنساخ – وسائل منع الحمل – تشريح الجثث- الموت الرحيم. - الدواء والصوم – الأدوية والادمان – التداوي بالأعشاب.	10-8
8- بعض المشكلات المعاصرة وكيف عالجها الإسلام: سوء التغذية – انتشار الامراض المعدية. 9- حكم وأثر ممارسة العادات الضارة: المخدرات – المهدئات – اللواط – العادة السرية. 10- قضايا معاصرة: الغزو الفكري – الشورى في الإسلام – حقوق الانسان في الإسلام – التبشير – العولمة – المرأة في الإسلام، ونظرة الشرع حول عملها في المجال الطبي.	13-11
11- القانون اليمني في مجال الطب والصيدلة: - الاحكام والقوانين المنظمة لمهنة الطب والصيدلة. - شروط ممارسة المهنة في القانون اليمني. - عقوبة مخالفة القوانين الطبية	14
مراجعة عامة للمقرر	15

طرق التدريس
المحاضرات. المناقشات والحوار
الوسائل المستخدمة:
السبورة. جهاز العرض. الملصقات
المراجع
1- الثقافة الإسلامية ، د/ عبدالحكيم بن عبداللطيف السروري. 2- أضواء على الثقافة الإسلامية، د/ علي محمد الاهدل، ود/ عبدالحكيم السروري.

3- الثقافة الإسلامية، د/ عبدالغني حيدر.
4- الموسوعة الفقهية الطبية، د/ محمد أحمد كنعان.
5- قانون الجرائم والعقوبات اليمني، د/ علي حسن الشرفي.
6- قانون مهنة الطب والصيدلة، وزارة الشؤون القانونية.

Course title	
General chemistry	
Course specification	
Academic year	First
Academic semester	1st
Course code	MSC 02
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks) ; Pract.(11 weeks)

COURSE DESCRIPTION:

The course provides the student basic knowledge of chemistry of matters including chemical structure theories و periodic table of elements, chemical bonds, electronegativity, polarity , acidity, basicity, ionization constant , Quantum in chemistry, types of Chemical reactions and equilibrium. The practical part of the course is designed to provide the student practical skills of how to safely and effectively perform tests of chemical reactions and identification. Such knowledge and skills will help the student in performing such practice while studying more specific related courses e.g. pharmaceutical analytical chemistry, pharmaceutical organic chemistry and medicinal chemistry.

Course Intended Learning Outcomes (CILOs) :	
A. Knowledge and Understanding: Upon successful completion of the course, students will be able to:	
a1	Explain the basic principles, theories, and laws in chemistry and its contributions in developing solutions to many medical problems.
a2	Know the methods for preparing solutions and their reactions, especially the reactions in aqueous solutions as a medium for conducting many biologically important reactions; the changes accompanying their reactions and their chemical behavior.

a3	Describe the rules for naming chemical compounds; the differences between organic and inorganic compounds based on properties, composition, and structure; and the most important functional groups in structure of organic compounds.
a4	Classify the elements in periodic table based on their properties, their electronic configuration and graduating the periodic properties.
B. Intellectual Skills: Upon successful completion of the course, students will be able to:	
b1	Distinguish between elements and compounds, nature of substance, its properties, its behavior, the source of its activity, and the interrelationship between its behavior, properties, and chemical structure.
b2	Conduct the calculations related to chemical formula & chemical equation; ΔH, different ways of concentration and pH….etc. to solve the different problems.
b3	Analyze accurately types and quantities of reactants and products; the best conditions required to complete a chemical reaction at low cost; and environmentally and healthily safe with high yield and quality.
b4	Interpret the reason for occurrence of chemical reactions and their kinetics; the results of chemical analysis and the changes accompanying in a scientific manner.
C. Professional and Practical Skills: Upon successful completion of the course, students will be able to:	
c1	Utilize safely chemicals and equipment's for the laboratory experiments.
c2	Employ the principles, theories, ideas, and facts related with chemicals in practice for making chemical modifications in the structure of a useful drug to improve its effectiveness or reduce the side effects.
c3	Use the different results of analysis, characteristic reactions of some functional groups, and the acquired analytical and standard skills, for a more accurate and precise diagnosis.
D. Transferable Skills: Upon successful completion of the course, students will be able to:	
d1	Take the responsibility, in professional and ethical commitment, to protect the environment.
d2	Work effectively with the others as a team work in performing the report on general chemistry.
d3	Demonstrate time management and self-learning during performing practical works and assignments.

COURSE CONTENT

Topics	Weeks

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1- Introduction: chemistry (definition, brief history, disciplines of chemistry : general, organic, inorganic, analytical, medicinal, physical,etc.) , importance and applications of chemistry in modern sciences.	**1**
2- Chemical structures: atoms , atomic structure, electronic configuration, molecules and molecular formula, , elements, periodic table of elements, compounds (types), chemical bonds (ionic,covalent)	**2-4**
3- Chemical properties: electronegativity, dipole moments, polar and non-polar molecules **,** acidity, basicity (pH), ionization constant , pKa**,** buffer systems	**5 , 6**
Mid-semester exam	**7**
4- Quantum in chemistry: atomic weight, molecular weight, equivalent, weight, moles, molarity, molality, milliequivalent	**8, 9**
5- Chemical reactions and equilibrium: chemical reactivity, inertness, energy change and heat of reaction , chemical equations balance , reactions catalysts; acid-base reactions, Redox reactions, addition, reaction, elimination reactions, substitution reactions, decomposition reactions etc.	**10 – 12**
6- Inorganic chemistry: identification and reactions of common inorganic compounds	**13, 14**
Course review and discussion session	**15**

TEACHING & LEARNING METHODS
1- Lecture 2- Seminar 3- Concepts map 4- Assignments and Feedback 5- Lab Work
LEARNING AIDS
• White board & Markers. • Data show • Lab materials, tools and instrument
REFERENCES
1. Bothara. inorganic pharmaceutical chemistry 2. Cotton . Basic inorganic chemistry

3. Richard E. Beleil , General chemistry Lab. Manual, 2005, Dakota State university:

1st YEAR					
Second Semester					
No.	Code	Course	Credit hours		
			T	P	Total
1.	MSC 05	English for Medical Purposes	4	-	4
2.	MSC 06	Anatomy and histology	2	1	3
3.	PHRM 01	Organic Chemistry	3	1	4
4.	PHRT 02	Mathematics	2	-	2
5.	MSC 04	Physics	2	1	3
6.	PHRM 02	Drug Discovery and Development	2	-	2
7.	MSC 03	Communication skills	2	-	2
		Total	17	3	20

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Course title	
English for Medical Purposes	
Course specification	
Academic year	First
Academic semester	2nd
Course code	MSC 05
Credit hours	Theor. (4) Theor. (15 weeks)

COURSE DESCRIPTION:	
The course concerns with the study of basic medical terminology and the sequence of understanding of medical English articles.	
INTENDED LEARNING OUTCOMES (ILOS):	
At the end of this course, the student shall have been able to:	
I. Cognitive (knowledge & thinking) outcomes	1) Elucidate the Basic structures and components of medical terms. 2) Describe the denotations of parts of the common medical term parts and the meaning of these terms. 3) Divide the English articles into paragraphs and ideas. 4) Improve his/her ability to understand English articles. 5) Memorize and recall information from English articles.
II. Psychomotor (practical and professional skills) outcomes	6) Write properly an essay in English

COURSE CONTENT	
Topics	Weeks
I. Medical terminology ○ Origin of medical terms ○ Parts of a medical term: prefix, suffix, root ○ Prefixes related adjectives e.g. numeric (e.g.mono) , size" large and small" (e.g. micro, macro) , dimension "short (e.g. brachy) , speed" slow, fast (e.g. brady, tachy), location (intra, exter, per, ante, post) increased and decreased (e.g. hypo, hyper , mal, olig,a, an), different (e.g. dis, pseud, meta,) , colors (e.g. leuco,	1 - 6

erytho) ○ Suffixes related to science (e.g. -logy, -logist), tests (-scope, -scopy, ----- -graph, -graphy, , measurement (e.g. -meter), case (-ia, -iasis, - osis,), diseases (e.g.- pathy, -oma, -neoplsm), operations(e.g. –ectomy) Roots related to body cells (e.g. cyte, cyto) tissues(hist) , organs(vaso, card), chemical names (glyc, hydr, chlor, proteo), **sciences** (patho, physio, bio) ○ Multi-roots terms e.g. hyperglycemia ○ Terms without suffix e.g. erythrocytes ○ Terms without prefix e.g. cardiology	
Mid-semester exam	7
II. Articles understanding **i. Basic skills** 1. Comprehensive reading 2. Overall topic of the article 3. Paragraphing 4. Memorizing 5. Recalling 6. Answering questions 7. Making questions **ii. Experimentation of basic skills on a number of Medical articles** 1. History of Medicine **(**1- in Muslims civilization, Greekcivilization) 2. Human anatomy **(**skeletal system) 3. Disease (1.symptoms); (2- infectious diseases) ; (3- prevention of disease), (4- disease treatment), 4. current chronic Diseases (1.Hypertension); (2- Diabetes) ;(3- Depression), (4- Cancer),	8 - 11
III. Essay i. Basic skills i. Making a correct sentence. ii. Flow and compatibility of ideas. iii. Topics (pharmacy , Al-Razi, risk of drugs, patients)	12 - 14
Course review and discussion session	**15**

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TEACHING & LEARNING METHODS
1-Lectures 2-Assignment and feedback 3- Brainstorming 4-Seminar
LEARNING AIDS
• Lecture notes • Data show
REFERENCES
1. Harvey Marcovich. Black Medical dictionary, 2005, A & C Black Publishers Limited 2. Yusuf K.hitti Medical dictionary 3. Mohammed Ali. Dictionary of pharmacy 4. Saunders. Dorlands pocket medical dictionary 5. Marjorie canfield willis, Medical terminology

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Course title	
Anatomy and histology	
Course specification	
Academic year	First
Academic semester	2nd
Course code	MSC 06
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks) ; Pract.(11 weeks)

COURSE DESCRIPTION:

Anatomy is one of the most important courses that requires the student to learn Medicine and Health Science, which enables him to know a number of concepts and issues, the most important of which are: The history of morphological sciences, the structures of human body. This course is designed to provide the students with the needed knowledge in human anatomy needed to be applied at a later stage during their clinical training. The lecture topics include introduction to anatomy with study systems consisting human body and some applied comparative clinical anatomy in addition to all related structures of each region and its surface anatomy.

Course Intended Learning Outcomes (CILOs) :

A. Knowledge and Understanding:	
a1	Name all structures, components, systems, Regions, parts, organs, cavities of human body.
a2	Must know all and the enough knowledge and information of human anatomy about human body which needed to other clinical and paraclinical sciences as pathology
a 3	Complete all the basic information which prepare them as dentist in the future, and enable them for postgraduate study.
a 4	Establish Medical Specialists with excellent information and skills of human anatomy able to compete others worldwide.
B. Intellectual Skills:	
b1	Categorize structures and organs of different regions of human body
b2	Analyze the basic, surface and applied anatomy to solve clinical problems
b 3	Distiguish position, relation, blood supply and drainage, lymphatics and nerve supply of different organs and structures

b 4	Integrate with clinical problem according to site of injury
C. Professional and Practical Skills:	
c1	Demonstrate relationship between the different structures and organs.
c2	Interpret the relationship between form and structures by applying comparative human anatomy in understanding the origin of blood and nerve supply
c3	Prescribe relevance of bones, muscles, regions, contents, arteries, veins, nerves and lymphatics of organs and structures and human body.
D. Transferable Skills:	
d 1	Inspect anatomical basis which requires to understand its physiology.
d 2	Evaluate the paraclinical points as operative, anesthesia and surgery.
d 3	Estimate the clinical& preclinical problems.

COURSE CONTENT	
Topics	Weeks
1- Classification of body systems	**1**
2- Types and differentiation of tissues in human body	**2**
3- Skeletal system	**3, 4**
4- Nervous system	**5, 6**
Mid-semester exam	**7**
5- Cardiovascular system	**8**
6- Digestive system and its appendix organs	**9**
7- Renal/Urinary system	**10**
8- Endocrine glands	**11**
9- Male and female Reproductive systems	**12**
10- Sense organs: skin, eye, ear	**13**
11- Receptors on and inside the cells	**14**
Course review and discussion session	**15**

TEACHING & LEARNING METHODS

1. Lecture
2. Brainstorming
3. Seminar
4. Concepts map
5. Assignments and Feedback
6. Lab Work

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LEARNING AIDS
• White board & Markers. • Data show • Lab materials, tools and Illustrative models
REFERENCES
1. Chummy s. sinnatamby Lasts anatomy: regional and applied 2. R Kanagasuntheram anatomy :Regional-functional and clinical 3. Atlas of Human Anatomy. Jypee Brothers 4. A K Jain. Human Anatomy and Physiology For pharmacy

Course title	
Organic Chemistry	
Course specification	
Academic year	First
Academic semester	2nd
Course code	PHRM 01
Credit hours	Theor. (4) ; Pract. (-); Total : 4 Theor. (15 weeks)

COURSE DESCRIPTION:

The course is an introduction to specialized pharmacy courses (Pharmaceutical organic chemistry and Medicinal chemistry), as it provides the student with basic knowledge of carbon chemistry from which all organic compounds, including drugs, are derived. The course focuses on uncomplicated organic compounds in terms of their functional chemical groups, chemical composition, physical and chemical properties and their interactions. And methods of preparation and common examples of them, and these compounds include: hydrocarbons. haloalkanes, alcohols, ethers. The practical part also provides the student with the skills necessary to deal with these compounds and perform tests to identify their reactions in the chemistry lab.

IV. Intended learning outcomes of the course: (CILOs) and their alignment

1. Alignment of CILOs

Knowledge & understanding: Upon successful completion of the course, students will be able to:

a1. Explain the significance of organic chemistry in modern sciences.

a2. Discuss the properties of Carbon atom, models of structural formula, specific properties, mechanisms of reactions and synthesis of uncomplicated organic compounds.

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Intellectual skills: Upon successful completion of the course, students will be able to:
b1. Differentiate, name and draw the chemical structure of organic compounds.
b2. Relate functional group in organic compounds to the physical and chemical properties of the compounds.
b3. Predict the catalysts required and the outcomes of a reaction between an organic compound and other chemicals.
b4. Design a sequence to synthesize an organic compound from a parent compound.
Professional & practical skills: Upon successful completion of the course, students will be able to:
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory
c2. Identify organic compounds from their physical and chemical properties
c3. Operate the instruments and perform experiments successfully in the laboratory
c4. Search efficiently for information using documented and electronic sources of information.
Transferable skills: Upon successful completion of the course, students will be able to:
d1. Communicate effectively and behave in discipline with colleagues.
d2. Demonstrate the skills of time management and self-learning.
d3. Participate efficiently with his colleagues in a team work.
d4. Use internet, computer-based programs to search for information that can help to solve the problems that are related to completion of a chemical reaction, nomenclature, draw structures, mechanisms of reactions and others.

COURSE CONTENT

Theory

Topics	Weeks
1. **Introduction to organic chemistry**: definition, brief history, structural theory. **Carbon chemistry**: carbon atomic	**1**

structure, chemical bonds,atomic Orbitals and electron configuration; sp^3, sp^2, sp hybridization	
2. **Models of Structural formula** (all-stick formula, dot formula, dashformula, condensed formula, bond-line formula) and **stereochemistry** of organic compounds	**2**
3. **Classification of organic compounds based on functional groups. Hydrocarbons: Aliphatic** (**Alkanes, Alkenes, Alkynes, cycloalkanes, cycloalkenes)**: definitions, general formula, nomenclature, radical groups nomenclature, physical state, dipole moment, isomerism, preparation and reactions. **Hydrocarbons: Aromatic Compounds** (definitions, types, general formula, structural models, nomenclature, radical groups nomenclature, physical state, resonance, preparation and Reactions.	**3, 4**
4. **Aliphatic and aromatic Alkyl halides (Haloalkanes) and organometallic compounds**: (definitions, types, general formula, nomenclature, radical groups nomenclature, physical properties, preparation and reactions).	**6**
Mid-term exam	**7**
5. **Aliphatic and aromatic Alcohols , ethers and thioethers** (definitions,types, general formula, nomenclature, radical groups nomenclature, physical properties, preparation and reactions)	**8, 9**
6. Aliphatic and aromatic Amines (definitions, types, general formula,nomenclature, radical groups nomenclature, physical properties, preparation and reactions).	**10**
7. Aliphatic and aromatic Nitro compounds: (definitions, types, generalformula, nomenclature, radical groups nomenclature, physical properties, preparation and reactions)	**11**
8. **Aliphatic and aromatic Aldehydes and ketones** (definitions, types, general formula, nomenclature, radical groups nomenclature, physicalproperties, preparation and reactions)	**12**
9. Aliphatic and aromatic Carboylic acids (definitions, types,	**13**

generalformula, nomenclature, radical groups nomenclature, physical properties, preparation and reactions).	
10.Aliphatic and aromatic Derivatives of Carboylic acids : definitions, types **(esters, acyl halides, acid anhydrides)** general formula, nomenclature, radical groups nomenclature, physical properties, preparation and reactions.	**14**
Course Review and discussion session	**15**
Practical Part:	

N.O	TOPICS	HRS
1	Identification of simple liquids of organic compounds Alcohols. 1- Methanol 2- Ethanol. 3- Glycerol.	4
2	• Aldehvdes • Formalclehyde • Acetaldehyde	6
3	• Ketones • Acetone	8
4	• Organic acids • Formic acid. • Acetic acid	8
5	scheme for identification For simple liquids of organic compiles	6
6	Identification of simple solids of organic compiles. • Oxalic acid. • Tartaric acid. • Citric acid. • Benzoic acid. • Salicylic acid. • Aniline salts. • Aniline Sulphate.	10

	• Anline hydrochloride. • Urea.	
7	Scheme of identification of unknown organic Solids.	6
	Total	48

TEACHING & LEARNING METHODS

1- Lecture
2- Brainstorming
3- Seminar
4- Concepts map
5- Assignments and Feedback
6- Lab. work

LEARNING AIDS

- White board & Markers.
- Data show
- Molecular models

REFERENCES

1. Murray. Principles of organic chemistry
2. Sykes , A guidebook to mechanism in organic chemistry
3. G. L. Patrick, Instant notes in organic chemistry, bioscientific publisher, USA
4. Frederick George Mann, practical organic chemistry, 1986, New Delhi: Orient Longman Limited.

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Course title	
Mathematics	
Course specification	
Academic year	First
Academic semester	2nd
Course code	PHRT 02
Credit hours	Theor. (2) , Practical (-) , Total : 2 Theor. (15 weeks)

COURSE DESCRIPTION:

The course of "Mathematics" is designed to provide the student with basic mathematical knowledge and skills including rectangular Co-ordinates, curve fitting using first-degree equation in both variables, determination of slope and intercept and point of intersection, equation of first degree in both x and y , exponential and logarithmic curves, graphical solution of equation, graphical solution of simultaneous equations, arithmetic progression, geometric progression, permutation-combination, binomial theorem, exponential theorem. These knowledge and skills will help the student to solve mathematical problems encountered in during pharmaceutical, analytical and pharmacokinetics. The course is co-requested with "Medical Physics" course as both concern with skills of solving mathematical problems and skills.

Intended learning outcomes of the course (CILOs)
A:Knowledge & understanding: Upon successful completion of the course, students will be able to:
a1. Discuss the basic mathematical principles commonly encountered during his/her pharmacy study and at practicing the profession.
B: Intellectual skills: Upon successful completion of the course, students will be able to:
b1. Interpret the linearity and other graphical parameters.
b2. Solve graphically, calculus and matrices mathematical problems.
b3. Extract related equations from graphs.
b4. Use the serial thinking to find the solution of mathematical problems.
C: Professional & practical skills: Upon successful completion of the course, students will be able to:
c1. Operate and use scientific calculator correctly.

c2. Apply equations and rules to solve mathematical problems
D: Transferable skills: Upon successful completion of the course, students will be able to:
d1. Share successfully in team-work.
d2. Demonstrate time management during solving mathematical problems

COURSE CONTENT	
Topics	Weeks
1. Graphs and Gradients: a) Rectangular Co-ordinates. Curve fitting using first-degree equation in both variables. b) Determination of slope and intercept and point of intersection c) Equation of first degree in both x and y (circle, ellipse, rectangular hyperbola etc. d) Exponential and logarithmic curves, graphical solution of equation, graphical solution of simultaneous equations e) Arithmetic progression, geometric progression, permutation-combination, binomial theorem, exponential theorem. f) Application of curve fitting method in expressing degradation of drugs	**1- 6**
Mid-semester exam	**7**
2. Calculus: a) Rate process, rules of differentiation, successive and partial differentiation, differentiation of a function, relation between the derivatives of inverse functions b) Rules of integration, integration as a summation, area under curve, integration by partial fraction, graphicalintegration, indefinite and definite integrals.	**8 - 10**
3. Matrices: Addition. Subtraction and multiplication of matrices, unit matrix, row transformation, determinants, inverse ofmatrix and solution of equations by matrix	**11- 14**
Course Review an discussion session	
TEACHING & LEARNING METHODS	

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1) Lecture 2) Brainstorming 3) Assignments and Feedback
LEARNING AIDS
• White board & Markers. • Over head projector. • Data show
REFERENCES
1. Rao. A text book of mathematics. 2. Indra K. Reddy Mansoor a. khan, Essential Math and calculations for pharmacy, CRC Press. 3. Shahidulla , Bhattacharjee : A text book on Coordinate Geometry and Vector Analysis.

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Course title	
Physics	
Course specification	
Academic year	First
Academic semester	2nd
Course code	MSC 04
Credit hours	Theor. (2) , Practical (1) , Total : 3 Theor. (15 weeks) ; Pract. (12 weeks)

COURSE DESCRIPTION:

The objective of this course is learning of concepts physics for the first-year undergraduate students in the medical sciences. Topics covered in this course include: Units, Biomechanics forces effects on our bodies, Energy and Work, Properties of Fluid and gases, Pressure, Heat, Sound, Light Electricity within the body, Electromagnetic, X-Ray, Radiation therapy and application in medical sciences for diagnostic or treatment. The principal objective of the course is for students to acquire knowledge and understanding of current theoretical concepts in the subject of the course and to develop practical thinking skills.

Course Intended Learning Outcomes (CILOs) :

A: Knowledge and Understanding: Upon successful completion of the course, students will be able to:	
a1	Determine the significance and its significant in modern sciences in particular medical sciences.
a2	Define basic physical parameters including those related to kinematics objects, work, energy, pressure, light, electricity, sound, and temperature
a3	Discuss the concepts and principles of physical phenomena related to movement, forces, electricity, radiation and light.
B. Intellectual Skills: Upon successful completion of the course, students will be able to:	
b1	Interpret physical phenomena presented in the topics such as electromagnetic fields, light refraction.
b2	Solve physical problems related to the course topics.
b3	Compare between related physical parameters such as energy force and power, and between temperature and heat, infra sound and ultra sound.

b4	Relate basic physical parameters including those related to kinematics of objects, work, energy, pressure, light, electricity, sound, and temperature to their affecting factors and governing laws.
C. Professional and Practical Skills: Upon successful completion of the course, students will be able to:	
c1	Handle efficiently the tools and chemicals used in physics Lab.
c2	Operate successfully the instruments and chemicals used in physics Lab.
c3	Apply physical laws to solve physical problems.
c4	Perform effectively the experiments he/she is assigned to do in physical lab and report his/her work correctly.
c5	Take the required safety criteria during performing experiments in physics lab.
D. Transferable Skills: Upon successful completion of the course, students will be able to:	
d1	Share successfully in team-work.
d2	Communicate effectively with his/her colleagues during performing experiments in physics lab.
d3	Behave in discipline during performing experiments in physics lab.
d4	Demonstrate time management during performing experiments in physics lab.

COURSE CONTENT	
Topics	Weeks
1- Introduction to physics : definition, brief history; applications	1
2- Mass : definition, physical effects, governing law	2
3- Energy: Definition, forms and sources of energy (electric, optical, chemical etc. and their governing laws) , differences from Force and Power.	3-5
4- Gravity : Definition, physical effects, related laws	6
Mid-semester exam	7
5- Pressure: principle, governing laws; applications	8

6- Optics physics: photons, light waves, wave length, wavenumber, frequency, spectrum (visible, UV, IR, ..,etc.), light absorbance, light refraction, light scattering	9- 11
7- Electricity : definition, brief history, electrical resistance, potential and current, generation techniques, ; electromagnetic field.	12- 14
Course review and discussion session	15

TEACHING & LEARNING METHODS
1) Lecture 2) Brainstorming 3) Seminar 4) Concepts map 5) Assignments and Feedback
LEARNING AIDS
• White board & Markers. • Data show
REFERENCES
1. Christman. fundamentals of physics 2. Parkash. An introduction to medical biophysics 3. Cameron, John R. and James G. Skofronick; Medical Physics. A Wiley-Interscience publication. New York,1978

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Course title	
Drug Discovery and Development	
Course specification	
Academic year	First
Academic semester	2nd
Course code	PHRM 02
Credit hours	Theor. (2) ; Pract. (-); Total : 2 Theor. (15 weeks)

COURSE DESCRIPTION:

The course is designed to provide students basic knowledge of sources of drugs, history of drug discovery (older and modern history) and modern phases and approaches of drug discovery& development from disease identify to approved and marketing of drug.

Intended learning outcomes of the course (CILOs)
A: Knowledge and understanding: upon completion of the course, students will be able to:
a1. Define drug discovery & drug development and recognize their nowadays requirements.
a2. Determine the main sources of drugs.
a3. Discuss the purposes, phases and modern approaches of drug discovery and development
a4. Recognize his/her role as drug discoverer and developer.
B: Intellectual skills: upon completion of the course, students will be able to:
b1. Compare between various approaches employed in drug discovery and development.
b2. Predict the future progress in drug discovery and development approaches.
C: Professional and practical skills: upon completion of the course, students will be able to:
c1. Participates in the adoption of policies and laws for the process of drug discovery and development
c2. Report his/her work efficiently.

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D: Transferable skills: upon completion of the course, students will be able to:
d1. Share successfully in team-work.
d2. Comply to pharmacy laws and ethics.
d3. Demonstrate self-learning and time management.
d4. Properly search for information related drug discovery and development using books and suitable media technologies.

COURSE CONTENT	
Topics	Weeks
1. Introduction: definitions (drug discovery, drug development), source of drugs (Drugs Derived from Natural Products , synthetic drugs, semisynthetic drugs), Roles of medicinal chemistry and pharmacognosy in drug discovery	**1**
2. Approaches to new drug discovery: Existing Drugs as a Source for New Drug Discovery (Active, HIT, LEAD), Disease Models as Screens for New Drug Leads , Physiological Mechanisms: the Modern "Rational Approach" to Drug Design , Approaches to Lead Optimization , Bioisosteric replacement , Conformation restriction , Increase selectivity Increase affinity , Pharmacophore	**2- 6**
Mid-semester exam	**7**
3. Receptors as target of drug design: Receptor Theory, Receptor Complexes and Allosteric Modulators , Second and Third Messenger Systems , Molecular Biology of Receptors , Receptor Models and Nomenclature , Lead Compound Discovery of Receptor agonists and antagonists.	**8, 9**
4. Prodrug design: for drugs containing (-COOH, OH, NH)	**10, 11**
5. Phases of drug discovery & development: Project-program- product collaboration in drug development and NIH-FDA	**12, 13**
6. Typical Program Team for drug development	**14**
Course review and discussion session	**15**

TEACHING & LEARNING METHODS
1. Lecture 2. Brainstorming 3. Seminar

4. Concepts map 5. Assignments and Feedback 6. Presentation
LEARNING AIDS
• White board & Markers. • Data show
REFERENCES
1- Wermuth, Essentials medicinal chemistry 2- Chatten pharmaceutical chemistry 3- Donald J Abraham, Burger`s medicinal chemistry and drug discovery: ,John Wiley and Sons, Inc 4- Edward R. Zartler,fragment-based drug discovery a practical approach, 2008 John Wiley & sons, ltd 5- Purcell. A strategy of drug :a guide to biological activity

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Course title	
Communication skills	
Course specification	
Academic year	First
Academic semester	2nd
Course code	MSC 03
Credit hours	Theor. (2) , Practical (-) , Total : 2 Theor. (15 weeks)

COURSE DESCRIPTION:

The course aims to train the students to communicate effectively using different strategies by improving their verbal and non-verbal communication style, as well as enhancing academic and employability skills. The course also aims to eliminate communication roadblocks and build self-confidence in students through performing presentations and discussions in class. This course provides students with skills for their future careers and how to get jobs effectively.

Course Intended Learning Outcomes (CILOs) :	
Knowledge and Understanding: Upon successful completion of the course, students will be able to:	
a1	Show understanding of the communication skills and their strategies.
B. Intellectual Skills: Upon successful completion of the course, students will be able to:	
b1	Explain skills of communication such as problem solving, oral presentation, and employability skills.
C. Professional and Practical Skills: Upon successful completion of the course, students will be able to:	
c1	Demonstrate the ability to make effective presentation using ICT skills.
c2	Use appropriate tactics to handle tasks such as solving problems, team work, answering job interview questions.
c3	Write professional texts such as CV, cover letter ….etc.
D. Transferable Skills: Upon successful completion of the course, students will be able to:	

d1	Communicate effectively orally or in writing using effective strategies.
d2	Show real adherence of communication skills.

COURSE CONTENT	
Topics	Weeks
1- Definitions, Importance of communication in pharmacists with other pharmacists, patients, physicians and other health care Professionals.	1
2- The communication process and Communication media	2, 3
3- Active listening skills	4
4- Non-verbal communication : Body language	5 ,6
Mid-semester exam	7
5- Writing communication	8
6- Constructive feedback and questioning skills	9, 10
7- Effective communication	11, 12
8- Barriers to communication and communication failure	13, 14
Course review and discussion session	15

TEACHING & LEARNING METHODS

1. Lectures
2. Seminar
3. Presentation
4. Role play

LEARNING AIDS

- White board & Markers
- Data show

REFERENCES

1- Tara Dixon, Communication skills, Northumria university
2- Adler, R. B. & Elmhorst, J. M. (1999) Communicating at Work: Principles and Practices for Business and the Professions, McGraw Hill Singapore
3- Tindall, W.N., 2003 Pharmaceutical care ; Insights from community pharmacists, pharmaceutical press.

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2nd YEAR					
First semester					
No.	Code	Course	Credit hours		
			T	P	Total
1.	PHRM 03	Pharmaceutical Organic Chemistry	3	1	4
2.	MSC 08	Physiology I	2	-	2
3.	PHRT 03	Physical pharmacy	2	1	3
4.	MSC 07	Psychology	2	-	2
5.	PHRG 01	Botany	2	1	3
6.	PHRT 04	Pharmaceutical calculations skills	2	-	2
7.	MSC 09	Medical Biochemistry	2	1	3
		Total	15	4	19

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Course title	
Pharmaceutical Organic Chemistry	
Course specification	
Academic year	SECOND
Academic semester	1st
Course code	PHRM 03
Credit hours	Theor. (3) ; Pract. (1); Total : 4 Theor. (15 weeks) ; Pract.(11 weeks)

COURSE DESCRIPTION:

The course is the course (Phar. Organic chemistry) which provide the student with knowledge and skills of organic chemistry. This course focuses on the functional chemical groups, chemical composition, physical and chemical properties, synthesis, reactions of complicated organic compounds (monocyclic, polycyclic, homocyclic and heterocyclic). The practical part also provides the student with the skills necessary to deal with these compounds and perform tests to identify their reactions in the chemistry lab.

Intended learning outcomes of the course: (CILOs)

Knowledge & understanding: Upon successful completion of the course, students will be able to:

a1. Discuss the physicochemical properties of monocyclic, polycyclic, homocyclic and heterocyclic organic compounds.

Intellectual skills: Upon successful completion of the course, students will be able to:

b1. Differentiate, name and draw the chemical structure of monocyclic, polycyclic, homocyclic and heterocyclic compounds. organic compounds.

b2. Relate structures of monocyclic, polycyclic, homocyclic and heterocyclic compounds to their physical and chemical properties. .

b3. Predict the outcomes of a reaction of monocyclic, polycyclic, homocyclic and heterocyclic compounds. organic compound and other chemicals.

b4. Design a scheme to synthesize monocyclic, polycyclic, homocyclic and heterocyclic organic compounds from a parent compound.

Professional & practical skills: Upon successful completion of the course, students will be able to:

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c1. Handle efficiently and safely the chemical materials and tools used in the laboratory
c2. Operate the instruments and perform experiments successfully in the laboratory
c3. Search efficiently for information using documented and electronic sources of information.
c4. Perform synthesis of some monocyclic, polycyclic, homocyclic and heterocyclic compounds. organic compound and other chemicals.
Transferable skills: Upon successful completion of the course, students will be able to:
d1. Communicate effectively and behave in discipline with colleagues.
d2. Demonstrate the skills of time management and self-learning.
d3. Participate efficiently with his colleagues in a team work.
d4. Use internet, computer-based programs to search for information that can help to solve the problems that are related to completion of a chemical reaction, nomenclature, draw structures, mechanisms of reactions and others.

COURSE CONTENT	
Theory	
Topics	Weeks
Classification, physicochemical properties, preparation, reactions, examples of drugs and their medical uses of the following groups of organic compounds:.	
1- Monocyclic Alicyclic compounds	1
2- Benzyl and Benzhydryl derivatives	2
3- Phenethyl and Phenylpropylamines	3, 4
4- Arylacetic and Arylpropionic Acids	5, 6
Mid-semester exam	7
5- Arylethylenes compounds	8
6- Polycyclic Aromatic compounds	9, 10
7- Steroids	11
8- Heterocyclic compounds: 5, 6, 7 –membered fused to one ring and two rings	12 - 14
Course review and discussion session	15

Practical Part:			
Order	**Tasks/ Experiments**	**Number of Weeks**	**contact hours**

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General physicochemical properties of the chemical group. experiments of Chemical identification and synthesis of one-two drugs belonging to the following groups			
1.	Monocyclic Alicyclic compounds e.g. Hyoscine	**1**	**2**
2.	Benzyl and Benzhydryl derivatives e.g. Orphenadine	**1**	**2**
3.	Phenethyl and Phenylpropylamines e.g. adrenaline	**1**	**2**
4.	Phenethyl and Phenylpropylamines e.g. methyldopa	**1**	**2**
5.	Arylacetic and Arylpropionic Acids e.g. Thyroxin	**2**	**4**
6.	Polycyclic Aromatic compounds e.g. Tetracycline	**1**	**2**
7.	Heterocyclic compounds e.g. Mebendazole	**1**	**2**
8.	Heterocyclic compounds e.g. indomethacin	**1**	**2**
9.	Heterocyclic compounds e.g. aminophylline	**1**	**2**
10.	Heterocyclic compounds e.g. ascorbic acid	**1**	**2**
	PRACTICAL EXAM	**1**	**2**
	Total	**12**	**24**

TEACHING & LEARNING METHODS

1- Lectures
2- Discussion
3- Lab Work

LEARNING AIDS

- White board & Markers.
- Data show
- Lab materials, tools and instrument

REFERENCES

1- Daniel Ledincer : Organic chemistry of drug synthesis, John Wiley & Sons
2- Saraf. The chemistry of heterocyclic compounds
3- Anil. A text book of pharmaceutical organic chemistry
4- Ali. A text book of pharmaceutical organic chemistry

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Course title	
Physiology I	
Course specification	
Academic year	Second
Academic semester	1st
Course code	MSC 08
Credit hours	Theor. (2) ; Pract. (-); Total : 2 Theor. (15 weeks)

COURSE DESCRIPTION:

The course concerns with study of cell repair mechanism, transport mechanism through cell membrane, body fluids , acid-base balance as well as with functions and regulation of organs o the nervous system, endocrine and skeletal system.

Course Intended Learning Outcomes (CILOs) :

Upon successful completion of the Course, student will be able to:

A. Knowledge and Understanding:	
a1	Describe the functions of the different organelles in the human cell, and describe the transport system across the cell membranes.
a2	Describe the body fluids, compartments, composition & functions.
	B. Intellectual Skills:
b1	Distinguish between physiological and pathological performance of body cells.
b2	Integrate physiology with other sciences
	C. Professional and Practical Skills:
c1	Choose and classify data obtained from physiological experiments.
c2	Determine the requirements of homeostasis.
	D. Transferable Skills:
d1	Work separately or in a team to research and prepare a scientific topic.
d2	Present clearly and effectively scientific topic in a tutorial, a staff meeting or the yearly scientific day.

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COURSE CONTENT	
Topics	Weeks
1. Introduction: physiology definition, the concept of homeostasis. Negative feedback.	**1**
2. Cell : structure, functions, membrane transport mechanisms: (passive diffusion , mediated transport, osmosis), membrane potential(resting, action)**Cell repair :** mechanisms**.** Composition and regulations of **Body fluids, electrolytes and acid-base balance**.	**2, 3**
3. Nervous system: classes of neurons, Synaptic transmission **(** chemicalsynapsis, summation, interconnection between neurons, factors affecting the transmission).	**4**
4. Central nervous system: composition, major composition an level of CNS functions, functions of brain composition (cerebrum, cerebral cortex, etc.), blood brain barrier , spinal cord (function, composition, spinal reflex, cerebrospinal fluid)	**5, 6**
Mid-semester exam	**7**
5. Central nervous system: Pain**:** nociception, hyperalgesia, pain pathway, neurotransmitters of pain**,** types of pain (cutaneous, visceral,deep, , referred , phantom) , endogenous analgesic system	**8**
6. Autonomic nervous system: definition and composition, regulation,sympathetic system (functions, neurotransmitters, receptors**),** adrenal medulla , parasympathetic system (functions, neurotransmitters,receptors**),**	**9, 10**
7. (pituitary gland, thyroid gland, parathyroid gland, pancreas, sex organs)	**11, 12**
8. Muscles : types , functions, factors affecting contraction and relaxation	**13, 14**
Course review and discussion session	**15**

TEACHING & LEARNING METHODS
1- Lecture 2- Brainstorming 3- Seminar 4- Concepts map 5- Assignments and Feedback
LEARNING AIDS
• White board & Markers.

•	Data show, Lab materials, tools and instrument

REFERENCES

1. C.C.Chatterjee. Human physiology
2. Hassan Hamdi, Fundamentals of human physiology
3. Salah Abu-Sitta , Synopsis of medical physiology
4. W. F. Ganong. Review of medical physiology
5. Laurie kelly . Essential of human physiology for pharmacy, 2004, CRC press

Course title	
Physical pharmacy	
Course specification	
Academic year	Second
Academic semester	1st
Course code	PHRT 02
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks) ; Pract.(11 weeks)

COURSE DESCRIPTION:

This course provides the student with knowledge related to physical properties of solid, liquid and gaseous matters and various physical phenomena observed in matters. Moreover, the course deals with stability and degradation of matters and physical interactions that occur between matters. The practical part of the course intends to acquire the student the skills to measure and observe those properties and phenomena. The course also links these properties with their observation or application in pharmacy in particular their correlation or influence on design and formulation of pharmaceutical dosage forms design. Therefore, this course can be referred so as to introduction to "pharmaceutics" courses.

INTENDED LEARNING OUTCOMES (ILOS):

At the end of this course, the student shall have been able to:

I. Cognitive (knowledge & thinking) outcomes	1) Compare between various physical properties of drugs and their roles in pharmacy. 2) Correlate the physical phenomena to their factors and applications. 3) Interpret physical phenomena observed in pharmacy.

II. Psychomotor (practical and professional skills) outcomes	4) Measure various physical properties of matters. 5) Effectively use tools and instruments in the laboratory.
III. Affective (feelings, attitudes) outcomes	6) Share in a team-work in practicing experiments and accomplishing assignments. 7) comply the rules of safety in laboratory practice.

COURSE CONTENT

Theory

Topics	Weeks
1- Scope and aims of physical pharmacy and Properties of Matter : State of matter, change in the state of matter, Latent heatand vapor pressure, sublimation critical point, Eutectic mixtures, gases, aerosols-inhalers, relative humidity, liquid complexes, liquid crystals, glassy state, solids-crystalline, amorphous and polymorphism, applications in pharmacy.	1, 2
2- Micrometrics and powder rheology: Particle size and distribution, average particle size, number and weight distribution, particle number, methods for determining particle volume, optical microscopy, sieving, sedimentation, measurement, particle shape, specific surface, methods for determining surface area, permeability, adsorption, derived properties of powders, porosity, packing arrangement, densities, bulkiness & flow properties, applications in pharmacy.	3, 4
3- Liquid Rheology: Newtonian systems, Law of flow, kinematic viscosity, effect of temperature, non-Newtonian systems, pseudoplastic, dilatant, plastic, thixotropy, thixotropy in formulation, determination of viscosity, capillary, falling ball, rotational viscometers, applications in pharmacy.	5
4- Solubility and dissolution: definition of dissolution andsolubility, mechanism of dissolution, Noyes-Whitney equation, factors affecting dissolution and solubility, applications in pharmacy.	
5- Surface and Interfacial Phenomenon: Liquid interface, surface and interfacial tensions, surface free energy, measurement of surface and interfacial tensions, spreading coefficient, adsorption at liquid interfaces	6, 7
Mid-semester exam	7
5- Surface and Interfacial Phenomenon: surface active agents, HLB classification, solubilization, detergency, adsorption at solid	8

interfaces, solid gas and solid-liquid interfaces, complex films, electrical properties of interface applications in pharmacy.	
6- Dispersion systems: Colloidal dispersions : Definition, types, properties of colloids, protective colloids, applications of colloids in pharmacy; Suspensions and Emulsions: Interfacial properties of suspended particles, settling in suspensions, theory of sedimentation, effect of Brownian movement, sedimentation of flocculated particles,sedimentation parameters, wetting of particles, controlled flocculation, flocculation in structured vehicles, rheological considerations, Emulsions-types, theories, physical stability, applications in pharmacy.	9, 10
7- Adsorption and comlexation : definitions, types, governing rules, factors affecting, applications in pharmacy.	11
8- Diffusion and partition coefficient: definition, Fick`s law, Peppa`s equation, Higuchi equation , application in pharmacy**.**	12
9- Stability kinetics of drugs and formulations : Half-life determination, Influence of temperature, light, solvent, catalytic species and other factors, Accelerated stability study, expiration dating, decomposition and stabilisation of medicinal agent.	13, 14
Course review and discussion session	15

Practical Part:

Order	Tasks/ Experiments	Number of Weeks	contact hours
1.	Melting point determination by capillary method	**1**	**2**
2.	Particle size analysis (sieve and sedimentation method)	**1**	**2**
3.	Crystallization : preparation of salicylic acid crystals	**1**	**2**
4.	Tapped and bulk density porosity and Carr`s index of flowability description ..	**1**	**2**
5.	Viscosity determination (Ostwald tube)	**1**	**2**
6.	Surface tension determination (Capillary or Drop weight method)	**1**	**2**
7.	Critical micelles concentration (CMC)determination	**1**	**2**

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Practical Part:			
8.	Partition coefficient determination (salicylic acid between water & ether)	**1**	**2**
9.	Review	**1**	**2**
	PRACTICAL EXAM	**1**	**2**
	Total	**10**	**20**

TEACHING & LEARNING METHODS

1. Lecture
2. Brainstorming
3. Seminar
4. Concepts map
5. Assignments and Feedback
6. Lab Work

LEARNING AIDS

- White board & Markers.
- Data show
- Lab materials, tools and instrument

REFERENCES

1. Shotton. physical pharmaceutics
2. Gaud practical physical pharmacy
3. Mohanta physical pharmacy
4. Subrahmanyam. A text book of physical pharmaceutics, Vallabh Prakashan
5. Martin`s : Physical pharmacy and pharmaceutical sciences, 2011, Lippincott Williams & Wilkins

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Course title	
Psychology	
Course specification	
Academic year	Second
Academic semester	1st
Course code	MSC 07
Credit hours	Theor. (2) , Practical (-) , Total : 2 Theor. (15 weeks)

COURSE DESCRIPTION:

The course focuses on study of development of human personality according to various psychological and the importance of the caring environment for the health of patients.

The Course Intended Learning Outcomes (CILOs)
Knowledge & understanding : Upon successful completion of the course, students will be able to:
a1. Show sound understanding of physical properties and phenomena that influence the design of pharmaceutical preparations
a2.Illustrate the physico-chemical properties of drugs and various substances used in preparation of medicines, in addition to the properties of different pharmaceutical dosage forms
a3. Explain The effects of drug complexation, solubilization, adsorption, stability and interfacial tension on drug efficacy.
Intellectual skills : Upon successful completion of the course, students will be able to:
b1. Apply relevant equations to calculate physical measurements related to vapor pressure, atmospheric pressure, thermal energy formulation and stability of pharmaceutical preparations.
b2. Assess the relative important of solubility, stability, adsorption complexation, rheology, surface tension on drug formulation**.**
b3. Explore the optimum storage condition for different drug products based on shelf- life**.**

b4. Predict possible complexation related problems in pharmaceutical systems based on chemical structure.
Professional & practical skills : Upon successful completion of the course, students will be able to:
c1. Practice and calculate melting point determination, particle size analysis crystallization, tapped and bulk density porosity, viscosity determination.
c2. Training and estimate the surface tension, solubility and partition coefficient of some pharmaceutical substance.
Transferable skills : Upon successful completion of the course, students will be able to:
d1. Participate efficiently with his colleagues in a teamwork.
d2. Demonstrate the skills of time management and self-learning.
d3. Communicate effectively and behave in discipline with colleagues.

COURSE CONTENT	
Topics	Weeks
1. Concept and different schools of psychology.	**1, 2**
2. Basic human needs: Biological or primary drives, Secondary social and psychological drives.	**3, 4**
3. Mental ability , Motor skills , Motives	**5 , 6**
Mid-semester exam	**7**
4. Sensation , Conceit , emotion	**8, 9**
5. Personality: Definition and dimensional types, Growth and environment factors, Methods of assessment, Relationship between achievement of development stages goals and basic structure of personality.	**10, 11**
6. Medical psychology: Fear, anxiety and depression associated with Illness, Emotional needs of ill persons, Psychologicalhealth and behavioral Medicine.	**12- 14**
Course review and discussion session	**15**
TEACHING & LEARNING METHODS	

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1- Lectures 2- Concepts map
LEARNING AIDS
• White board & Markers. • Data show
REFERENCES
Psychology Textbook

Course title	
Botany	
Course specification	
Academic year	Second
Academic semester	1st
Course code	PHRG 01
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks) ; Pract.(11 weeks)

COURSE DESCRIPTION:

The course concerns with providing the student with essential knowledge on plants as a source of drugs in their taxonomy, biological features of plants (morphology, reproduction, nutrition, metabolism and growth). The course focus is mainly on the plant parts and classification of the suborder angiosperm as major source of vegetable drugs. The practical part of the course provides the student with skills of identifying the morphological and Microscopical of different types of plant part which will help the student in specific pharmacy courses and hence this course can be referred as introduction to those courses including "Pharmacognosy" and "Phytochemistry" and "Complementary and alternative medicine".

Course Intended Learning (CILOs) :

B. Knowledge and Understanding: Upon successful completion of the course, students will be able to:

a1. Identify the general characters, life cycles and nutritional sources of the common orders, families, genera and species of the plant kingdom.

a2. Describe the types morphological and microscopical features of plant seeds, roots, leaves, stems , barks, flowers and fruits.

a3. Determine the structural/functional components and biological processes of plant cell and the anatomical and physiological features of tissues and systems in common plant species.

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a4. Explicit the economic and medical uses of common plant genera and species in particular plants belonging to Angiosperm.
B. Intellectual Skills: Upon successful completion of the course, students will be able to:
b1. Distinguish the tasks of different hospital pharmacy organizations in hospital setting
b2. Identify the components of typical medication use systems in different pharmacy practice settings.
b3. Compare between animal cell and plant cell.
C. Professional and Practical Skills: Upon successful completion of the course, students will be able to:
c1. Handle efficiently and safely the chemical materials and tools used in the Biology & Pharmacognosy lab.
c2. Operate the instruments (Microscopes) and perform experiments successfully in the Biology & Pharmacognosy lab.
D. Transferable Skills: Upon successful completion of the course, students will be able to:
d1. Communicate effectively and behave in discipline with colleagues and in teacher in the lab.
d2. Work successfully within a team.
d3. Demonstrate the ability of time management, self-learning and problem-solving skills.

COURSE CONTENT

Topics	Weeks
1. Introduction to botany • Definition and Brief history of botany • Basis of plant structures: plant cell and plant cellular contents ,types of plant tissues and plant organs • Differences between plant kingdom and animal kingdom • Nutrition, metabolism and growth of plant **Plant taxonomy** : basis of classification of plant kingdom intoorders, orders, suborders, etc	**1**
2. Plant Order (1) THALLOPHYTES (Thallophyta) ○ General characters ○ **Algae** e.g. Pleurococcus, Spirogyra, Vaucheria,	**2- 4**

Diatoms.), economic use of algae	
○ **Fungi** , differences from algae, types **phycomycetes** (oomycetes e.g. saprolegnia), (zygomycetes e.g. black mold) **eumycetes** (ascomycetes e.g. yeasts: Ergot fungi) (Basidiomycetes edible mushroom, amanita) economic use of fungi ○ **lichens** types and examples ○ **Bacteria** (only brief study on general characters and differences from fungi, algae and lichens. **Viruses :** general characters, examples	
3. Plant order (2) ARCHEGONIATES (Archegoniatae): ○ General characters ○ **Bryophytes** e.g. Hepaticae, mosses **Pteridophytes** e.g. Ferns, club mosses)	**5**
4. Plant order (3) SPERMOPHYTES (seeding plants) ○ Gymnosperms , characters, differences, examples of plants Angiosperms: characters, differences, examples of plants	**6**
Mid-semester exam	**7**
5. Plant parts in Angiosperms (morphology, anatomy and physiology) of : ○ The root ○ The stem ○ The leaf ○ The flowers ○ The fruit ○ The seed	**8- 11**
6. classification of angiosperms yielding vegetable drugs. • **Monocotyledons :** general characters, classification, examples of plants and their yielding drugs **Dicotyledons: (**Archichlamydeae or Choripetalae, Metachlamydeas or Sympetalas): general characters,classification, examples of plants and their yielding drugs	**12 - 14**
Course review and discussion session	**15**

Practical Part:

Order	Tasks/ Experiments	Number of Weeks	contact hours

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Practical Part:			
1.	introduction to pharmaceutical organic Biology & Pharmacognosy lab.: safety requirements, list of experiments, How to report, etc.	**1**	**2**
2.	Algea: microscopical slides	**1**	**2**
3.	Fungi: microscopical and morphological features of different fungi species	**2**	**4**
4.	Plant leaves: morphology and microscopy	**2**	**4**
5.	Plant barks: morphology and microscopy	**1**	**2**
6.	Plant roots and rhizomes: morphology and microscopy	**1**	**2**
7.	Plant flowers: morphology and microscopy	**1**	**2**
8.	Plant fruits: morphology and microscopy	**1**	**2**
9.	Differentiation between Monocotyledons Dicotyledons : morphology and microscopy	**1**	**2**
	PRACTICAL EXAM	**1**	**2**
	Total	**12**	**24**
Number of Weeks			**12**

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1. Lecture 2. Brainstorming 3. Seminar 4. Concepts map 5. Assignments and Feedback 6. Lab Work
LEARNING AIDS
• White board & Markers. • Data show • Lab materials, tools and instrument
REFERENCES
1. James Schooley , introduction to botany, 1997, Delmar publisher 2. W.C. Evans, Trease and Evans pharmacognosy, 2009, W.B.Saunders 3. Stern. Introductory plant biology

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Course title	
Pharmaceutical calculations skills	
Course specification	
Academic year	Second
Academic semester	1st
Course code	PHRT 04
Credit hours	Theor. (2) ; Pract. (-); Total : 2 Theor. (15 weeks)

COURSE DESCRIPTION:

The course provides the student with basic knowledge and skills of pharmaceutical calculations including: how to express and convert numerals (Arabic and Roman), measurement of weight and volume systems (American, British and French) and interconversion between these systems, how to interpret and quantify compounded prescriptions. The knowledge and skills are significant during medication`s formulation, dispensing, dosing and others missions of pharmacy practice.

Intended learning outcomes of the course (CILOs)

A:Knowledge & understanding: Upon successful completion of the course, students will be able to:

a1. Describe the methods of pharmaceutical calculations.

B: Intellectual skills: Upon successful completion of the course, students will be able to:

b1. Interpret abbreviations employed in pharmaceutical prescriptions.

b2. Apply pharmaceutical calculations in preparation of medications and dispensing of prescriptions

C: Professional & practical skills: Upon successful completion of the course, students will be able to:

c1. Operate calculator correctly during formulation of pharmaceutical preparations

D: Transferable skills: Upon successful completion of the course, students will be able to:

d1. Demonstrate the skill of time management and self-learning

d2. Participate efficiently with his colleagues in a team work.

COURSE CONTENT

Topics	Weeks

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1- Introduction: basic mathematical processing, calculators , source of errors, Roman and Arabic Numerals	1
2- Weight expressions: **pharmaceutical measurement systems** : apothecary, metricsystems. Equivalent weight and milliequivalent weight	2
3- Pharmaceutical measurement systems of volumes: apothecary, metric, house-hold systems	**3**
4- Expressions of concentrations: percentage, ratio, quantity/quantity, PPM, PPB, molarity, milliequivalent	**4, 5**
5- Dilution : ○ Dilution of conc. Solutions **Alligation (dilution of potent solids)**	**6**
Mid-semester exam	**7**
6- Isotonicity	**8**
7- Buffer capacity	**9**
8- Medical prescriptions: ideal prescription, components of the prescriptions, abbreviations	**10, 11**
9- Enlarging and reducing prescription formulas	**12**
10- Dose : definitions, types expressions, calculation the child`s dose based on age, weight and body surface area	**13, 14**
Course review and discussion session	**15**

TEACHING & LEARNING METHODS

1. Lecture
2. Brainstorming
3. Seminar
4. Concepts map
5. Assignments and Feedback
6. Exercises

LEARNING AIDS

- White board & Markers.
- Data show

REFERENCES

1. Winfield. calculations for pharmaceutical practice
2. Howard C. Ansel,, Pharmaceutical Calculations, 2010, Lippincott Williams & Wilkins.
3. Ryan F Donnelly, Johanne Barry, MCQs in Pharmaceutical Calculations, 2009, pharmaceutical press.

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Course title	
Medical Biochemistry	
Course specification	
Academic year	Second
Academic semester	1st
Course code	MSC 09
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks) ; Pract.(11 weeks)

COURSE DESCRIPTION:

The course deals study of the types of biochemical compounds, including carbohydrates, lipids, proteins, enzymes , vitamins and nucleic acids, and the changes to which are undergone to in the body.

Intended learning outcomes of the course (CILOs)
A: Knowledge & Understanding: Upon successful completion of the course, students will be able to:
a1. Identify the biochemical compounds and that have significant roles in human and living organisms bodies.
a2. Explicit the physiological/pathological involvement of carbohydrates, lipids, proteins and other biochemicals.
a3. Discuss the biosynthesis and metabolic pathways of biochemical compounds.
B: Intellectual skills: Upon successful completion of the course, students will be able to:
b1. Interpret certain body diseases based on disturbances in levels of body biochemicals
b2 . Solve biochemical problems related to nomenclature, synthetic and metabolic reactions.
b3. Classify biochemicals into various categories.
b4. Compare between different types of biochemical synthesis or metabolic reactions based on their income and outcomes products.
b5. Predict the outcomes of biochemical reactions.
C: Professional & practical skills: Upon successful completion of the course, students will be able to:
c1. Handleefficiently the tools and chemicals used in biochemistry Lab.
c2. Operate successfully the instruments used in biochemistry Lab.
c3 . Perform efficiently experiments and practical tasks for in vitro and in vivo identifications of biochemical compounds using standard procedures.
c4. Take and prepare human samples to biochemistry investigations using standard procedures.

c5 .Take the required safety criteria during performing practical works in in biochemistry Lab.
c6 .Appropriately search for information and also present and report his/her work using various source of information and media technologies..
c7. Use effectively symbols and figures and drawing to express chemical reactions and synthesis
D: Transferable skills: Upon successful completion of the course, students will be able to:
d1. Share successfully in team-work.
d2. Show respect to life.
d3. Communicate effectively with his/her colleagues during performing practical works in in biochemistry Lab.
d4. behave in discipline during performing practical works in biochemistry Lab.
d5. Demonstrate time management and self-learning during performing assignments and during practical works in in biochemistry Lab.

COURSE CONTENT

Topics	Weeks
1. Carbohydrates • Classifications and physiological roles • Glycolysis • Citric acid cycle • Glycogenesis and glycogenolysis • Hexose monophosphate shunt • Uronic acid pathway • Blood sugar and its regulation. • Pathological conditions related carbohydrates.	**1-3**
2. Lipids • Classifications and physiological roles • Biosynthesis of fats • Oxidation of fatty acids • Ketogenesis and ketosis • Metabolism of cholesterol • Essential fatty acid and eicosanodis phospholipids. • Sphingolipids.	**4 - 6**

• Bile salts. • Pathological conditions related to lipids.	
Mid-semester exam	**7**
3. Proteins • Classification of aminoacides. • General biochemical reaction of amino acids like ○ Transamination ○ Deamination ○ Decarboxylation • Peptides and polypeptides • Biosynthesis of proteins : role of DNA • Classifications and physiological roles of proteins • Metabolism of proteins • Urea cycle • Nitrogen balance. • Pathological conditions related to proteins.	**8, 9**
4. Enzymes • Classifications and physiological roles. • Nomenclature • Factors affecting enzyme action • Enzyme kinetics • Cytochrome P450 enzymes : Classification, roles, stimulation and inhibition. • Pathological conditions related to enzymes.	**10 , 11**
5. Vitamins and minerals • Classifications and physiological roles • Vitamins as coenzymes and their significance • Metals as co-factors. • Role and significant of minerals and trace elements	**12 , 13**
6. Nucleic acids • Basic structures • Types (DNA, RNA), roles , biosynthesis and catabolism. • DNA replication and mutation. • DNA repair mechanism	**14**

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Course review and discussion session			15
Practical Part:			
Order	**Tasks/ Experiments**	**Number of Weeks**	**contact hours**
1.	**introduction to biochemistry chemistry** Lab.: safety requirements, list of experiments, How to report, etc	**1**	**2**
2.	**carbohydrates** monosaccharaides : physicochemical properties and in vitro identification & differentiation.	**1**	**2**
3.	**carbohydrates** disaccharides physicochemical properties and in vitro identification & differentiation.	**1**	**2**
4.	**carbohydrates** polysaccharides physicochemical properties and in vitro identification & differentiation.	**1**	**2**
5.	**Sampling and preserving of human samples : blood, urine**		**2**
6.	**Bioassay of blood glucose**	**1**	**2**
7.	**Lipids** physicochemical properties and in vitro identification of cholesterol.	**1**	**2**
8.	**Assay of cholesterol in human blood.**	**1**	**2**
9.	**Proteins:** physicochemical properties and in vitro identification of certain types of proteins	**1**	**2**
10.	**bioassay of certain enzymes related to hepatic function e.g. GPT**	**1**	**2**
11.	**bioassay of thyroxin hormones.**	**1**	**2**
PRACTICAL EXAM		**1**	**2**
Total		**12**	**24**
Number of Weeks		**12**	

TEACHING & LEARNING METHODS
1. Lecture 2. Brainstorming 3. Seminar 4. Concepts map

5. Assignments and Feedback 6. Lab Work
LEARNING AIDS
• White board & Markers. • Data show • Lab materials, tools and instrument
REFERENCES
1-Hiram f. Gilbert , Basic concepts in biochemistry ; a student's survival guide, 2000, McGraw-Hill 2- Pamela C. Champe, Lippincott's illustrated review in Biochemistry, 2010, Lippincott William & Wilkins 3-Vyas . Pharmaceutical biochemistry

2nd YEAR					
Second Semester					
No.	Code	Course	Credit hours		
			T	P	Total
1.	PHRT 05	Pharmaceutics I	2	1	3
2.	PHRC 01	Physiology II	2	-	2
3.	PHRM 04	Pharmaceutical Analytical Chemistry	2	1	3
4.	PHRT 06	Pharmaceutical Microbiology	2	1	3
5.	MSC 10	Pathology	2	-	2
6.	PHRG 02	Pharmacognosy I	2	1	3
7.	PHRM 05	Medicinal chemistry I	2	1	3
8.	PHRC 02	Pharmacology I	3	-	3
Total			17	5	22

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Course title	
Pharmaceutics I	
Course specification	
Academic year	Second
Academic semester	2nd
Course code	PHRT 05
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks) ; Pract.(11 weeks)

COURSE DESCRIPTION:

The first part of this course provides the student with an introduction to the science and art of designing pharmaceutical dosage forms, especially the roles and types of excipients in the dosage form and the stages of developing the dosage form, which includes the pre-formulation stage, the formulation and development stage, and then the production stage. The second part of the course provides knowledge for preparing liquid dosage forms, compressed gases (pharmaceutical aerosols). The practical part provides the student with skill of compounding the pharmaceutical liquid dosage forms in Pharmaceutics Lab.

I. The Course Intended Learning Outcomes (CILOs

A: Knowledge & understanding: Upon successful completion of the course, students will be able to:

a1. Describe the significance of pharmaceutics as art and science of dosage form design

a2. Explain the types and roles of excipients and packaging included in pharmaceutical aerosols, and different types of liquid dosage forms.

a3. Describe the stages of designing pharmaceutical aerosols and liquid dosage form (solution, suspension, and emulsion)

a4. Describe the role of pharmacist in formulation of pharmaceutical aerosols and liquid dosage forms (solution, suspension, and emulsion)

a5. Explain the general properties, advantages and disadvantages of pharmaceutical aerosols and liquid dosage forms (solution, suspension, and emulsion).

a6. Discuss the principles, pharmacopoeial requirements, and methods of preparation, of various types' pharmaceutical liquid dosage forms. (solution, suspension, and emulsion)

B: Intellectual skills : Upon successful completion of the course, students will be able to:
b1. Distinguish pharmaceutical liquid dosage forms.
b2. Determine the roles and types of pharmaceutical excipients and packaging
b3. Classify pharmaceutical aerosols and categorize liquid dosage forms. (solution, suspension, and emulsion)
b4. Compare between various types of pharmaceutical aerosols and liquid dosage forms in particular between old and current dosage forms and between solutions and dispersion liquids. (solution, suspension, and emulsion)
b5. Design pharmaceutical aerosols and liquid dosage forms (solution, suspension, and emulsion)
C: Professional & practical skills: Upon successful completion of the course, students will be able to:
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory
c2. Operate the instruments and perform experiments successfully in the laboratory
c3. Employ the relevant way to prepare liquid extemporaneous pharmaceutical dosage forms. (solution, suspension, and emulsion)
c4. Search efficiently for information using documented and electronic sources of information.
c5. Present and report his/her works correctly using appropriate writing rules and technologies media.
D: Transferable skills : Upon successful completion of the course, students will be able to:
d1. Participate efficiently with his colleagues in a teamwork.
d2. Demonstrate the skills of time management and self-learning.
d3. Communicate effectively and behave in discipline with colleagues.

COURSE CONTENT	
Theory	
Topics	Weeks
1- Introduction: definitions and brief history of pharmaceutics, dosage forms, pharmacopeia, active ingredients, excipients.	**1, 2**
2- Compounded prescriptions: formula, incompatibilities,	**3**

general operations (maceration, percolation, filtration, mixing,size-reducing, etc)	
3- Pharmaceutical excipients : roles, types with examples	**4**
4- Pharmaceutical dosage forms: the need to dosage forms, classification (according to physical form, route of administration, etc.)	**5**
5- Old pharmaceutical dosage forms: Galenicals, mucilages, lozenges, cachets, pills, glycerites, etc.	**6**
Mid-semester exam	**7**
6- Non-sterile Pharmaceutical solutions: definition of solutions, advantages, disadvantages, general method of preparation, enhancement of dissolution, excipients, types of waters	**8**
7- Aqueous Pharmaceutical solutions (aromatic waters, douches, mouthwashes, syrups(linctuses), non-syrup oral solutions, enemas**) :** advantages, disadvantages, method of preparation, purpose of each type, general characters	**9**
8- Non-Aqueous Pharmaceutical solutions (concentrated water, spirits, elixirs, collodions, liniments, sprays, fluidextracts, tinctures), , method of preparation, purpose of each type, general characters	**10**
9- Non-sterile liquid Dispersion systems: definition, difference from solutions, advantages, disadvantages. **Colloidals**: types, advantages, disadvantages, properties , examples.	**11**
10- Dispersion systems (suspensions) definition, types, advantages, disadvantages, physical properties (sedimentation, stability, flocculated, deflocculated, zeta-potential), excipients, method of preparation, examples	**12**
11- Dispersion systems (emulsions) definition, types, advantages, disadvantages, physical stability, excipients, method of preparation, examples **Microemulsions:** definition, types, advantages, disadvantages, physical stability, excipients, method of preparation, examples	**13**
12- Non-sterile Drops and mixtures: definition, types, formulation requirements,	**14**

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Course review and discussion session			15
Practical Part:			
Order	**Tasks/ Experiments**	**Number of Weeks**	**contact hours**
Aqueous solutions			
1.	Iodine tincture	**1**	**2**
2.	vaginal douches (sodium borate solution)	**1**	**2**
3.	simple syrup (BP; USP)	**1**	**2**
4.	Peppermint aromatic water	**1**	**2**
5.	Oral rehydration solution	**1**	**2**
6.	Preparation of elixir (paracetamol elixir)	**1**	**2**
Non-aqueous solutions			
7.	camphor liniment	**1**	**2**
8.	Otic Glycerites	**1**	**2**
Liquid disperse systems			
9.	Calamine lotion (suspension)	**1**	**2**
10.	emulsions (castor oil emulsion)	**1**	**2**
PRACTICAL EXAM		**1**	**2**
Total		**11**	**22**

TEACHING & LEARNING METHODS

1. Lecture
2. Brainstorming
3. Seminar
4. Concepts map
5. Assignments and Feedback
6. Lab Work

LEARNING AIDS

- White board & Markers.
- Data show
- Lab materials, tools and instrument

REFERENCES

1-Aulton M.E., Pharmaceutics: the science of dosage form design, 2002, Churchill Livingstone, UK
2-Rawlins. Bentley s of text book of pharmaceutics 3- Kasture pharmaceutics
4-Raje. pharmaceutics
5-Raph. practical pharmaceutics

6-Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins, USA

Course title	
Physiology II	
Course specification	
Academic year	Second
Academic semester	2nd
Course code	PHRC 01
Credit hours	Theor. (2) ; Pract. (-); Total : 2 Theor. (15 weeks)

COURSE DESCRIPTION:

The course concerns with the study of functions and regulation heart , blood vessels, blood as well as organs of the respiratory, digestive ,renal and immune systems.

Intended learning outcomes of the course (CILOs)
A: Knowledge and understanding: upon completion of the course, students will be able to:
a1:Describe the functions of the different organelles in the human cell.
a2: Understand the role of kidney in homeostasis.
a3: Understand physiology of the cardiovascular system.
B: **Intellectual skills: upon completion of the course, students will be able to:**
b1: Distinguish between physiological and pathological performance of body cells.
b2: Integrate physiology with other sciences
b3: Distinguish between normal and abnormal functions of renal system.
C: Professional and practical skills: upon completion of the course, students will be able to:
c1: Choose and classify data obtained from physiological experiments.
c2: Determine the requirements of homeostasis.
c3: Reform hematological analysis related to units.
D:Transferable Skills**: upon completion of the course, students will be able to:**
d1: Assess the importance of homeostasis in explanation of different abnormality of acid-base balance.
d2: Present clearly and effectively scientific topic in a tutorial, a staff meeting or the yearly scientific day.

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d3: Work separately or in a team to research and prepare a scientific topic.

COURSE CONTENT	
Topics	Weeks
1- Cardiovascular system: the heart: functions and regulation of the heart work, physiologic parameters of the heart work: heart rate, cardiac output, heat rhythmicity, conductivity, contraction **Blood vessels**: functions and regulation of the blood vessels (veins, arteries, capillaries), physiologic parameters of the blood vessels : blood pressure, peripheral vascular resistance.	**1 – 3**
2- Blood Circulation and blood components: regulations and factors affecting venous return and blood flow. Blood composition, functions and regulation of plasma, RBCs, WBCs and platelets.	**4 , 5**
3- Respiratory system: blood-gas interface, airways, the pleura, mechanism of breathing, Ventilation, Diffusion , Partial pressuresof oxygen and carbon dioxide,	**6, 7**
Mid-semester exam	**7**
4- Respiratory system: Ventilation–perfusion matching, Gas transport in blood , Regulation of ventilation, Ventilatory response to exercise.	**8**
5- Digestive system: functions and regulations of the mouth, pharynx and the gastrointestinal tract (esophagus, stomach, small and large intestine, the digestive system associated –organs: the liver, gall bladder., spleen and pancreases	**9, 10**
6- Renal system: basic unit of the kidney, renal blood flow, glomerular filtration, active excretion tubular reabsorption, ,regulation of plasma volume and plasma osmolarity	**11, 12**
7- Immune system : compositions, functions , regulations	**13, 14**
Course review and discussion session	**15**

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1) Lecture 2) Brainstorming 3) Seminar 4) Concepts map 5) Assignments and Feedback
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• White board & Markers. • Data show
REFERENCES
1. C.C.Chatterjee. Human physiology 2. Hassan Hamdi, Fundamentals of human physiology 3. Salah Abu-Sitta , Synopsis of medical physiology 4. W. F. Ganong. Review of medical physiology 5. Laurie kelly . Essential of human physiology for pharmacy, 2004, CRC press

Course title	
Pharmaceutical Analytical Chemistry	
Course specification	
Academic year	Second
Academic semester	2nd
Course code	PHRM 04
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks) ; Pract.(11 weeks)
COURSE DESCRIPTION:	
The course provides the student with basic knowledge of analysis of substances, including types of qualitative and quantitative analysis, preparation of analytical samples, types of analytical techniques, validation of analysis, and how to avoid the source of errors in analysis. The course also focuses on the concepts and theoretical underpinnings of two types of analysis: titrimetric analysis and electrochemical analysis. The practical part provides the student with the skill of dealing with chemicals, operating analytical instruments, and performing analytical experiments in a chemistry lab. This course is taken in conjunction with another course (Pharmaceutical Organic Chemistry I) to make the student link the concept of analysis and the chemical nature of compounds.	
III. Intended learning outcomes of the course (CILOs)	
A: Knowledge & understanding: Upon successful completion of the course, students will be able to:	
a1. Explain the physicochemical properties of substances that can be utilized for their qualitative and quantitative analysis	
a2. Describe the principles of titrimetric and electrochemical analysis.	
a3. Describe the role of pharmacist to perform accurate and precise quantitative and qualitative analysis.	

B: Intellectual skills: Upon successful completion of the course, students will be able to:
b1. Interpret data obtained by titrimetric and electrochemical analysis.
b2. Select appropriate standard operating procedure for titrimetric and electrochemical analysis.
b3. Design a suitable titrimetric and electrochemical analysis. based on the substance physicochemical properties.
b4. Calculate the content % of a material in a sample using titrimetric and electrochemical analysis.
C: Professional & practical skills: Upon successful completion of the course, students will be able to:
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory
c2. Operate the instruments and perform experiments successfully in the laboratory
c3. Practice pharmaceutical analysis of drugs by all titration methods.
D: Intellectual skills: Upon successful completion of the course, students will be able to:
d1. Communicate effectively and behave in discipline with colleagues.
d2. Participate efficiently with his colleagues in a team work.
d3. Demonstrate the skills of time management and self-learning.

COURSE CONTENT	
Topics	Weeks
1. Introduction to analytical chemistry: • Definitions, brief history, scope of applications, Quantitative and qualitative analytical chemistry • significant numbers, rejection of doubtful values , sourcesof errors calibration of analytical equipment • Sampling procedures. • preparation of standard solutions and calibration curve • Analyzing of results : average, SD, coefficient of variation Source of errors	**1 - 4**
2. Aqueous Acid Base Titration: • Definitions	**5 , 6**

• Distribution of acid-base species with pH of the medium. • Acid-Base titrimetry for determination of weakly acidic andbasic drugs. • Indicators (theories) and their selection applications	
Mid-semester exam	**7**
3. Non-Aqueous Acid Base Titrimetry: • Theoretical considerations and principles. • Bronsted Lowery of acids and bases. • Non-aqueous solvents. • Titration of weak acids and weak bases. • Applications and scope of non-aqueous titrations.	**8 - 10**
4. Oxidation Reduction Titration: • Principles and concepts, determination involving oxidizingagents. • iodimetric and iodometric determination, miscellaneous oxidation and reduction titrations. Indicators applications.	**11, 12**
5. Complexometric Titration: • Principle, Complexes and chelates, stability of complexions. • Types of Complexometric titrations. Technique employed in complexometric titration, End point detection	**13 - 14**
Course review and discussion session	**15**

Practical Part:

Order	Tasks/ Experiments	Number of Weeks	contact hours
1.	introduction to the Lab.: safety requirements, list of experiments, How to report, source of errors, etc	1	2
2.	aqueous titration of weak acids e.g. acetic acid	1	2
3.	aqueous titration of weak bases e.g. ammonium chloride	1	2
4.	non-aqueous titration of weak acids e.g. salicylic acid	1	2

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5.	Oxidation/reduction titration (iodometry) ; titration of H_2O_2 using iodine	1	2
6.	Complexiметric titration of calcium salt	1	2
7.	Potentiometric titration of drugs : diclofenac sodium	2	2
8.	Review	1	2
PRACTICAL EXAM		**1**	**2**
Total		**10**	**20**

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1. Lecture
2. Brainstorming
3. Seminar
4. Concepts map
5. Assignments and Feedback
6. Lab Work

7. LEARNING AIDS

- White board & Markers.
- Data show
- Lab materials, tools and instrument

REFERENCES

1. Verma. Analytical chemistry
2. Gary G. Christian, analytical chemistry, 2004, John Wiley & sons
3. Leslie G Chatten: Deans analytical chemistry handbook, 2003, McGraw Hill

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Course title	
Pharmaceutical Microbiology	
Course specification	
Academic year	Second
Academic semester	2nd
Course code	PHRT 06
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks) ; Pract.(11 weeks)
COURSE DESCRIPTION:	
The course deals study of pathogenic microorganisms and their infections as well the applications of microbiology in pharmacy.	

II. Intended learning outcomes of the course (CILOs)
A: Knowledge & understanding: Upon successful completion of the course, students will be able to:
a1. Identify of the microbes commonly resistant to antimicrobials.
a2. Describe the biological characters and mechanism of microbial resistance
a3. Discuss the principles and technologies applied in pharmacy for microbial investigations, product preservation, sterilization and assessment of antimicrobial activity.
a4. Describe the pharmacist role in applying microbiology knowledge and skills in pharmacy.
B: Intellectual skills: Upon successful completion of the course, students will be able to:
b1. Interpret the data of inhibition zone obtained from antimicrobial activity test.
b2. Differentiate between resistant and susceptible microbes
b3. Select standard operation procedures to test microbial content and antimicrobial activity.
C: Professional & practical skills: Upon successful completion of the course, students will be able to:
c1. Handle efficiently and safely the chemical materials, human biological samples, microbial samples and tools used in the laboratory
c2. Operate the instruments (Microscopes, Oven, Incubator, and others) and perform experiments successfully in the laboratory
c3. Search efficiently for information using documented and electronic sources of information.

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D: Transferable skills: Upon successful completion of the course, students will be able to:
d1. Communicate effectively and behave in discipline with colleagues.
d2. Participate efficiently with his colleagues in a team work.
d3. Demonstrate the skills of time management and self-learning.

COURSE CONTENT	
Topics	Weeks
1. Introduction to Microbiology: • Definition, brief history, role in medical sciences • Prokaryotic and Eukaryotic. • Classification of microorganisms.	1
2. Bacteria: • Nomenclature , Morphology and fine structures, biologicalprocess : (growth, reproduction , nutrition), classification, • Study of the microscopical features , common infections and culture media of pathogenic bacteria e.g. Staphylococci , Streptococci, Neisseriae, E.coli, pseudomonas, , Mycobacteria, Vibrio , Mycoplasma , Ureaplasma, Chlamydia	2- 6
Mid-semester exam	7
3. Micro-organisms other than bacteria: (Brief study): • **Fungi**: Types, morphology, Reproduction and physiology.Pathogenic yeasts , dermatophytes, aspergillus • **Rickettsiae**: Introduction, characteristics, Pathogenic rickettsiae, laboratory diagnosis of rickettsiai diseases. • **Viruses**: History of viruses. Classification. Characteristics.Reproduction and culture of viruses. Virus inhibition. Control of virus infections.	8- 10
4. Application of microbiology in pharmacy • Methods of Preservation of pharmaceutical preparations: - Pharmacopeial requirements of microbial contents in variouspharmaceutical dosage forms.	11-14

• Sampling procedures for microbial content test • Culture media preparation • Study of antimicrobial activity of drugs	
Course review and discussion secession	**15**

Practical Part			
Order	**Tasks/ Experiments**	**Number of Weeks**	**contact hours**
1.	introduction to the Lab.: safety requirements, list of experiments, How to report, source of errors, etc.	**1**	**2**
2.	Sterilization & disinfection of plastic and glassware	**1**	**2**
3.	Preparation of culture media and inoculums for microorganisms	**1**	**2**
4.	Wet preparation & Microscopical characteristics differentiation of bacteria: streptococci, staphylococci, E.coli, pseudomonas aeruginosa, Neisseria, M. tuberculosis.	**3**	**6**
5.	Microscopical characteristics differentiation of Fungi Candida albicans.	**1**	**2**
6.	Antimicrobial susceptibility tests (disc diffusion)	**1**	**2**
7.	Antimicrobial susceptibility tests (dilution method)	**1**	**2**
8.	Determination of microbial content (e.g. staphylococci) in pharmaceutical product : paracetamol syrup	**1**	**2**
9.	Testing of sterility of pharmaceutical products	**1**	**2**
PRACTICAL EXAM		**1**	**2**
Total		**12**	**24**

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1. Lecture 2. Brainstorming 3. Concepts map 4. Assignments and Feedback

5. Lab Work
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REFERENCES
1.W. B. Hugo: pharmaceutical microbiology, 1998, Black well science LTD. 2.Aulton, pharmaceutics the science of dosage form design, 2002, Churchill Livingston 3.Kar. Pharmaceutical microbiology 4.Chandrakanty pharmaceutical microbiology

Course title	
Pathology	
Course specification	
Academic year	Second
Academic semester	2nd
Course code	MSC 10
Credit hours	Theor. (2) ; Pract. (-); Total : 2 Theor. (15 weeks)
COURSE DESCRIPTION:	
Pathology is defined as the study of disease. The aim of the course is to provide the students with a basic education about the general pathology which is concerned about the basic abnormal alterations in the cells and tissues as a result of diseases. To understand the etiology, pathogenesis and structural changes (gross pathology and histopathology) of pathological lesions of different and common diseases. Each lecture lasts 1 hour and is illustrated with macroscopic and microscopic photographs. On the laboratory practical sessions the students can learn the basic macroscopic and microscopic skills and ability to recognize the pathologic lesions and describe them. To help the students to find the lesions on their own slides the lecturer will demonstrate the slides with the data show and power point slides. The students will have an opportunity to make drawings and notes of the slides. The topics of the practical study match the lectures.	
Intended learning outcomes of the course (CILOs)	
A: Knowledge and understanding: upon completion of the course, students will be able to:	

a1: Understand the basic mechanisms of tissue (aetiology and pathogenesis) and body reactions (course and outcomes) to injury
a2: Understand the normal and altered morphology (gross & microscopy) of different organ systems of the human body
B: **Intellectual skills: upon completion of the course, students will be able to:**
b1. Recognize the difference between neoplastic and non-neoplastic lesions based on morphological and clinical characteristic features.
b2: Able to solve pathological problems
C: Professional and practical skills: upon completion of the course, students will be able to:
c1: Diagnose and fully describe the pathologic picture of a disease based on morphology, clinical data and laboratory investigations
c2: Differentiate between benign and malignant tumors by their morphology
D:Transferable Skills**: upon completion of the course, students will be able to:**
d1: Make computer search and use the library to search for information
d2: Work effectively as an individual and as a member of a team

COURSE CONTENT	
Topics	Weeks
1- Cell injury : mechanisms, failure of cell repair, cell death; apoptosis , adaptation.	**1, 2**
2- Alteration in body fluids and electrolytes and acid-base balance: mechanism, prognosis	**3, 4**
3- Pathological Alteration in body defense: stress,inflammation, alteration in tissue repair , fever, alteration in immune response : allergy and hypersensitivity,	**5, 6**
Mid-semester exam	**7**
4- Pathological Alteration in body defense: alteration in immune response : immunopathology, immunodeficiency	**8**
5. Genetic impact on diseases • Diseases caused by single – gene defects • -Disorders with multifactor polygenic inheritance • Cytogenetic disorders • (Down s syndrome)	**9 - 11**

• sex chromosome disorders • kline felters syndrome XYY	
6. **Pathological Alterations in the Hematologic System**	**12**
7. **Pathology of cancer**: aetiology, carcinogenic agents, cellular ad histological changes, types of cancers	**13, 14**
Course review and discussion session	15

TEACHING & LEARNING METHODS

1) Lecture
2) Brainstorming
3) Seminar
4) Concepts map
5) Assignments and Feedback

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- Data show

REFERENCES

1. Martin M. Zadnaovich , essentials of pathophysiology for pharmacy, 2003, CRC press.
2. John H,. Essentials of Anatomic and Clinical Pathology
3. Gamal Nada. Colour Atlas of histopathology.
4. Siddiqui , Biochemistry and clinical pathology

Course title	
Pharmacognosy I	
Course specification	
Academic year	Second
Academic semester	2nd
Course code	PHRG 02
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks) ; Pract.(11 weeks)

COURSE DESCRIPTION:

The course provides the student with fundamental knowledge in plants as a natural source of drugs. It focuses on the principles and procedures applied for cultivation, collection and processing of plants as crude drugs and the methods used for detection of active constituents and discovering adulteration of medicinal plants. It also

provides detailed knowledge on identification features and medical uses of leaves, barks, roots and rhizomes that have scientific-based evidences to be used as complementary and alternative medicines. The practical part of the course provides the student with skills to handle and prepare of plant samples for morphological and microscopical identification tests.
Intended learning outcomes of the course (CILOs)
A: Knowledge & understanding: Upon successful completion of the course, students will be able to:
a1. Explicit the methods used for detection of active constituents and discovering adulteration of medicinal plants.
a2. Discuss the principles and procedures applied for cultivation, collection and processing of plants as crude drugs.
a3. Identify the botanical origin, morphological and microscopical characteristics of common medicinal leaves, barks, roots and rhizomes.
a4. Determine the active constituents and therapeutic use of medicinal leaves, barks, roots and rhizomes.
a5. Describe his/her role as pharmacist in identification and evaluation of medicinal plants
B: Intellectual skills: Upon successful completion of the course, students will be able to:
b1. Express with drawings the morphology and key microscopical features of medicinal plants
b2. Differentiate between medicinal leaves, barks, roots and rhizomes based on morphological and microscopical features.
b3. Classify active constituents in medicinal plants.
b4. Select standard operation procedures to identify medicinal plants and crude drugs
C: Professional & practical skills: Upon successful completion of the course, students will be able to:
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory
c2. Operate the instruments (Evaporator, Grinder, Dryer) and perform experiments successfully in the laboratory.
c3. Prepare plant samples and investigate the morphological and microscopical features in medicinal leaves, barks, roots and rhizomes
c4. Search efficiently for information using documented and electronic sources of information.

D: Transferable skills: Upon successful completion of the course, students will be able to:
d1. Communicate effectively and behave in discipline with colleagues.
d2. Participate efficiently with his colleagues in a team work.
d3. Demonstrate the skills of time management and self-learning.

COURSE CONTENT	
Topics	We
1- Introduction • Definition, importance, and function, brief history • Crude, official and unofficial drugs. • Nomenclature of crude drugs (botanical, geographical and commercial sources of drugs) • Classification of crude drugs (alphabetical ,taxonomical, morphological, pharmacological and chemical) • Cultivation (Disadvantages of collecting wild plants and advantagesof cultivation, factors affecting cultivation). • Collection (Time of the year, time of the day, stage of the development of the plant and general rules of collection). • Post-collection processing of crude drugs: Drying(Natural methods, artificial methods, changes occurring after drying), Preservation andprotection of crude drugs(deterioration during storage, physicochemical factors, biological factors, methods to destroy and control of insects). • Adulteration(sophistication, substitution, admixture and deterioration, determination of adulteration.)	**1 - 4**
2- **Natural Chemical constituents in plants:** Types , biological and pharmaceutical and therapeutic roles of : starch, proteins, fixed oilsand fats, terpenes, etc., gums, mucilage, resins, tannins ,alkaloids, volatile oils and glycosides etc.	**5, 6**
Mid-semester exam	**7**
3- Medicinal leaves Study of botanical origin, microscopical features, active constituents and medical uses of the following medicinal leaves: Digitalis, Senna, Stramonium, Belladonna, Hyoscymus, Bucho, Boldo , Coca, Jaborandi, Henna.	**8-10**

4- Medicinal barks Study of botanical origin, microscopical features, active constituents and medical uses of the following medicinal barks: Cinchona, Cinnamon, Frangula, Quillaia, Pomegranate, Hamamelis andGalls.	**11, 12**
5- Medicinal roots and rhizomes Study of botanical origin, microscopical features, active constituents and medical uses of the following medicinal barks: Liquorice,Ipecacuanha,Rauwolfia,Senega,Ginger,Colchicum,Squill,Ginseng,Rhubarb,Curcuma,Podophylum,Aconite,Veratrum,Sasaparilla,Kava-kava	**13, 14**
Course review and discussion session	**15**

Practical Part:

Order	Tasks/ Experiments	Number of Weeks	contact hours
1.	preparation of hard parts of plant(e.g. roots, seeds), for investigation : drying, grinding, treating with reagents , etc	1	2
2.	preparation of soft parts of plant(e.g. leaves, flowers), for investigation : drying, grinding, treating with reagents , etc.	1	2
3.	microscopical Detection of types of calcium oxalate in plant	1	2
4.	microscopical Detection of types of starch in plant	1	2
5.	morphology and microscopical determination of medicinal leaves : senna leaves	1	2
6.	morphology and microscopical determination of medicinal leaves : Henna leaves	1	2
7.	morphology and microscopical determination of medicinal barks : cinnamon bark	1	2
8.	morphology and microscopical determination of medicinal barks : pomegranate bark	1	2
9.	morphology and microscopical determination of medicinal roots & rhizomes: Ginger	1	2
10.	morphology and microscopical determination of medicinal roots & rhizomes: licorice	1	2
11.	Review	1	2

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PRACTICAL EXAM	1	2
Total	12	24

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- White board & Markers.
- Data show
- Lab materials, tools and instrument

REFERENCES

1. W.C. Evans, Trease and Evans pharmacognosy, 2009, W.B.Saunders
2. Jarald. Colour atlas of medicinal plants
3. Khandelwal. Pharmacognosy
4. Bhandari. Textbook of pharmacognosy.
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Course title	
Medicinal chemistry I	
Course specification	
Academic year	Second
Academic semester	2nd
Course code	PHRM 05
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks) ; Pract.(11 weeks)

COURSE DESCRIPTION:

This course is the first among (Medicinal chemistry) courses which are designed to provide knowledge and skills in chemistry of medicinal agents (drugs). The first part of the course deals with an introduction to drug design, stereochemistry and chemistry of drug metabolism while the second part deals with the physicochemical properties, chemical synthesis, structure activity relationship (SAR), pharmacophore molecules and metabolism of drugs affecting autonomic nervous system and autacoids. The practical part provides the student the skill to identify the physicochemical, spectroscopic, chromatographic specification of the drugs under study The course is co-requisite with (Pharmacology I) as both deals with the same medicinal agents.

Intended learning outcomes of the course (CILOs)
A: Knowledge & understanding: Upon successful completion of the course, students will be able to:
a1. Explain the principles of synthesis, purification and metabolic reactions of drugs affecting autonomic nervous system, autacoids.
a2. Explain the correlation between the chemical and therapeutic properties of drugs to their molecular structure.
a3. Describe the role of pharmacist in chemical synthesis of drugs.
B: Intellectual skills : Upon successful completion of the course, students will be able to:
b1. Interpret the rules of structure-activity relationship to construct pharmacophore of drugs affecting autonomic nervous system, autacoids.
b2. Express molecular structure, synthesis and reactions of drugs with hand-drawing
b3. Classify, chemically, the drugs affecting autonomic nervous system, autacoids.
b4. Compare between chemically related drugs based on their chemical structure

b5. Design newer drugs affecting autonomic nervous system, autacoids using structure activity relationship rules.
C: Professional & practical skills: Upon successful completion of the course, students will be able to:
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory
c2. Operate the instruments (UV-Spectrometry, HPLC) and perform experiments successfully in the laboratory
c3. Perform synthesis of some autonomic nervous system, autocoid and antihistamine drugs.
c4. Determine the quantitative analysis of some autonomic nervous system, autocoid and antihistamine drugs.
D: Transferable skills: Upon successful completion of the course, students will be able to:
d1. Communicate effectively and behave in discipline with colleagues.
d2. Demonstrate the skills of time management and self-learning.
d3. Participate efficiently with his colleagues in a team work
d4. Use internet, computer-based programs to search for information that can help to hypothetically design newer drugs from a studied patent drug using SAR principles)

COURSE CONTENT	
Topics	Weeks
(1) Introduction to medicinal chemistry: definitions, brief history, roles in pharmacy, physicochemical properties in relation tobiological activity , binding and drug-receptor interaction chemical bonding and biological activity , stereochemical aspects of drug action isosterism and bioisosterism , Drug metabolism (phase I andII), deactivation, active metabolites	1- 6
Mid-semester exam	7
(2) Drugs acting on the autonomics nervous system • cholinergic agonists • cholinergic blocking agents • adrenergic agonists	8, 9

adrenergic blocking agents	
(3) Drugs acting on the central nervous system • anxiolytics and hypnotics • anaesthetics • antidepressants • neuroleptics • Opioids. • Antiepileptics	10 - 14
Course review and discussion session	**15**

Practical Part

Order	Tasks/ Experiments	Number of Weeks	contact hours
1.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **adrenaline**	**1**	**2**
2.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **atenolol**	1	2
3.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **neostigmine**	1	2
4.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification **atropine**	**1**	**2**
5.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **suxamethonium**	**1**	**2**
6.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **chlorpheniramine.**	**1**	**2**
7.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **ondansetron**	**1**	**2**
8.	Synthesis of drugs	**2**	**4**
9.	Purification of drugs.	**1**	**2**
PRACTICAL EXAM		**1**	**2**

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Total	11	22

TEACHING & LEARNING METHODS

1. Lecture
2. Brainstorming
3. Seminar
4. Concepts map
5. Assignments and Feedback
6. Lab Work

LEARNING AIDS

- White board & Markers.
- Data show
- Lab materials, tools and instrument

REFERENCES

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2.Ashutoch Kar. Medicinal chemistry, 2007, New age international publisher
3.Siddique. A textbook of medicinal chemistry
4.Rajie. Pharmaceutical chemistry
5.Wermuth. The practice of medicinal chemistry

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Course title	
Pharmacology I	
Course specification	
Academic year	second
Academic semester	2nd
Course code	PHRC 02
Credit hours	Theor. (3) ; Pract. (-); Total : 3 Theor. (15 weeks)

COURSE DESCRIPTION:

This course will go through the crucial ideas that students should understand on the pharmacological underpinnings of therapeutics and the basis of drug action. The course's first section will cover fundamental pharmacological concepts like pharmacodynamics and pharmacokinetics. The second section will be devoted to systemic pharmacology and will address important medication classes in relation to various organ systems or significant pathophysiological illnesses. Autonomic medications and cardiovascular drugs are among the subjects.

Intended learning outcomes of the course (CILOs)

A:Knowledge & understanding: Upon successful completion of the course, students will be able to:

a1. Identify the actions of medicines in human body, their therapeutic uses, adverse drug reactions, contraindications, drug-drug/drug-food interactions.

a2. Describe the pharmacokinetics, route of administration, and bioavailability of medicine in variable pharmaceutical preparations and application in pharmacy practice.

a3. Describe the role of pharmacist in providing correct information on rational use of medications.

B:Intellectual skills: Upon successful completion of the course, students will be able to:

b1. Utilize pharmacological basis of therapeutics in the proper selection and use of drugs in various disease conditions.

b2. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency) and drug limitations.

C: Professional & practical skills: Upon successful completion of the course, students will be able to:

c1. Advise the patient and healthcare professional to optimize medicine use

c2. Use properly the pharmaceutical and medical terms, abbreviations and symbols in pharmacy practice.
c3. Select the appropriate medication therapy for a given diseases based on its etiology, pathophysiology, patient medical history, possible interactions and age-related factors.
D: Transferable skills: Upon successful completion of the course, students will be able to:
d1. Demonstrate time management and decision-making skills.
d2. Work effectively in a team in a variety of health care settings.
d3. Interact effectively with patients, the public and health care professionals

COURSE CONTENT	
Topics	Weeks
1- Principles of Pharmacology (History, Terminology, Dosage forms and their Routes of Administration)	**1**
2- Drugs-receptors interactions	**2**
3- Pharmacokinetics and pharmacodynamics	**3**
4- Importance of Neuropharmacology & Drugs affecting the autonomic nervous system (1) Cholinergic Agonists	**4**
5- (2) Cholinergic Antagonists	**5**
6- Adrenergic Agonists and Adrenergic Antagonists	**6**
Mid-semester exam	**7**
7- Anxiolytic and Hypnotic Drugs	**8**
8- CNS Stimulants	**9**
9- Anaesthetics	**10**
10- Antidepressants	**11**
11- Neuroleptic	**12**
12- Opioids	**13**
13- Antiepileptic Drugs	**14**
Course review and discussion session	**15**

TEACHING & LEARNING METHODS
1) Lecture 2) Brainstorming 3) Seminar 4) Concepts map 5) Assignments and Feedback
LEARNING AIDS

• White board & Markers. • Data show
REFERENCES
1. Rang, Dale and Ritter. Pharmacology, (2007), Churchill Livingstone. 2. Richard A. Harvey. Lippincott's pharmacology, 2000, Lippincott William and Wilkins. 3. Katzung –Basic and Clinical Pharmacology, (2007), McGraw-Hill 4. Udaykumar. Text book of medical pharmacology 5. Aikad. Applied pharmacology 6. Murugesh. A concise text book of pharmacology 7. Kasture. A hand book experiments in pre-clinical pharmacology

3rd YEAR					
First semester					
No.	Code	Course	Credit hours		
			T	P	Total
1.	PHRO 01	Medical parasitology	2	1	3
2.	PHRT 07	Pharmaceutics II	2	1	3
3.	PHRM 06	Medicinal Chemistry II	3	1	4
4.	PHRM 07	Pharmaceutical instrumental analysis I	2	1	3
5.	PHRC 03	Pharmacology II	3	-	3
6.	PHRG 03	Pharmacognosy II	2	1	3
7.	PHRC 04	Pathophysiology	2	-	2
Total			16	5	21

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Course title	
Medical parasitology	
Course specification	
Academic year	Third
Academic semester	1st
Course code	PHRO 01
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks) ; Pract.(11 weeks)
COURSE DESCRIPTION:	
The course deals with the study of pathogenic parasites commonly infecting humans. The study concerns with mode of infections, general characters, morphology, life cycle, pathogenesis, diagnosis, prevention and control of those parasites.	
Intended learning outcomes of the course (CILOs):	
A: Knowledge and understanding: upon completion of the course, students will be able to:	
a1. Identify and describe the microscopical/morphological features of common pathogenic parasites including protozoa , helminthes and arthropods.	
a2. Determine life cycle, pathogenicity, diagnosis, management of spread and treatment of common pathogenic parasites.	
a3. Discuss the principles and technologies of parasitology applied for sampling and diagnosis of common pathogenic parasites infections	
B: Intellectual skills: upon completion of the course, students will be able to:	
b1. Differentiate between similar parasites using morphological and microscopical techniques	
b2 . Classify pathogenic parasites.	
b3. Relate the severity of parasitic infections to its affecting factors such as immunity.	
C: Professional and practical skills: upon completion of the course, students will be able to:	
c1. Handleefficiently the tools and chemicals used in parasitology Lab.	
c2. Operate successfully the instruments used in parasitology Lab.	
c3 . Perform effectively the experiments and practical tasks in microbiology Lab. including microscopical investigation using standard procedures.	

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c4 . Take the required safety criteria during performing different types of practical and professional pharmacy works**.**
D:Transferable Skills: upon completion of the course, students will be able to:
d1. Share successfully in team-work.
d2. Show respect to life.
d3. Communicate effectively with his/her colleagues.

COURSE CONTENT

Topics	Weeks
1. Introduction to medical parasitology • Definition of parasitology • Types of parasite (Ecto, endo ,obligate ,facultative) • Types of host(Mechanical and biological) and Host parasitesrelationship • Effect of parasite on the host (Mechanical effect, effect on cell ,invasion and destruction ,inflammatory reaction to the parasite or production ,competition for host nutrient and toxic effect) • Types of vector (obligate ,facultative) • Source of infection (food& drink, soil and water, vector ,directcontact and congenial) • Mode of infection. • Classification of parasites (protozoa, helminthes , arthropods) classand example for all class Protozoa	**1-4**
2. Techniques for sampling and detection of parasites - Type of specimens (urine, stool, blood, etc.) • Collection, transport and preservation of samples. • Microscopic examination • Direct Smear Method	**5**
3. Protozoa • General characteristic of protozoa(morphology, biologicalfeature, multiplication ,nutrient, and locomotion) • Classification (amoebae ,ciliate, flagellate, sporozoa) • Amoebae ○ Entamobea histolytica (Morphology ,life cycle,pathogenesis, Diagnosis, prevention and control)	**6**

○ Difference between Entamobea histolytica and Entamobea.coli	
Mid-semester exam	**7**
3. Protozoa Ciliate : Bantium coli (Morphology ,life cycle, pathogenesisDiagnosis, prevention and control)	**8**
4. Flagellates - Intestinal flagellates: **Giardia lamblia** (Morphology ,life cycle, pathogenesis ,Diagnosis, prevention and control Genital : **Trichomnas vaginalis** Morphology ,life cycle, pathogenesis ,Diagnosis, prevention and control	**9**
5. Blood flagellates • Leishmanias (Visceral and cutanouse) Morphology ,life cycle,pathogenesis ,Diagnosis, prevention and control) • Trypanosoma (all types Morphology ,life cycle, pathogenesis. • ,diagnosis, prevention and control	**10**
6. Sporozoa Malaria parasites (Plasmodium falciparum, vivax, ovali , malareae) ➢ Morphology ,life cycle, pathogenesis ,Diagnosis, prevention and control	**11**
7. Helminthes • Classification of helminthes (Nematodes, Cestodes, Trematodes). • Morphology ,life cycle, pathogenesis, Diagnosis, prevention and control of helminthes from each class.	**12- 14**
Course review and discussion session	**15**

Practical Part

Order	Tasks/ Experiments	Number of Weeks	contact hours
1.	investigation of Enatamopea histolytica & Enatamopea coli	1	2
2.	investigation of Giardia	1	2
3.	investigation of Trichomonas	1	2
4.	investigation of Leishmania	1	2
5.	investigation of Malaria spp (with preparation of blood smear)	1	2

6.	investigation of Ascaris& Anchylostoma	1	2
7.	investigation of Teania spp	1	2
8.	investigation of H. nana	1	2
9.	investigation of schistosoma	1	2
10.	investigation of Arthropodes	1	2
PRACTICAL EXAM		1	2
Total		12	24

TEACHING & LEARNING METHODS

1- Lecture
2- Brainstorming
3- Seminar
4- Concepts map
5- Assignments and Feedback
6- Lab Work

LEARNING AIDS

- White board & Markers.
- Data show
- Lab materials, tools and instrument

REFERENCES

1. Kayser, Medical Microbiology: parasitology, 2005 Thieme
2. Michael j. Cuomo. Diagnosing medical parasites: a public health officers guide to assisting laboratory and medical officers, USAF
3. Chatterjee. Parastology
4. Parija. Text book of medical parastology

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Course title	
Pharmaceutics II	
Course specification	
Academic year	Third
Academic semester	1st
Course code	PHRT 07
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks) ; Pract.(11 weeks)

COURSE DESCRIPTION:

This course is the second part of "Pharmaceutics "courses that are intended to provide the student with knowledge in preformulation, formulation and preparation of pharmaceutical dosage forms. The course deals with designing of semisolid dosage forms (ointments, creams, pastes and gels), suppositories, and pharmaceutical ophthalmic preparation. The practical part provides the student with skills to prepare those dosage forms in pharmaceutics Lab.

The Course Intended Learning Outcomes (CILOs)

Knowledge & understanding: Upon successful completion of the course, students will be able to:

a1. Describe the advantages and disadvantages, types, classification of pharmaceutical ophthalmic preparations and semisolid dosage forms. (Ointments, paste, cream, gel, suppository)

a2. Describe the advantages and disadvantages, types, classification of pharmaceutical ophthalmic preparations and semisolid dosage forms. (Ointments, paste, cream, gel, suppository)

a3. Describe the stages of designing pharmaceutical ophthalmic preparations and semisolid dosage form (Ointments, paste, cream, gel, suppository).

a4. Describe the role of pharmacist in formulation of pharmaceutical ophthalmic preparation and semisolid dosage forms (Ointments, paste, cream, gel, suppository)

a5. Recognize the different additives used in manufacturing of pharmaceutical ophthalmic preparations and semisolid dosage form (Ointments, paste, cream, gel, suppository)**.**

a6. Discuss the principles, pharmacopoeial requirements, and methods of preparation, of various types' pharmaceutical ophthalmic preparations and semisolid dosage forms. (Ointments, paste, cream, gel, suppository)

Intellectual skills : Upon successful completion of the course, students will be able to:

b1. Classify pharmaceutical ophthalmic preparations and semisolid dosage form (Ointments, paste, cream, gel, and suppository).
b2. Compare between various types of pharmaceutical ophthalmic preparations and semisolid dosage form in particular between old and current dosage forms (Ointments, paste, cream, gel, suppository)
b3. Design pharmaceutical ophthalmic preparations and semisolid dosage form (Ointments, paste, cream, gel, suppository).
Professional & practical skills: Upon successful completion of the course, students will be able to:
c1. Exercise professional good laboratory practice (GLP) during practical sessions and operate machinery used properly.
c2. Employ the relevant way to prepare pharmaceutical ophthalmic preparations and semisolid dosage form. (Ointments, paste, cream, gel, suppository).
c3. Present and report his/her works correctly using appropriate writing rules and technologies media.
Transferable skills : Upon successful completion of the course, students will be able to:
d1. Participate efficiently with his colleagues in a teamwork.
d2. Demonstrate the skills of time management and self-learning.
d3. Communicate effectively and behave in discipline with colleagues.

COURSE CONTENT	
Topics	Weeks
1- Liquid Pharmaceutical aerosols	
Definition , advantages, disadvantages, types of aerosols, anatomical features of the bronchi, Pressurized packages (Type of propellants , Containers , Formulation aspects, Air-blast nebulizers), methods of preparation (pressurized filling, cold filling), quality control evaluation.	**1, 2**
2- Pharmaceutical semisolid dosage forms	
(i) introduction: definitions , advantages, disadvantages, types, anatomical features and targets of the skin,	3
(ii) ointments (definitions, advantages, advantages, disadvantages, classification based on type of ointment base, formulation considerations,method of preparation**)**	**4, 5**

(i) Pastes: (definitions, advantages, advantages, disadvantages, classification based on type of ointment base,	
(iii) Creams (definitions, advantages, advantages, disadvantages, classification, formulation considerations, method of preparation)	**6**
Mid-semester exam	7
(iv) Gels (definitions, advantages, classification, formulation considerations, method of preparation	**8**
3- Suppositories and pessaries	
definitions, advantages, advantages, disadvantages, classification (rectal, vaginal) formulation, method of preparation	**9, 10**
4- Solid dosage forms (Introduction)	
(i) Powder : • Definitions, advantages, disadvantages • classification (coarse, fine, microfine, etc; divided, bulk; compounded; medicated, cosmetic) • Formulation considerations (characters of ingredients morphology, flowability, stability, particle size, compatibility). • Comminution and Blending of powdersBulk and divided powders: formulation, examples. • Dusting powder: formulation, examples • Powders packaging: folding in papers. • Quality control evaluation : evaluation of mixing, flowability,water content, assay, stability, etc.	**11, 12**
(ii) Granules **2.** Definition, advantages, disadvantages **3.** Method of preparation **4.** Formulation considerations (characters of ingredients morphology, flowability, stability, particle size, compatibility) **5. Effervescent granules** ○ Definition, composition ○ Method of preparation: dry (fusion) method, wet	**13, 14**

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method. ○ Determination of the required quantity of sodium bicarbonate,tartaric acid and citric acid in the formulation	
Course review and discussion session	**15**

Practical Part:

Order	Tasks/ Experiments	Number of Weeks	contact hours
1.	Pharmaceutical aerosols: construction and use	**1**	**2**
2.	Preparation of salicylic acid 2 % ointment in simple ointment base	**1**	**2**
3.	Preparation of hydrophilic ointment USP	**1**	**2**
4.	Preparation of Polyethylene glycol ointment base.	**1**	**2**
5.	Preparation of o/ w creams: vanishing cream base	**1**	**2**
6.	Preparation of w/o creams: cold cream base	**1**	**2**
7.	Preparation of hydrophilic gel base : Carbomer or Carboxy methyl cellulose gel	**1**	**2**
8.	Preparation of Emulgel	**1**	**2**
9.	Preparation of Aspirin in cocoa butter base suppositories.	**1**	**2**
10.	Preparation of Glycerin suppositories BP	**1**	**2**
11.	Preparation of Glycerin suppositories USP	**1**	**2**
PRACTICAL EXAM		**1**	**2**
Total		**12**	**24**

TEACHING & LEARNING METHODS

1. Lecture
2. Brainstorming.
3. Seminar
4. Concepts map
5. Assignments and Feedback
6. Lab Work

7. LEARNING AIDS

- White board & Markers.
- Data show

• Lab materials, tools and instrument
REFERENCES
1-Aulton M.E., Pharmaceutics: the science of dosage form design, 2002, Churchill Livingstone, UK 2-Rawlins. Bentley s of text book of pharmaceutics 3- Kasture pharmaceutics 4-Raje. pharmaceutics 5-Raph. practical pharmaceutics 6-Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins, USA

Course title	
Medicinal Chemistry II	
Course specification	
Academic year	Third
Academic semester	1st
Course code	PHRM 06
Credit hours	Theor. (3) ; Pract. (1); Total : 4 Theor. (15 weeks) ; Pract.(11 weeks)
COURSE DESCRIPTION:	
This course is the second one among (Medicinal chemistry) courses which are designed to provide knowledge and skills in chemistry of medicinal agents (drugs). It deals with the physicochemical properties, chemical synthesis, quantitative structure activity relationship (SAR), qualitative structure activity relationship (QSAR), pharmacophore molecules, mechanism of action, and metabolism of drugs used for cardiovascular system, blood, central nervous system and endocrine system disorders. Also, there are practical part concerns with Pharmacopeial physicochemical properties, chemical, chromatographic or spectroscopy identification of some CVS drugs.	

Intended learning outcomes of the course (CILOs)
A:Knowledge and understanding: upon completion of the course, students will be able to:
a1. Explain the correlation between the chemical and therapeutic properties of drugs to their molecular structure.
a2. Explain the principles of synthesis, purification and metabolic reactions of drugs used for cardiovascular system, blood, central nervous system and endocrine disorders.
a3. Describe the role of pharmacist in chemical synthesis of drugs.

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B:Intellectual skills: upon completion of the course, students will be able to:
b1. Interpret the rules of structure-activity relationship to construct pharmacophore of drugs used for cardiovascular system, blood, central nervous system and endocrine disorders.
b2. Express molecular structure, synthesis and reactions of drugs with hand-drawing
b3. Classify, chemically, drugs affecting drugs used for cardiovascular system, blood, central nervous system and endocrine disorders.
b4. Compare between chemically related drugs based on their chemical structure
b5. Design newer drugs used for cardiovascular system, blood and endocrine disorders.
C: Professional and practical skills: upon completion of the course, students will be able to:
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory
c2. Operate the instruments (UV-Spectrometry, HPLC) and perform experiments successfully in the laboratory
c3. Perform synthesis of some cardiovascular system, blood, CNS and endocrine disorders.
c4. Determine the quantitative analysis of some cardiovascular system, blood, CNS and endocrine disorders.
Transferable skills: upon completion of the course, students will be able to:
d1. Communicate effectively and behave in discipline with colleagues.
d2. Demonstrate the skills of time management and self-learning.
d3. Participate efficiently with his colleagues in a team work.
d4. Use internet, computer-based programs to search for information that can help to hypothetically design newer drugs from a studied patent drug using SAR principles)

COURSE CONTENT	
Topics	Weeks
1. Drugs used in gastrointestinal tract	
(i) Drugs used in Peptic Ulcer	1
(ii) Anti- emetics, Laxatives and Anti-diarrheal agents etc…	2
2. Drugs acting on the respiratory system; bronchodilators, corticosteroids, Asthma reventers, Cough)	3, 4
3. Cardiovascular Drugs	

(i)Anti-anginal drugs and Lipid-regulating drugs	5
(ii) Cardiac glycosides and other drugs used in Congestive heart failure. (iii) Anti-arrhythmic drugs.	6
Mid-semester exam	7
(iv) Antihypertensive and Diuretic agents	8, 9
4. Anticoagulant drugs (antiplatelet drugs, drugs acting on the clotting cascade, fibrinolytic drugs).	10
5. Drugs used in the management of inflammation and pain	
(i) Non-steroidal anti-inflammatory drugs (NSAIDs)	11, 12
(ii) Anti-inflammatory steroids	13
(iii) Narcotic analgesics	14
Course review and discussion session	15

Practical Part

Order	Tasks/ Experiments	Number of Weeks	contact hours
1.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **ketamine**	**1**	**2**
2.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **diazepam**	1	2
3.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **codeine**	1	2
4.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **carbamazepine**	**1**	**2**
5.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **amlodipine**	**1**	**2**
6.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **bisoprolol**	**1**	**2**
7.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **Tranexmic acid**	**1**	**2**

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8.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **Warfarin**	**2**	**4**
9.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **Glyburide**	**1**	**2**
PRACTICAL EXAM		**1**	**2**
Total		**11**	**22**

TEACHING & LEARNING METHODS

1. Lecture
2. Brainstorming
3. Seminar
4. Concepts map
5. Assignments and Feedback
6. Lab Work

LEARNING AIDS

- White board & Markers.
- Data show
- Lab materials, tools and instrument

REFERENCES

1.Gareth Thomas, Medicinal chemistry: an introduction to, 2007 John Wiley & Sons Ltd,
2.Ashutoch Kar. Medicinal chemistry, 2007, New age international publisher
3.Siddique. A textbook of medicinal chemistry
4.Rajie. Pharmaceutical chemistry
5.Wermuth. The practice of medicinal chemistry

Course title	
Pharmaceutical instrumental analysis I	
Course specification	
Academic year	Second
Academic semester	2nd
Course code	PHRM 07
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks) ; Pract.(11 weeks)

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COURSE DESCRIPTION:
The course provides the student with knowledge and skills of advanced analytical techniques used for analysis of substances including drugs. The course focuses on the study of principles, instrumentation and applications of advanced spectroscopic techniques (atomic absorption/emission spectroscopy, Infrared spectroscopy (IR) and mass spectroscopy (MS) The practical part of the course provides the student with skills to operate that equipment and perform analysis of compounds by those techniques.
Intended learning outcomes of the course (CILOs)
A:Knowledge & understanding: Upon successful completion of the course, students will be able to:
a1. Explain the physicochemical properties of substances that can be utilized for their qualitative and quantitative analysis
a2. Describe the principles of advanced spectroscopic, chromatographic, NMR and coupled techniques.
a3. Describe the role of pharmacist to perform accurate and precise quantitative and qualitative analysis.
B:Intellectual skills: Upon successful completion of the course, students will be able to:
b1. Interpret data obtained by advanced spectroscopic, chromatographic, NMR and coupled techniques.
b2. Classify advanced analytical technique based on principles of works.
b3. Lay out the design of advanced analytical techniques.
b4. Calculate the content % and identify substances in a sample using advanced spectroscopic, chromatographic, NMR and coupled technique.
C:Professional & practical skills: Upon successful completion of the course, students will be able to:
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory
c2. Operate the instruments (UV-Visible spectroscopy, NMR) and perform experiments successfully in the laboratory.
c3. Practice and carry out assays of number of drugs by spectrophotometric methods.
c4. Utilize IR, NMR and mass spectrometry simulated programs to identification of drugs.

c5. Present and report his/her works correctly using appropriate writing rules and technologies media.
D:Transferable skills: Upon successful completion of the course, students will be able to:
d1. Communicate effectively and behave in discipline with colleagues.
d2. Participate efficiently with his colleagues in a team work.
d3. Demonstrate the skills of time management and self-learning.
d4. Use internet, computer-based programs to search for information that can help to solve the problems provided by the teacher at the end of each unit.

COURSE CONTENT	
Topics	Weeks
i. Electrochemical analysis • **Electrogravimetric analysis:** Theory of electroanalysis, polarizatuon, decomposition, potential and over voltage electrolytic determination at constant current and with controlled potential at the cathode. • **Conductometry**: experimental details of conductometric titration and applications. • **Potentiometry**: Principles, methods and application. • **Amperometry:** theory and technique of amperometric titration with dropping mercury electrode, high frequency titration, its applications. **Polarographic analysis**: Introduction, principles, diffusion current and half wave potential, quantitative techniques.	**1 - 4**
ii. Thermal analysis **Thermogravimetry:** principle, apparatus, temperature, verification, verification of electrobalance, procedures. • **Differential scanning calorimetry: principle**s, apparatus, calibration of equipments, procedures, phase change, application of phase diiagra, determination of purity • **Melting point tester:** Principle, apparatus, procedures, applications	**5, 6**
Mid-semester exam	**7**
ii. Thermal analysis • **Thermomicroscopy:** principle, apparatus, applications	**8**

• **Freezing point tester:** Principle, purpose, apparatus **Determination of Distillation Range :** Principle, purpose,apparatus, procedures, applications	
iii. Particle size and morphology analysis: **(i) analysis of particle size by laser light diffraction** • Definitions and non-instrumental methods for particle size analysis. • laser light diffraction: Principle, apparatus, procedures, • measurement of particle size of dispersed samples • Conversion of scattering pattern into particle-sizedistribution **(ii) Determination of particle morphology (crystallinity)** • Definition and significance of crystallinity • **X-ray powder diffraction** for determination ofcrystallinity: Principle, apparatus, procedures **Other methods:** microcalorimetry, solution calorimetry,thermal analysis	**10- 12**
iv. Optical properties analysis • **Flow cyometry:** Principle, apparatus, procedures, applications • **Polarimetery: Determination of optical and specific opticalrotation:** Principle, purpose, apparatus, procedures, **Determination of refractive index:** Principle, purpose,apparatus, procedures	**13, 14**
Course review and discussion session	**15**

Practical Part

Order	Tasks/ Experiments	Number of Weeks	contact hours
1.	Determination of melting point by (capillary-thermometer-parrafin oil) method for : benzoic acid	1	2
2.	Determination of boiling point of toluene by (capillary- thermometer-paraffin oil)	1	2
3.	Differential scanning calorimetry (DSC)	1	2
4.	Determination of refractive index of some drugs	1	2
5.	Polarimetric analysis of specific rotation of D- and L- compounds e.g. glucose	1	2

6.	UV-visible spectrophometric operation and handling	1	2
7.	UV-visible spectrophometric analysis of potassium permanganate aqueous solution (prepare standard solution, determine UV spectrum and 300-700 nm . Wavelength max.)	1	2
8.	UV-visible spectrophometric analysis of potassium permanganate aqueous solution at wavelength max. (calibration curve and concentration of sample with unknown concentration)	1	2
9.	UV-visible spectrophometric analysis of aspirin in methanol solution (UV spectrum 200-400 nm, wavelength max.)	1	2
10.	UV-visible spectrophometric analysis of aspirin in methanol at wavelength max (calibration curve and concentration of sample with unknown concentration)	1	2
11.	Review	1	2
PRACTICAL EXAM		1	20
Total		12	24

TEACHING & LEARNING METHODS

1- Lecture
2- Brainstorming
3- Seminar
4- Concepts map
5- Assignments and Feedback
6- Lab Work

LEARNING AIDS

- White board & Markers.
- Data show
- Lab materials, tools and instrument

REFERENCES

1. British pharmacopeia 2009, book
2. British pharmacopeia, 2013, program
3. David Harvey, modern analytical chemistry, 2000, McGraw-Hill
4. Hadkar. Instrumental methods in pharmaceutical analysis
5. Purcell. Pharmaceutical analysis

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Course title	
Pharmacology II	
Course specification	
Academic year	Third
Academic semester	1st
Course code	PHRC 03
Credit hours	Theor. (3) ; Pract. (-); Total : 3 Theor. (15 weeks)

COURSE DESCRIPTION:

This course is one of the main requirements for pharmacy students, this course builds on and consolidates the information learned in Pharmacology-I and is meant to teach students about the individual pharmacological processes. It focuses on the research of the pharmacokinetics, pharmacodynamics, clinical use, and toxicities of medications that affect the endocrine and blood systems, as well as analgesics, general and local anesthetics, and the gastrointestinal system.

Intended learning outcomes of the course (CILOs)
A:Knowledge & understanding: Upon successful completion of the course, students will be able to:
a1. Identify the actions of medicines in human body, their therapeutic uses, adverse drug reactions, contraindications, drug-drug/drug-food interactions.
a2. Describe the pharmacokinetics, route of administration, and bioavailability of medicine in variable pharmaceutical preparations and application in pharmacy practice.
a3. Describe the role of pharmacist in providing correct information on rational use of medications.
B:Intellectual skills: Upon successful completion of the course, students will be able to:
b1. Utilize pharmacological basis of therapeutics in the proper selection and use of drugs in various disease conditions.
b2. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency) and drug limitations.
C:Professional & practical skills: Upon successful completion of the course, students will be able to:
c1. Advise the patient and healthcare professional to optimize medicine use
c2. Use properly the pharmaceutical and medical terms, abbreviations and symbols in pharmacy practice.
c3. Select the appropriate medication therapy for a given diseases based on its etiology, pathophysiology, patient medical history, possible interactions and age-related factors.
D:Transferable skills: Upon successful completion of the course, students will be able to:
d1. Demonstrate time management and decision-making skills.

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d2. Interact effectively with patients, the public and health care professionals	
COURSE CONTENT	
Topics	Weeks
(1) Drugs used in Gastrointestinal diseases	
(i) Peptic Ulcer, Emetic	**1 , 2**
(ii) Anti- emetics, Laxatives and Anti-diarrheal agents etc…	**3, 4**
(2) Drugs acting on the respiratory system	
(i) bronchodilators, corticosteroids, Asthma preventers	**5**
(ii) drugs for Cough	**6**
Mid-semester exam	**7**
(3) Cardiovascular Drugs	
(i) Anti-angina drugs and lipid lowering drugs	**8**
(ii) Cardiac glycosides and other drugs used in Congestive heart failure. (iii) anti-arrhythmic drugs.	**9**
(iv) Antihypertensive.	**10, 11**
(v) Diuretic agents.	**12**
(4) Anticoagulant drugs	**13, 14**
Course review and discussion session	15

TEACHING & LEARNING METHODS

1. Lecture
2. Brainstorming
3. Seminar
4. Concepts map
5. Assignments and Feedback

LEARNING AIDS

- White board & Markers.
- Data show

REFERENCES

1. Rang, Dale and Ritter. Pharmacology, (2007), Churchill Livingstone.
2. Richard A. Harvey. Lippincott's pharmacology, 2000, LippincottWilliam and Wilkins.
3. Katzung –Basic and Clinical Pharmacology, (2007), McGraw-Hill
4. Udaykumar. Text book of medical pharmacology
5. Aikad. Applied pharmacology

6. Murugesh. A concise text book of pharmacology
7. Kasture. A hand book experiments in pre-clinical pharmacology

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Course title	
Pharmacognosy II	
Course specification	
Academic year	Third
Academic semester	1st
Course code	PHRG 03
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks) ; Pract.(11 weeks)

COURSE DESCRIPTION:

This course is the complement of a previous course (Pharmacognosy I) and both are designed to provide the student with basic knowledge in medicinal plants as a natural source of drugs. This course deals with botanical origin, morphological, microscopical features and medical uses of flowers, seeds, fruits , herbs and unrecognized plant parts that are evidence-based proved to be used as complementary and alternative medicines. The practical part provide the student with skills to prepare plant samples and perform their morphological and microscopical identification in Pharmacognosy Lab.

Intended learning outcomes of the course (CILOs)
A:Knowledge and understanding: upon completion of the course, students will be able to:
a1. Explicit the methods used for detection of active constituents and discovering adulteration of medicinal flowers, seeds, fruits, herbs and unrecognized plant parts.
a2. Discuss the principles and procedures applied for cultivation, collection and processing of medicinal flowers, seeds, fruits, herbs and unrecognized plant parts. as crude drugs.
a3. Identify the botanical origin, morphological and microscopical characteristics of medicinal flowers, seeds, fruits, herbs and unrecognized plant parts.
a4. Determine the active constituents and therapeutic use of medicinal flowers, seeds, fruits, herbs and unrecognized plant parts.
a5. Describe his/her role as pharmacist in identification and evaluation of medicinal plants
B:Intellectual skills: upon completion of the course, students will be able to:
b1. Express with drawings the morphology and key microscopical features of medicinal plants
b2. Differentiate between medicinal flowers, seeds, fruits, herbs and unrecognized plant parts based on morphological and microscopical features.

b3 Classify active constituents in medicinal flowers, seeds, fruits, herbs and unrecognized plant parts.
b4. Select standard operation procedures to identify medicinal plants and crude drugs.
C:Professional and practical skills: upon completion of the course, students will be able to:
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory
c2. Operate the instruments (Evaporator, Grinder, Dryer and others) and perform experiments successfully in the laboratory
c3. Screen drugs in medicinal flowers, seeds, fruits, herbs and unrecognized plant parts.
c4. Search efficiently for information using documented and electronic sources of information.
D:Transferable skills: upon completion of the course, students will be able to:
d1. Communicate effectively and behave in discipline with colleagues.
d2. Participate efficiently with his colleagues in a team work.
d3. Demonstrate the skills of time management and self-learning.

COURSE CONTENT	
Topics	Weeks
1- Medicinal flowers • Introduction to flowers, flower buds, inflorescence andplacetation. • Study of the following medicinal flowers: Clove, Chammoile,Pyrethrum, Tilia, Santonica, Lavender and Saffron.	**1 – 3**
2- Medicinal seeds • Introduction, macroscopical and microscopical character ofseeds • Study of the following medicinal seeds: Cardamom, Colchicine. • nux vomica, Linseed, Nutmeg, Black and White Mustard, Fenugreek, Clabar and Nigella.	**4 -6**
Mid-semester exam	**7**
3- Medicinal fruits • Definition and classification •Study of the following medicinal fruits: Ammi vinaga, Anise, • Fennel, Caraway, Capsicum, star Anise, Coriander, Vanilla	**8 - 11**

andSenna	
4- Medicinal herbs • Introduction to herbs • Study of the following medicinal herbs: Ergot, Indian hemp, Chatharanthus, Lobelia, Peppermint, Thyme,Passiflora andEphedra	**9- 12**
5- Medicinal unorganized drugs • Definition , classification, chemical and physical properties • Study of medicinal resin and resin combinations: Colophony,Myrrh, Tolu peru, Tolu Balsam, Oliabanum and Benzoin. • Medicinal gums , juices and extracts	**13, 14**
Course review and discussion session	**15**

Practical Part:

Order	Tasks/ Experiments	Number of Weeks	contact hours
1.	morphology and microscopical investigation of medicinal flowers : clove	**1**	**2**
2.	morphology and microscopical investigation of medicinal flowers : Saffron	**1**	**2**
3.	morphology and microscopical determination of medicinal herbs : Peppermint	**1**	**2**
4.	morphology and microscopical investigation of medicinal herbs : Thyme	**1**	**2**
5.	investigation of medicinal resin : Myrrh	**1**	**2**
6.	investigation of medicinal gum	**1**	**2**
PRACTICAL EXAM		**1**	**2**
Total		**12**	**24**

TEACHING & LEARNING METHODS

1. Lecture
2. Brainstorming
3. Seminar
4. Concepts map
5. Assignments and Feedback

6. Lab Work
LEARNING AIDS
• White board & Markers. • Data show • Lab materials, tools and instrument
REFERENCES
1. W.C. Evans, Trease and Evans pharmacognosy, 2009, W.B.Saunders 2. Jarald. Colour atlas of medicinal plants 3. Khandelwal. Pharmacognosy 4. Bhandari. Textbook of pharmacognosy. 5. Ross. Medicinal plants world 6. Gokhale. Practical pharmacognosy

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Course title	
Pathophysiology	
Course specification	
Academic year	Third
Academic semester	1st
Course code	PHRC 04
Credit hours	Theor. (2) ; Pract. (-); Total : 2 Theor. (15 weeks)
COURSE DESCRIPTION:	
The course concerns with the study of etiology, mechanisms , phases and changes in physiological functions, risk factors , investigations and complications of common types of diseases. This course is regarded as a complementary course for the pathology and physiology which have been studied by the students in theprevious semesters and also a support for pharmacology and pharmacotherapy courses.	
Intended learning outcomes of the course (CILOs)	
A:Knowledge & understanding: Upon successful completion of the course, students will be able to:	
a1. Identify the causes (etiology) of diseases and risk factors that predisposing or exacerbating of common type of diseases.	
a2. Determine how of common type of diseases are progressed and their eventual complications.	
B:Intellectual skills : Upon successful completion of the course, students will be able to:	
b1. Differentiate between causes and risk factors of common type of diseases.	
b2. Interpret investigational data of common type of diseases.	
b3. Relate between investigational data	
b4. Predict complications of common type of diseases.	
b5 . Assess the stage of disease progress.	
C:Professional & practical skills: Upon successful completion of the course, students will be able to:	
c1 . Search efficiently for information using documented and electronic sources of information.	

c2. Present and report his/her works correctly using appropriate writing rules and technologies media.
D:Transferable skills : Upon successful completion of the course, students will be able to:
d1. Share successfully in team-work.
d2. Show respect to life.
d3. Communicate effectively with his/her colleagues.
d4. Demonstrate time management and self-learning during performing practical and professional works and assignments.

COURSE CONTENT	
Topics	Weeks
(1) **Pathophysiology of cardiovascular disorders:** hypertension angina, arrhythmia, congestive heart failure.	**1, 2**
(2) **pathophysiology of gastrointestinal disorders** (peptic ulcer, vomiting, diarrhoea, constipation, irritable-bowel syndrome, and liver diseases (hepatic failure)	**3, 4**
(3) **pathophysiology of respiratory disorders:** bronchial asthma, Chronic Obstructive Pulmonary Disease	**5**
(4) **pathophysiology of renal disorders:** renal failure, patients-having haemodialysis.	**6**
Mid-semester exam	**7**
(6) **pathophysiology of neurologic disorders :** epilepsy, depression psychosis	**8, 9**
pathophysiology of endocrinologic disorders: diabetes mellitus, thyroid disorders, infertility	**10- 12**
(8) **Pathophysiology of bacterial infections** : bacteraemia septicaemia,	**13**
Pathophysiology of viral infections : AIDS	**14**
Course review and discussion session	15

TEACHING & LEARNING METHODS
1) Lecture 2) Brainstorming 3) Seminar 4) Concepts map 5) Assignments and Feedback
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• White board & Markers. • Data show
REFERENCES
1.Martin M. Zadnaovich , essentials of pathophysiology for pharmacy, 2003, CRC press. 2. Valentina L. Brashers, Clinical Applications of Pathophysiology: Assessment, Diagnostic Reasoning, and Management 3.Chaudhari. Biochemistry and clinical pathology

3rd YEAR					
Second Semester					
No.	Code	Course	Credit hours		
			T	P	Total
1.	PHRG 04	Phytochemistry I	2	1	3
2.	PHRC 05	Pharmacology III	3	-	3
3.	PHRT 08	Pharmaceutics III	2	1	3
4.	PHRC 06	Pharmacotherapy I	2	-	2
5.	PHRM 08	Pharmaceutical Instrumental analysis II	2	1	3
6.	PHRM 09	Medicinal Chemistry III	3	1	4
7.	PHRT 09	Clinical pharmacy I	2	-	2
8.	PHRT 10	Integrated- case based learning I	-	2	2
		Total	16	6	22

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Course title	
Phytochemistry I	
Course specification	
Academic year	Third
Academic semester	2nd
Course code	PHRG 04
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks) ; Pract.(11 weeks)
COURSE DESCRIPTION:	
The course deals with introduction to the science of active phytochemical constituents of medicinal plants and the techniques used for their extracting, separation and isolation. The course also concerns with the study of alkaloids and terpenoids phytochemicals.	
Intended learning outcomes of the course (CILOs)	
A:Knowledge and understanding: upon completion of the course, students will be able to:	
a1. Explain the physicochemical properties of **alkaloids** and terpenoids phytochemicals.	
a2. Discuss the methods and techniques used to extract and isolate phytochemicals	
a3. Define the botanical sources and therapeutic uses of alkaloids and terpenoids phytochemicals.	
a4. Describe the role of pharmacist in extraction, isolation and identification of phytochemicals.	
B:Intellectual skills: upon completion of the course, students will be able to:	
b1. Express the chemical structure of phytochemicals using drawings.	
b2. Differentiate between various types of alkaloids and terpenoids.	
b3. Classify alkaloids and terpenoids.	
b4. Compare between different types of alkaloids and terpenoids	
b5. Select standard operation procedure to extract, isolate and identify alkaloids and terpenoids in a plant sample	
C: Professional and practical skills: upon completion of the course, students will be able to:	

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c1. Handle efficiently and safely the chemical materials and tools used in the laboratory
c2. Operate the instruments (Evaporator, **Soxhlet,** Grinder, Dryer and others) and perform experiments successfully in the laboratory.
c3. Screen for alkaloid and terpenoid drugs from plant sources.
c4. Search efficiently for information using documented and electronic sources of information.
D:Transferable skills: upon completion of the course, students will be able to:
d1. Communicate effectively and behave in discipline with colleagues.
d2. Participate efficiently with his colleagues in a team work.
d3. Demonstrate the skills of time management and self-learning.

COURSE CONTENT

Topics	Weeks
1. Introduction to phytochemistry • Definition, brief history, types (conventional, medicinal) • Scope of medicinal phytochemistry. • Phytochemicals : Definition , evolution process, clarification	**1**
2. Extraction of phytochemicals <u>Extraction techniques</u> • **Maceration, percolation, soxhlet extractor:** principle,apparatus, applications • Spouted bed extraction • Superficial fluid extraction • Solid-phase microextraction **<u>Separation and isolation of phytochemicals</u>** **Sublimation , Distillation , Fractional liberation , Fractional crystallization :** principle, apparatus, applications • **Chromatography** • principle, brief history, types and selection of stationary phaseand mobile phase, general factors affecting separation • **adsorption chromatography**: **Thin layer chromatography** • principle and procedures • applications	**2 -6**

• preparative TLC • illustrative examples of phytochemicals isolated by TLC • **partition chromatography: Paper chromatography**: principle ,procedures and application • **High performance liquid chromatography (HPLC)** : principle, equipment (pressure system, injector, column and stationary phase, mobile phase, flow rate), illustrative examplesof phytochemicals isolated by HPLC • **Counter-current extraction :** principle, types (High-speed,droplet), apparatus, applications • **Gas liquid chromatography:** : principle, equipment (pressure system, injector, column and stationary phase, mobile phase, flowrate), illustrative examples of phytochemicals isolated. • **Capillary-column gas chromatography:** : principle, equipment(pressure system, injector, column and stationary phase, mobile phase, flow rate), illustrative examples of phytochemicals isolated . • **Gel filtration technique** principle , equipment, procedures andapplication • **Electrochromatography :** principle , equipment, procedures and application	
Mid-semester exam	**7**
3. Alkaloids • Introduction: definition, history, occurrence, classification, nomenclature, physical and chemical properties, isolation, purification and detection. Phenylalkylamine alkaloids(ephedrine, cathinone and capsaicinoide) • Isochinolin alkaloids (papaverine, morphine, codeine andemetine) • Tropolon alkaloids (colchicines and demecolcine) • Amaryllidaceen alkaloids(lycorine and galanthamin) • Alkaloids derived from tryptophan:	**8- 10**

• Indol- alkaloids(physostigmine, carboline, ergoline, ajmalicine, yohimbine, ajmaline and strychnine type) • Chinoline alkaloids(cinchona alkaloids) • Alkaloids derived from histidine:(pilocarpine, isopilocarpine and pilosine) • Alkaloids derived from asparagic acid :(ricinine and nicotinealkaloids) • Alkaloids derived from lysine piperidinealkaloids(piper, lobelia and pomergranate alkaloids) • chinolizidine alkaloids(lupinine, sparteine and cytosine) • Alkaloids derived from ornithine: tropan alkaloids(atropine, hyoscyamine , scopolamine and cocaine)chinazoline alkaloids(tetradoxine) • Alkaloids derived from glycine: purine alkaloids (caffeine, theophylline and theobromine)terpen. alkaloids(monoterpen, sesquiterpen and diterpen alkaloids)	
4. Terpenoids • Introduction (definition, classification, biosynthesis and distribution) • Monoterpens (regular and irregular mono terpenoids, iridoids, structures, chemical and physical properties and drugs containing monoterpenoids) • Sequiterpens and sequiterpens lactones(structures, chemical and biological properties and drug containing sequiterpens and sequiterpens lactones) • Diterpenes(structures, chemical and biological properties and drug containing diterpenes) Triterpenes(classification, structures and drug containing triterpenes) Tetraterpenes(chemical and biological properties, vitamin A anddrug containing tetraterpenes).	**11- 14**
Course review and discussion session	15

Practical Part			
Order	Tasks/ Experiments	Number of Weeks	contact hours

physicochemical properties , extraction (maceration or percolation or soxhlet extraction) , concentration (if necessary " rotary evaporation', isolation (Thin layer chromatography) and identification of the phytochemicals from crude drugs or parts of medicinal plants			
1.	alkaloids (Caffeine)	1	2
2.	alkaloids (Theophylline)	1	2
3.	alkaloids (cathinone)	1	2
4.	alkaloids (Trigonelline)	1	2
5.	alkaloids (vincristine)	1	2
6.	Terpenoids : (Prenol)	1	2
7.	Terpenoids : (Eucalytol)	1	2
8.	Terpenoids : (Retinol)	1	2
9.	Terpenoids : (squalane)	1	2
10.	Review	1	2
Total		11	22

TEACHING & LEARNING METHODS

1- Lecture
2- Brainstorming
3- Seminar
4- Concepts map
5- Assignments and Feedback
6- Lab Work

LEARNING AIDS

- White board & Markers.
- Data show
- Lab materials, tools and instrument

REFERENCES

1. W.C. Evans, Trease and Evans pharmacognosy, 2009, W.B.Saunders
2. Amritpal Singh Saroya, Herbalism, Phytochemistry and Ethnopharmacology, 2011, CRC press Jarald.
3. Bhandari. Textbook of pharmacognosy.

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Course title	
Pharmacology III	
Course specification	
Academic year	Third
Academic semester	2nd
Course code	PHRC 04
Credit hours	Theor. (3) ; Pract. (-); Total : 3 Theor. (15 weeks)

COURSE DESCRIPTION:

This course is a continuation in the series of pharmacology for pharmacists. The focus of this series is on the drugs that affect the respiratory system, CNS and chemotherapeutics. The course will cover the mechanism of action, pharmacokinetic properties, contraindications and adverse effects with the emphasis on chemotherapeutics agents mechanism of action, routes of administration, drug target, chemotherapeutic spectrum and modes of drug resistance by the pathogens.

Intended learning outcomes of the course (CILOs)

A:Knowledge & understanding: Upon successful completion of the course, students will be able to:

a1. Identify the actions of medicines in human body, their therapeutic uses, adverse drug reactions, contraindications, drug-drug/drug-food interactions.

a2. Describe the pharmacokinetics, route of administration, and bioavailability of medicine in variable pharmaceutical preparations and application in pharmacy practice.

a3. Describe the role of pharmacist in providing correct information on rational use of medications.

B:Intellectual skills: Upon successful completion of the course, students will be able to:

b1. Utilize pharmacological basis of therapeutics in the proper selection and use of drugs in various disease conditions.

b2. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency) and drug limitations.

C:Professional & practical skills: Upon successful completion of the course, students will be able to:

c1. Advise the patient and healthcare professional to optimize medicine use

c2. Use properly the pharmaceutical and medical terms, abbreviations and symbols in pharmacy practice.

c3. Select the appropriate medication therapy for a given diseases based on its etiology, pathophysiology, patient medical history, possible interactions and age-related factors.
D:Transferable skills: Upon successful completion of the course, students will be able to:
d1. Demonstrate time management and decision-making skills.
d2. Interact effectively with patients, the public and health care professionals.

COURSE CONTENT	
Topics	Weeks
1. Drugs used in the management of inflammation and pain	
Non-steroidal anti-inflammatory drugs (NSAIDs)	1
Anti-inflammatory steroids	2
Opioid Narcotic analgesics and Drugs used for neuropathic pain	3, 4
2. Chemotherapeutic Drugs	
Introduction to chemotherapy	5
(i) Antibacterial drugs • **Antibacterial drugs targeting the cell wall (B-lactam antibacterials): Penicillins** benzylpenicillin, ,phenoxymethylpenicillin, amoxicillin, ampicillin, , cloxacillin, flucloxacillinand temocillin.	6 - 9
○ **Mid-semester exam**	7
○ **(i) Antibacterial drugs** ○ **Antibacterial drugs targeting the cell wall (B-lactamantibacterials)::** Cephalosporins include cefaclor, cefadroxil, cefalexin, cefixime, ○ cefotaxime, cefpodoxime, ceftazidime, ceftriaxone and cefuroxime).	8
a. **Antibacterial drugs** • **Antibacterials drugs targeting ribosomes** (Chloromphenicol,Tetracyclines, Macroids, Aminoglycosides and Clindamycin • **Fluoroquinolones antibacterials** (ciprofloxacin, levofloxacin,moxifloxacin, norfloxacin and ofloxacin ○ **Other antibacterials**	9

○ **(ii) Antifungals**	10
○ **(iii) Antivirals**	11
○ **(iv) Antiprotozoal Anthelminthics**	12, 13
○ **(v)Introduction to Cancer Chemotherapy, Anticancer agents**	14
○ **Course review and discussion session**	**15**

TEACHING & LEARNING METHODS

1) Lecture
2) Brainstorming
3) Seminar
4) Concepts map
5) Assignments and Feedback

LEARNING AIDS

- White board & Markers, Data show

REFERENCES

1. Rang, Dale and Ritter. Pharmacology, (2007), Churchill Livingstone.
2. Richard A. Harvey. Lippincott's pharmacology, 2000, LippincottWilliam and Wilkins.
3. Katzung –Basic and Clinical Pharmacology, (2007),McGraw-Hill
4. Udaykumar. Text book of medical pharmacology
5. Aikad. Applied pharmacology
6. Murugesh. A concise text book of pharmacology
7. Kasture. A hand book experiments in pre-clinical pharmacology

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Course title	
Pharmaceutics III	
Course specification	
Academic year	Third
Academic semester	2nd
Course code	PHRT 08
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks) ; Pract.(11 weeks)
COURSE DESCRIPTION:	
The course completes the topics of pharmaceutical dosage forms offered in the courses of Pharmaceutics I & II with the study of part II solid dosage forms including tablets and capsules as well with the study of sterile dosage forms including parenteral & ophthalmic preparations .	
The Course Intended Learning Outcomes (CILOs)	
A: Knowledge & understanding: Upon successful completion of the course, students will be able to:	
a1. Describe the advantages and disadvantages, types, classification of sterile pharmaceutical parenteral preparations and solid dosage forms. (powders, granules, capsules, tablets)	
a2. Describe the stages of designing sterile pharmaceutical parenteral preparations and solid dosage forms. (powders, granules, capsules, tablets)	
a3. Describe the role of pharmacist in formulation sterile pharmaceutical parenteral preparations and solid dosage forms. (powders, granules, capsules, tablets)	
a4. Recognize the different additives used in manufacturing of sterile pharmaceutical parenteral preparations and solid dosage forms. (powders, granules, capsules, tablets)	
a5. Discuss the principles, pharmacopoeial requirements, and methods of preparation, of various types' sterile pharmaceutical parenteral preparations and solid dosage forms. (powders, granules, capsules, tablets)	
B:Intellectual skills : Upon successful completion of the course, students will be able to:	
b1. Classify sterile pharmaceutical parenteral preparations and solid dosage forms. (powders, granules, capsules, tablets)	
b2. Compare between various types of sterile pharmaceutical parenteral preparations and solid dosage forms. (powders, granules, capsules, tablets)	

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b3. Design sterile pharmaceutical parenteral preparations and solid dosage forms. (powders, granules, capsules, tablets)
C: Professional & practical skills: Upon successful completion of the course, students will be able to:
c1. Operate the instruments and perform experiments successfully in the laboratory
c2. Employ the relevant way to prepare sterile pharmaceutical parenteral preparations and solid dosage forms. (Powders, granules, capsules, tablets).
c3. Formulate, label and evaluate of sterile pharmaceutical parenteral preparations and solid dosage forms. (Powders, granules, capsules, tablets).
D:Transferable skills : Upon successful completion of the course, students will be able to:
d1. Participate efficiently with his colleagues in a teamwork.
d2. Demonstrate the skills of time management and self-learning.
d3. Communicate effectively and behave in discipline with colleagues.

COURSE CONTENT	
Topics	Weeks
1. Tablets - Introduction. - Advantages and disadvantages. - Types of compressed tablets. - Tableting methods o Direct compression o Dry granulation o Wet granulation - Technology of production of granules on large scale by varioustechniques. - Tablet excipients - Large scale - production of tablets. - Tablet press machines. - Problems encountered during tablet formulation.	**1- 4**

- Standards quality control tests for tablets. - Tablet coating ▪ Types of coating ▪ Film forming materials ▪ Common polymers used for tablet coating. ▪ Formulation of coating solution ▪ Equipments for coating. ▪ Coating process evaluation of coated tablets.	
2. Capules (i) Hard gelatin capsules ○ Advantages and disadvantages ○ Composition of capsule shell ○ Selection of capsule size. ○ Excipients used in hard gelatin capsule formulation. ○ Enteric coating of capsules. ○ Capsule filling process. ○ Storage of hard gelatin capsules.	**5, 6**
Mid-semester exam	**7**
2. Capsules (ii) Soft gelatin capsules i. Advantage and disadvantages. ii. Capsule shell composition. iii. Shapes and sizes. iv. Soft gelatin capsule formulation. capsule filling process.	**8**
3. Sterile dosage forms **Differences between sterile & non-sterile dosage forms :** Definition of sterility, sterilization, preservation, pyrogenicity, pyrogen-free • Review of sterilization methods and preservation of dosage forms • Aseptic techniques : • Sources of contamination and methods of prevention	**9 - 12**

• Design of aseptic area , Laminar flow benches services andmaintenance) • Isotonicity of sterile preparations and methods of adjustment **A. Parenteral preparation** • Preformulation factors ○ Route of administration of injection ○ Water for injection ○ Non-aqueous vehicles • Formulation details ○ types of parenteral preparations (solutions, suspension, emulsions, powders) , factors affecting formulation : thevehicles, osmotic pressure, pH, specific gravity, ○ Formulation of Infusion fluids • Prefilling & filling ○ Types Containers (ampoules, vials) and closures selection ○ Washing of containers and closures ○ Filling and closing ampoules and vials. ○ Equipments for large scale manufacture and evaluation ofparticulate matter.	
1. Ophthalmic preparation • Anatomical features of the eye • Formulation , preparation , sterilization and preservation of Ophthalmic dosage forms : (Eye drops) : solution, suspension., Eye washes Ophthalmic semisolids (ointments, creams, gels). • Filling Examples of drugs used to treat certain eye diseases.	**13 - 14**
Course review and discussion session	15

Practical Part

Order	Tasks/ Experiments	Number of Weeks	contact hours
1.	Preparation of body powder	1	2

2.	Preparation of non-effervescent granules	1	2
3.	Preparation of effervescent granules	1	2
4.	Preparation of tablets using wet granulation method : paracetamol tablets	1	2
5.	Preparation of tablets using wet granulation method : mefenamic acid tablets	1	2
6.	Preparation of tablets using direct compression method : aspirin tablets	1	2
7.	film-coating of tablets mefenamic acid	1	2
8.	Preparation of hard gelatin capsules (Manual): aspirin	1	2
9.	Preparation of I.V. admixtures : Ringer lactate infusion	1	2
10.	Preparation of parenteral solutions from parenteral powders : reconstitution of cefuroxime sodium vial	1	2
11.	Preparation of sterile NaCl eye wash.	1	2
PRACTICAL EXAM		1	2
Total		**12**	**24**

TEACHING & LEARNING METHODS
1- Lectures. 2- Discussion. 3- Lab Work
LEARNING AIDS
• White board & Markers. • Data show • Lab materials, tools and instrument
REFERENCES
1-Aulton M.E., Pharmaceutics: the science of dosage form design, 2002, Churchill Livingstone, UK 2-Rawlins. Bentley s of text book of pharmaceutics 3- Kasture pharmaceutics 4-Raje. pharmaceutics 5-Raph. practical pharmaceutics 6-Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins, USA

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Course title	
Pharmacotherapy I	
Course specification	
Academic year	Third
Academic semester	2nd
Course code	PHRC 06
Credit hours	Theor. (2) ; Pract. (0); Total : 2 Theor. (15 weeks) ;

COURSE DESCRIPTION:

This course acts as an integration of all information about etiology, pathophysiology, and pharmacology to analyze and interpret patient's history and laboratory investigation altogether with the clinical picture of the Gastrointestinal, Cardiovascular, Endocrine, and Bone and Joint Disorders.

Intended learning outcomes of the course (CILOs)

A. Knowledge and Understanding:

a1. Describe the clinical manifestations, pathophysiology, laboratory tests, physical examination, diagnosis, and prognosis of the Gastrointestinal, Cardiovascular, Endocrine, and Bone and Joint Disorders

a2. Define the desired outcomes of drug therapy of the Gastrointestinal, Cardiovascular, Endocrine, and Bone and Joint Disorders.

B. Intellectual Skills:

b1.Construct appropriate drugs regimens and monitoring plan of the Gastrointestinal, Cardiovascular, Endocrine, and Bone and Joint Disorders.

C. Professional and Practical Skills:

c1. Implement rational pharmacotherapy regimen and monitoring plan to achieve targeted therapeutic outcomes of the Gastrointestinal, Cardiovascular, Endocrine, and Bone and Joint Disorders

D. Transferable Skills:

d1. Search efficiently for required medical information in professional medical references and sites.

d2. Share successfully therapeutic decisions with a healthcare team and patients

COURSE CONTENT

Topics	Weeks
First choice drugs as per the recommended therapeutic plans and	

the appropriate therapeutic alternatives and supportive drug therapy the following diseases:	
I. Cardiovascular disorders 1. Hypertension(mild, moderate, sever) 2. Angina pectoris (attack, prophylaxis). 3. Congestive heart failure	1 - 3
II. Gastrointestinal disorders 1. Peptic ulcer 2. Diarrhea 3. Vomiting 4. Irritable bowel syndrome	4 - 6
Mid-semester exam	7
III. Respiratory disorders 1. Bronchial asthma (acute, prophylaxis) 2. Chronic Obstructive Pulmonary Disease	8
IV. Renal disorders 1. Renal failure (Acute, chronic) 2. Patients having hemodialysis	9, 10
V. Endocrinologic disorders 1. Diabetes mellitus **2.** Hyperthyrodism and hypothyroidism **3.** Infertility	11 - 14
Course review and discussion session	15

TEACHING & LEARNING METHODS

1- Lecture
2- Brainstorming
3- Seminar
4- Concepts map

LEARNING AIDS

- White board & Markers.
- Data show
- Lab materials, tools and instrument

REFERENCES

1. Joseph D. Dipiro, pharmacotherapy: a pathological approach, 2005 McGraw-Hill Inc.

2. Wells. Pharmacotherapy hand book
3. Satoskar. Pharmacology and pharmacotherapeutics

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Course title
Pharmaceutical Instrumental analysis II
Course specification

Academic year	Third
Academic semester	2nd
Course code	PHRM 08
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks) ; Pract.(11 weeks)

COURSE DESCRIPTION:

The course provides the student with knowledge and skills of advanced analytical techniques used for analysis of substances including drugs. The course focuses on the study of principles, instrumentation and applications of advanced chromatographic techniques (high performance liquid chromatography (HPLC), ultra –high performance liquid chromatography (UHPLC), gas chromatography (GC), gel filtration chromatography (GFC), electrochromatography (EC), Nuclear magnetic resonance (NMR) and advanced coupled techniques such as GC-MS. The practical part of the course provides the student with skills to operate that equipment and perform analysis of compounds by those techniques.

Intended learning outcomes of the course (CILOs)

A. Knowledge & understanding: Upon successful completion of the course, students will be able to:

a1.Explain the physicochemical properties of substances that can be utilized for their qualitative and quantitative analysis

a2. Describe the principles of advanced spectroscopic, chromatographic, NMR and coupled techniques.

A3. Describe the role of pharmacist to perform accurate and precise quantitative and qualitative analysis.

B:Intellectual skills: Upon successful completion of the course, students will be able to:

b1. Interpret data obtained by advanced spectroscopic, chromatographic, NMR and coupled techniques.

B2. Classify advanced analytical technique based on principles of works.

B3. Lay out the design of advanced analytical techniques.

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B4. Calculate the content % and identify substances in a sample using advanced spectroscopic, chromatographic, NMR and coupled technique.
C: Professional & practical skills: Upon successful completion of the course, students will be able to:
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory
c2. Operate the instruments (HPLC chromatography, TLC, GC and GC/Mass) and perform experiments successfully in the laboratory.
C3. Practice and carry out assays of number of drugs by chromatographic methods.
C4. Utilize HPLC, UPLC, Gass chromatography and mass spectrometry simulated programs to identification of drugs.
C5. Present and report his/her works correctly using appropriate writing rules and technologies media.
D: Transferable skills: Upon successful completion of the course, students will be able to:
d1. Communicate effectively and behave in discipline with colleagues.
D2. Participate efficiently with his colleagues in a team work.
D3. Demonstrate the skills of time management and self-learning.
D4. Use internet, computer-based programs to search for information that can help to solve the problems provided by the teacher at the end of each unit.

COURSE CONTENT	
Topics	Weeks
1. Visible and Ultraviolet Spectrophotometry: ○ Introduction ○ Electromagnetic radiation, units, electromagnetic ○ Light spectra ○ Principle: Absorption and emission of radiation ○ Lambert's and Beer's Laws ○ Deviation from Lambert-Beer's law ○ Instrumentation ○ Colorometry, Chromophores and Auxochromes shifts, ○ Applications of Ultraviolet and Visible in	1, 2

quantitative analysis of drugs; data validation : calibration curve linearity, regression equation ○ Applications of Ultraviolet and Visible in qualitative analysis: Wavelength of maximal absorbance with illustrates examples ○ Factors Affecting Spectral Response. ○ Data validation: specificity, robustness	
2. Fluorescence spectrophotometry (Fluorimetry) • Principle, emission and Intensity: governing law • Instrumentation • Applications of quantitative analysis of drugs Data validation: specificity, robustness	3
3. Infrared spectroscopy • Definition and purpose, Instrumentation, Wavenumber andtypes of vibration of Chemical groups • Fourier transform infrared (FTIR) spectroscopy • Preparation of samples • Control of resolution performance • Verification of the wave-number scale • Near-infrared spectrophotometry. • Factors Affecting Spectral Response	4
3. Infrared spectroscopy • Identification using reference substances or reference spectra. • Interpretation of IR spectra with examples	5, 6
Mid-semester exam	7
4. Atomic absorption an Atomic emission spectrophotometry o Principles, instrumentations, procedures, applications of these two techniques of spectrophotometry.	8
5. Mass spectroscopy ○ Principle ○ Instrumentation ○ Procedures	9
6. Mass spectroscopy	10

Interpretation of data with examples	
7. Nuclear Magnetic Resonance Spectroscopy (NMR) ○ Principle ○ Types 1H NMR and 13C NMR): comparison ○ Instrumentation ○ Procedures ○ Interpretation of data	11, 12
8. Quantitation techniques using chromatography • TLC • HPLC and GC **Note** *the principles and instrumentation of chromatographic techniques havebeen discussed previously in Phytochemistry courses*	13, 14
• Course review and discussion session	15

Practical Part			
Order	Tasks/ Experiments	Number of Weeks	contact hours
1.	Analysis of drugs by UV spectrophotometer	4	6
2.	Atomic absorption spectroscopy	1	2
3.	Atomic emission spectroscopy	1	2
4.	Infrared spectroscopy analysis Instrumentation & SOP Bisoprolol, metronidazole Unknown drug	4	8
PRACTICAL EXAM		1	2
Total		11	22

TEACHING & LEARNING METHODS
1- Lecture 2- Brainstorming 3- Concepts map

4- Assignments and Feedback 5- Lab Work
LEARNING AIDS
• White board & Markers. • Data show • Lab materials, tools and instrument
REFERENCES
1. British pharmacopeia 2009, book 1. British pharmacopeia, 2013, program 2. David Harvey, modern analytical chemistry, 2000, McGraw-Hill 3. Hadkar. Instrumental methods in pharmaceutical analysis 4. Purcell. Pharmaceutical analysis

Course title	
Medicinal Chemistry III	
Course specification	
Academic year	Third
Academic semester	2st
Course code	PHRM 09
Credit hours	Theor. (3) ; Pract. (1); Total : 4 Theor. (15 weeks) ; Pract.(11 weeks)
COURSE DESCRIPTION:	
This course is the fourth one among (Medicinal chemistry) courses which are designed to provide knowledge and skills in chemistry of medicinal agents (drugs). It deals with the physicochemical properties, chemical synthesis, quantitative structure activity relationship (SAR), qualitative structure activity relationship (QSAR), pharmacophore molecules, mechanism of action, and metabolism of drugs used for infections and cancer. Also, there are practical part concerns with Pharmacopeial physicochemical properties, chemical, chromatographic or spectroscopy identification of some drugs used for infections, cancer and antiprotozoal drugs.	
Intended learning outcomes of the course (CILOs)	

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A:Knowledge and understanding: upon completion of the course, students will be able to:
a1. Explain the correlation between the chemical and therapeutic properties of drugs to their molecular structure.
a2. Explain the principles of synthesis, purification and metabolic reactions of drugs used for infections, cancer and antiprotozoal.
a3. Describe the role of pharmacist in chemical synthesis of drugs.
B: Intellectual skills: upon completion of the course, students will be able to:
b1. Interpret the rules of structure-activity relationship to construct pharmacophore of drugs used for infections, cancer and antiprotozoal.
b2. Express molecular structure, synthesis and reactions of drugs with hand-drawing
b3. Classify, chemically, drugs affecting drugs used for infections, cancer and antiprotozoal.
b4. Compare between chemically related drugs based on their chemical structure
b5. Design newer drugs used for infections, cancer and antiprotozoal.
C:Professional and practical skills: upon completion of the course, students will be able to:
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory
c2. Operate the instruments (UV-Spectrometry, HPLC) and perform experiments successfully in the laboratory
c3. Carry out synthesis of some drugs used for infections, cancer and antiprotozoal.
c4. perform the quantitative analysis of some drugs used for infections, cancer and antiprotozoal.
D:Transferable skills: upon completion of the course, students will be able to:
d1. Communicate effectively and behave in discipline with colleagues.
d2. Demonstrate the skills of time management and self-learning.
d3. Participate efficiently with his colleagues in a team work.
d4. Use internet, computer-based programs to search for information that can help to hypothetically design newer drugs from a studied patent drug using SAR principles)

COURSE CONTENT	
Topics	Weeks
1. Chemotherapeutic Drugs	
Antibacterial drugs targeting the cell wall: (B-lactam antibacterials): Penicillins include amoxicillin,	1 - 5

ampicillin, benzylpenicillin, phenoxymethylpenicillin, flucloxacillinand temocillin. Cephalosporins include cefaclor, cefadroxil, cefalexin, cefixime, cefotaxime, cefpodoxime, ceftazidime, ceftriaxone and cefuroxime). • Antibacterials drugs targeting ribosomes (Chloromphenicol, Tetracyclines, Macroids, Aminoglycosides and Clindamycin • Fluoroquinolones antibacterials (ciprofloxacin, levofloxacin, moxifloxacin, norfloxacin and ofloxacin. • Other antibacterials	
Antifungals	6
Mid-semester exam	7
Antivirals	8
Antihelminths and Antiprotozoa	9, 10
Anticancers	11
2. Immunomoulating agents	12
3. Endocrinologic agents	
• Insulin and oral hypoglycemics • Thyroid hormones • Antihyperthyroidism	13, 14
Course review and discussion session	**15**

Practical Part

Order	Tasks/ Experiments	Number of Weeks	contact hours
1.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of: **ampicillin**	**1**	**2**
2.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **ciprofloxacin**	1	2
3.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **Miconazole**	1	2
4.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **acyclovir**	**1**	**2**

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5.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **metronidazole**	**1**	**2**
6.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **chloroquine**	**1**	**2**
7.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **Mebendazole**	**1**	**2**
8.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **praziquantel**	**2**	**4**
9.	Pharmacopeial physicochemical properties , chemical , chromatographic or spectroscopy identification of **danuorubicin**	**1**	**2**
PRACTICAL EXAM		**1**	**2**
Total		**11**	**22**

TEACHING & LEARNING METHODS

1- Lecture
2- Brainstorming
3- Seminar
4- Concepts map
5- Assignments and Feedback 6- Lab Work

LEARNING AIDS

- White board & Markers.
- Data show
- Lab materials, tools and instrument

REFERENCES

1.Gareth Thomas, Medicinal chemistry: an introduction to, 2007 John Wiley & Sons Ltd,
2.Ashutoch Kar. Medicinal chemistry, 2007, New age international publisher
3.Siddique. A textbook of medicinal chemistry
4.Rajie. Pharmaceutical chemistry
5.Wermuth. The practice of medicinal chemistry

Course title

Clinical pharmacy I

Course specification

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Academic year	Third
Academic semester	2nd
Course code	PHRT 09
Credit hours	Theor. (2) ; Pract. (-); Total : 2 Theor. (15 weeks)

COURSE DESCRIPTION:

The Clinical Pharmacy-I course provides the students basic principles of pharmaceutical care and skills necessary for successfully completing the body-system courses which are required in the pharmacy program. This professional course aims to improve the students skills with a systematic approach to patient-centred pharmaceutical care that use the theoretical and basic principles of pharmacology, therapeutic and clinical courses to identify and resolve medication related issues.

Course Intended Learning Outcomes (CILOs) :

A. Knowledge and Understanding: Upon successful completion of the course, students will be able to:	
a1	Describe the elements of a Medication Therapy Management (MTM) service and how to provide pharmaceutical care plan to an individual patient
a2	Outline how to gather subjective and objective data to develop a care plan
a3	Determine the non-pharmacotherapy and advices that assist in management of diseases.
a4	Comprehend his/her role as a pharmacist in offering clinical pharmaceutical care services to patients in health care facilities and in participation and communication with other members of the health care team.
B. Intellectual Skills: Upon successful completion of the course, students will be able to:	
b1	Express investigational data using abbreviations.
b2	Interpret clinical features, lab. and instrumental investigations data used in diagnosis of diseases and data of patient medical records.
b3	Classify drug therapy problems according to their appropriate interventions.
C. Professional and Practical Skills: Upon successful completion of the course, students will be able to:	
c1	Provide patient-centered care as the medication expert (collect and interpret evidence, prioritize patient needs, formulate assessments and recommendations, implement, monitor and adjust plans, and document activities)
c2	Actively participate and engage as a healthcare team member by demonstrating mutual respect, understanding, and values to meet patient care needs
D. Transferable Skills: Upon successful completion of the course, students will be able to:	

d1	Share successfully in team-work.
d2	Communicate effectively with his/her colleagues, members of health care team and patients.
d3	Display technical and time management skill.

COURSE CONTENT	
Topics	Weeks
1. Introduction to clinical pharmacy • Definition • Patients-oriented services: clinical, hospital, communitypharmacy; inter-relations and differences. • Pharmacy from dispensing service to caregiving • Duties of clinical pharmacist • Clinical pharmacists as drug information center: source of information, types of drug information demanded (indications, contraindications, precautions, drug interactions,etc.). • basic requirements (knowledge and skills) of clinical pharmacist	1, 2
2. Clinical pharmacist as a member of the health care team ○ sharing in morning rotation and discussion , cooperation withother members ○ patient`s medical record (PMR): components, examples Skills of communication with patients	3, 4
3. Adverse drug reactions (ADRs) and Undesirable Druginteraction, ○ **Causes of ADRs with clinical examples**: overdosage,increased sensitivity, lack of selectivity ○ Types of ADRs with clinical examples : (unpredictable: hypersensitivity, idiosyncrasy), (predictable: side effects, toxic effects : overdosing, intolerance, tachyphylaxis, habituation, addiction, iatrogenicity) o **Types of drug-drug interactions** (pharmacokinetics: interactions at absorption, distribution, metabolism and excretion), pharmacodynamics (antagonisms, physiologic antagonism).	5, 6
Mid-semester exam	7

4. Drugs use in specialized population 1. **Pregnant women**: Harmful effects on the fetus, Recognition of teratogenic drugs, pharmacokinetics in pregnancy, drugs prescribed in pregnancy (Pregnancy A, B, C, X categories), drugs prescribed for [pain, GIT disorders, diabetes, gestational diabetes, asthma, cough, allergy, urinary tract infection, hypertension, thyroid abnormalities, thromboembolism, inflectional vaginosis, Epilepsy, mental health disorders] 2. **lactating women:** factors influence the amount of drug an infant will receive through breast-feeding, drugs avoided during lactation, treatment of mastitis, postpartum depression,cessation of lactation) 3. **Pediatrics:** classification of pediatrics (newborn, infant, child), differences of pharmacodynamics and pharmacokinetics and admiration sites of drugs in children, drug efficacy and toxicity, factors affecting pediatric therapy,drugs prescribed for [pain, fever, infections, GIT disorders] **Geriatrics:** relation of aging to diseases, common physiological changes in aging, alteration of pharmacokinetics and pharmacodynamics of drugs, drugsrisks in elderly, drugs avoided in geriatric patients.	8- 10
4. Clinical skills of diagnosis • Clinical features • Physical (clinical) examinations: methods andinterpretation • Vital signs evaluation and interpretation • Clinical lab. Data interpretation: blood analysis (CBC, serology, biochemistry, tumor markers), stool analysis,urine analysis. • Clinical instrumental diagnosis: techniques and data interpretation: Radiography, ultrasonography, Computed Tomogrphy Scan (CT scan), Magnetic Resonance. • Imaging, Echocardiography, electrocardiogram (ECG), Endoscopy	11, 12
5. Assessment of drug therapy(drug therapy monitoring DTM): objectives, patients need DTM,	13

methods , steps of DTM,case study of DTM, determination the source of the drug therapy problem	
6. Designing a therapeutic regimen for a patient: Information required, selection of drugs, case study of therapeutic regimen	14
Course review and discussion session	15

TEACHING & LEARNING METHODS

1) Lecture
2) Brainstorming
3) Seminar
4) Concepts map
5) Assignments and Feedback

LEARNING AIDS

- White board & Markers.
- Data show
- Charts
- Videos demonstrating clinical pharmacists during work.

REFERENCES

1) Karen J. Tietze. Clinical skills for pharmacists : A Patient-Focused Approach, 2012, Elsevier Inc.
2) Joseph T. Diprio, Encyclopedia of clinical pharmacy, 2003, Marcel Dekker.
3) James M. Ritter , A text book of clinical pharmacology and therapeutics, 2008, Hodder Arnold
4) Widmann. Good clinical interpretation of laboratory tests
5) Tipnis. Clinical pharmacy
6) Siddiuqe . A textbook of hospital and clinical pharmacy

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Course title	
Integrated- case based learning I	
Course specification	
Academic year	Third
Academic semester	2nd
Course code	PHRT 10
Credit hours	Theor. (-) ; Pract. (2); Total : 2 (9 weeks) starting from the 7th week of the semester

COURSE DESCRIPTION:

The course is designed to integrate the course of clinical pharmacy and therapeutics-I by seminar discussion for clinical cases. The course content will emphasize on the comprehensive delivery of pharmaceutical care (pharmacokinetics & pharmacodynamics, drug/drug interactions, dosage calculations, adverse effects, treatment algorithm, goals of therapy & patient education) for selected cases discussion.

Intended learning outcomes of the course (CILOs)

B. Knowledge and Understanding: Upon successful completion of the course, students will be able to:

a1. Describe pathophysiology, clinical presentations, and complications of cardiovascular, gastrointestinal, endocrine , bone and joint disorders.

a2. Define the rational medication use and goals of therapy of cardiovascular and infectious diseases.

B. Intellectual Skills: Upon successful completion of the course, students will be able to:

b1. Interpret clinical and Laboratory findings of cardiovascular, gastrointestinal, endocrine, bone and joint disorders.

b2. Design an appropriate pharmaceutical care plan to selected cases discussion of cardiovascular, gastrointestinal, endocrine , bone and joint disorders.

C. Professional and Practical Skills: Upon successful completion of the course, students will be able to:

c1. Choose the rational pharmacotherapy regimens and monitoring parameters based on patient conditions

c2. Provide effective advices of life style and drug compliance to patients in order to improve targeted outcomes.

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D. Transferable Skills: Upon successful completion of the course, students will be able to:
d1. Search effectively for updated medical information from professional medical references.
d2. Develop students presentation skills

COURSE CONTENT	
Case	Weeks
1) Pregnant women having ➢ Constipation and vomiting ➢ Diabetes. ➢ hypertension	7- 9
2) lactating women - mastitis. - lack of lactation	10, 11
3) Pediatrics ➢ Sever Bacterial infection. ➢ Dehydration	12, 13
4) Geriatrics ➢ B- blockers use in elderly patients Analgesics for rheumatism	14, 15

LEARNING METHODS
Seminar Discussion , Presentation and Group system
➢ The students shall be divided into groups so as to comprehend all cases ➢ Each group will be assigned to study a given clinical case prepared by the teacher including several questions about the case. ➢ The group should study the case and answer the associated questions, and then make a seminar presentation in front of the teacher and the other students. ➢ The presentation should include: ➢ Patient`s data ➢ Clinical features and interpretation ➢ Lab. and instrumental investigational data and interpretation ➢ Assessment of drug therapy: suitability of drugs to the

patient`s case, the source of drug therapy problem (if any), the need to change the therapy (if necessary).

- o The teacher will prepare further questions about the case and the other students are to encourage participating in discussion.

TEACHING & LEARNING METHODS

- Patient`s medical records
- Data show

LEARNING AIDS

- Case study and presentation % 40
- Final exam 60

REFERENCES

1- Soraya Dhillon, Rebekah Raymond, Pharmacy Case Studies, 2009, pharmaceutical press.
2- Markus Muller, Clinical pharmacology: current topics andcase studies, 2010, Springer-Verlagl Wien
3- Yadav. Hand book of clinical pharmacy
4- Gillmer. 100 cases for students of medicine

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4th YEAR					
First semester					
No.	Code	Course	Credit hours		
			T	P	Total
1.	PHRG 07	Experimental Pharmacology	2	1	3
2.	PHRT 14	Integrated- case based learning II	-	2	2
3.	PHRC 07	Pharmacotherapy II	2	-	2
4.	PHRT 13	Clinical pharmacy II	2	-	2
5.	PHRG 05	Phytochemistry II	2	1	3
6.	PHRT 15	Cosmetic Preparations	2	1	3
7.		Pharmaceutical instrumental analysis III	2	1	3
Total			12	6	*18*

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Course title	
Experimental Pharmacology	
Course specification	
Academic year	Fourth
Academic semester	1st
Course code	PHRT 07
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks), Pract (11 Weeks)

COURSE DESCRIPTION:

The course deals with the study of experiments related to study of drug effects on animals. Therefore, this course is a complementary of the previously studied pharmacology courses. The course also provides students with practical skills of pharmacology.

Intended learning outcomes of the course (CILOs)

A: Knowledge & understanding: Upon successful completion of the course, students will be able to:

a1. Identify types of animals used for testing of drugs.

a2. Determine the types of drug effects and toxicity of drugs tested on experimental animals.

a3. Explicit the techniques and approaches of experimenting drugs on animals as well as the alternative methods in which animals are not used such as simulation.

a4. Comprehend his/her role as a pharmacist in implementing ethics and laws regulations while experimenting drugs on animals and employing alternative methods for drug testing.

B: Intellectual skills : Upon successful completion of the course, students will be able to:

b1. Interpret outcome data obtained after a pharmacologic experiment.

b2. Classify the drug effects tested on animals.

b3. Assess the effect of the drug on the tested animals.

C: Professional & practical skills: Upon successful completion of the course, students will be able to:

c1. Perform effectively the experiments, practical tasks including experimenting of drugs on animals using standard procedures.

c2. Take the required safety criteria during performing different types of practical and professional pharmacy works.

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D: Transferable skills: Upon successful completion of the course, students will be able to:
d1. Share successfully in team-work.
d2. Communicate effectively with his/her colleagues.
d3. Comply to pharmacy laws and ethics and behave in discipline during practicing practical and professional works and assignments.

COURSE CONTENT

	Topics	Weeks
Introduction to experimental pharmacology	• Definition of terms: experimental pharmacology, experimental animals • Objectives of experimental pharmacology • Brief history of experimental pharmacology. • Approaches: in vivo testing, in vitro testing, vivisection, etc.	1

Experimental animals	• Handling of experimental animals
	• Requirements (food, homes, light, etc.) of animals cages.
	• Types and specifications of experimental animals:
	  ○ Invertebrates: fruit flies (Drosophila).
	  ○ Vertebrates: fishes, cats, dogs, frogs, rabbits, rats, monkey, etc.
		2,3

Applied experimental pharmacology researches	Procedures and objectives of researches focusing on : • Drug testing • Drug safety testing • Xenotransplantation • Cosmetic testing • Genetic-modifying testing • Others	4,5
Drug safety testing	Procedure and objectives of: • LD_{50} test • Eye irritancy • Skin irritation	6,7

	• Mutagenicity & carcinogenicity • Toxikinetic & ADME • Metabolic toxicity	
Mid-semester exam		8
Drug safety testing	Procedure and objectives of: • Pyrogen testing • Phototoxicity • Embryotoxicity • Endocrine disrupts • Ecotoxicity • Toxicogenomics	9,10
Ethics, regulations & laws of using experimental animals	• Ethics of use of experimental animals: The three Rs (replacement, refinement, reduction) • Regulations e.g., animal welfare act	11,12
Alternatives to animal testing	• Organs-on-a-chip • In silico: computer simulation • Micro dosing Position emission tomography	13,14
Course review and discussion session		15

Practical Aspect:

Order	Tasks/ Experiments	Number of Weeks
1.	Introduction to pharmacology Lab: safety requirements, list of experiments, handling animals, how to report, etc.	1
2.	Testing of drug effects on rabbit eyes: miotics, mydriatics, normal saline	2,**3**
3.	Testing of skin irritation of dermatological products on animals: (ciprofloxacin cream), tetracycline ointments, ketoprofen gel	4,**5**
4.	Testing of eye irritancy of solutions: eye washes	6
5.	Testing of LD_{50} of drugs: warfarin, digoxin	7,**8**

6.	Pyrogen testing of parenteral injections: vitamin B complex ampoules, sterile water for injection	9,**10**
7.	Review	11

TEACHING & LEARNING METHODS
6) Lecture 7) Brainstorming 8) Seminar 9) Concepts map 10) Assignments and Feedback
LEARNING AIDS
• White board & Markers. • Data show • Charts • Videos demonstrating clinical pharmacists during work.
REFERENCES
1) Rosenthal, Walte, Handbook of Experimental Pharmacology, Springer, 2004. **2)** Dinseh Badyal, Practical manual of pharmacology, Jaypee, India, 2008

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Course title	
Integrated- case based learning II	
Course specification	
Academic year	Fourth
Academic semester	1st
Course code	PHRT 14
Credit hours	Theor. (-) ; Pract. (2); Total : 2 (9 weeks) starting from the 7th week ofthe semester

COURSE DESCRIPTION:

The course is designed to integrate the course of clinical pharmacy and therapeutics-II. It aims to improve the students skills of pharmacy practice by seminar discussion for clinical cases discussion of selected diseases. It is designed to cover the pathophysiology, clinical presentations, complications, and pharmacotherapy of selected cases discussion including respiratory tract, renal, neurologic, immunologic, hematologic, and infectious diseases.

Course Intended Learning Outcomes (CILOs) :
Upon successful completion of the Course, student will be able to:

A. Knowledge and Understanding:	
a1	Describe the pathophysiology, clinical presentations, and complications of selected cases including respiratory tract, renal, neurologic, immunologic, hematologic, and infectious diseases
a2	Discuss the rational medication use and goals of therapy of selected cases including respiratory tract, renal, neurologic, immunologic, hematologic, and infectious diseases.
B. Intellectual Skills:	
b1	Identify drug-related problems and formulate appropriate pharmaceutical care plan of selected cases including respiratory tract, renal, neurologic, immunologic, hematologic, and infectious diseases.
b2	Design an appropriate pharmaceutical care plan to selected cases discussion of including respiratory tract, renal, neurologic, immunologic, hematologic, and infectious diseases.
C. Professional and Practical Skills:	

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c1	Choose the rational pharmacotherapy regimens for selected cases including respiratory tract, renal, neurologic, immunologic, hematologic, and infectious diseases.
c2	Provide effective advices of life style and drug compliance to patients in order to improve targeted outcomes.
D. Transferable Skills:	
d1	Search efficiently for updated medical information from professional medical references
d2	Improve the students presentations skills

COURSE CONTENT

Application of clinical pharmacy and pharmacotherapy skills on Study of the following clinical cases :

Case	Weeks
1) Gynecologic disorders **2)** Amenorrhea	7
2) Disorders of the eye and nose ➢ Glaucoma ➢ Allergic rhinitis	8
3) Hematologic disorders ➢ Anemias ➢ Coagulation disorders	9, 10
4) Infectious diseases ➢ Upper and lower respiratory infections ➢ Malaria	11, 12
5) Bone and joint disorders - Rheumatic arthirits	13
6) Oncologic disorders - Leukemia	14

TEACHING METHODS

Seminar Discussion , Presentation and Group system

- The students shall be divided into groups so as to comprehend all cases
- Each group will be assigned to study a given clinical case prepared by the teacher including several

questions about the case.

- The group should study the case and answer the associated questions, and then make a seminar presentation in front of the teacher and the other students.
- The presentation should include:
  - Patient`s data
  - Clinical features and interpretation
  - Lab. and instrumental investigational data and interpretation.
  - Assessment of drug therapy: suitability of drugs to the patient`s case, the source of drug therapy problem (if any), the need to changethe therapy (if necessary).
- The teacher will prepare further questions about the case and the other students are to encourage participating in discussion.

LEARNING AIDS

- Patient`s medical records
- Data show

ASSESSMENT

- Case study and presentation 40 %
- Final exam 60 %

REFERENCES

1- Soraya Dhillon, Rebekah Raymond, Pharmacy Case Studies, 2009, pharmaceutical press
2- Markus Muller, Clinical pharmacology: current topics and case studies, 2010, Springer-Verlagl Wien
3- Yadav. Hand book of clinical pharmacy
4- Gillmer. 100 cases for students of medicine

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Course title	
Pharmacotherapy II	
Course specification	
Academic year	Fourth
Academic semester	1st
Course code	PHRC 07
Credit hours	Theor. (2) ; Pract. (0); Total : 2 Theor. (15 weeks) ;

COURSE DESCRIPTION:

This This course aims cover the etiology, pathophysiology, laboratory investigations, clinical picture, and the rational pharmacotherapy regimens of bronchial asthma, COPD, acute renal failure, chronic Kidney failure (CKD), epilepsy, Parkinson's, Systemic Lupus Erythematous (SLE), anemia, Coagulation disorders, malaria, tuberculosis, Pneumonia, and antimicrobial prophylaxis in Surgery.

Intended learning outcomes of the course (CILOs)

A. Knowledge and Understanding: Upon successful completion of the course, students will be able to:

a1. Describe the clinical manifestations, pathophysiology, laboratory tests, physical examination, diagnosis, and prognosis of conditions under study.

a2. Define the desired outcomes of drug therapy for conditions under study.

B. Intellectual Skills: Upon successful completion of the course, students will be able to:

b1. Design rational pharmacotherapy regimen and monitoring plan for conditions under study.

C. Professional and Practical Skills: Upon successful completion of the course, students will be able to:

c1. Implement rational pharmacotherapy regimen and monitoring plan to achieve targeted therapeutic outcomes of conditions under study.

D. Transferable Skills: Upon successful completion of the course, students will be able to:

d1. Search efficiently for required medical information in professional medical references and sites.

d2. Share successfully therapeutic decisions with a healthcare team and patients

COURSE CONTENT	
Topics	Weeks

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I. Gynecological disorders 1. Amenorrhea 2. Endometriosis	1 , 2
II. Immunologic disorders 1. Allergy 2. Systemic Lupus Erythematosus	3
III. Disorders of the eyes and nose 1. Glaucoma 2. Allergic rhinitis	4
IV. Hematologic disorders 1. Anemias 2. Coagulation disorders	5, 6
V. Infectious diseases 1. Upper and lower respiratory infections 2. Burns and wounds infections 3. Malaria 4. Giardiasis and amoebiasis 5. Superficial Fungal Infections	7 - 11
VI. Bone and joint disorders 1. Osteoporosis and Osteomalacia 2. Rheumatoid arthritis	13, 14
VII. Oncologic disorders 1. Leukemia 2. Breast cancer	12
Course review and discussion session	**15**

TEACHING & LEARNING METHODS
1- Lecture 2- Brainstorming 3- Seminar 4- Concepts map
LEARNING AIDS
• White board & Markers. • Data show • Lab materials, tools and instrument
REFERENCES

1. Joseph D. Dipiro, pharmacotherapy: a pathological approach, 2005 McGraw-Hill Inc.
2. Wells. Pharmacotherapy hand book
3. Satoskar. Pharmacology and pharmacotherapeutics

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Course title	
Clinical pharmacy II	
Course specification	
Academic year	Fourth
Academic semester	1st
Course code	PHRT 13
Credit hours	Theor. (2) ; Pract. (-); Total : 2 Theor. (15 weeks)

COURSE DESCRIPTION:

The course aims to expose students to the comprehensive process of pharmaceutical care, including data collection, identification of drug-related problems, factors to consider when formulating care plan and professional communication of therapeutic plan in seminar based cases presentation. In addition, The course is designed to give the students the opportunity to work as team to solve clinical problems and to practice in a professional manner with peers, patients and other healthcare professionals of selected diseases.

Course Intended Learning Outcomes (CILOs) :	
A. Knowledge and Understanding: Upon successful completion of the course, students will be able to:	
a1	Describe the elements of a Medication Therapy Management (MTM) service and how to provide pharmaceutical care plan to an individual patient
a2	Outline how to gather subjective and objective data to develop a care plan
a3	Determine the non-pharmacotherapy and advices that assist in management of diseases.
a4	Comprehend his/her role as a pharmacist in offering clinical pharmaceutical care services to patients in health care facilities and in participation and communication with other members of the health care team.
B. Intellectual Skills: Upon successful completion of the course, students will be able to:	
b1	Express investigational data using abbreviations.
b2	Interpret clinical features, lab. and instrumental investigations data used in diagnosis of diseases and data of patient medical records.
b3	Classify drug therapy problems according to their appropriate interventions.
C. Professional and Practical Skills: Upon successful completion of the course, students	

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	will be able to:
c1	Provide patient-centered care as the medication expert (collect and interpret evidence, prioritize patient needs, formulate assessments and recommendations, implement, monitor and adjust plans, and document activities)
c2	Actively participate and engage as a healthcare team member by demonstrating mutual respect, understanding, and values to meet patient care needs
D. Transferable Skills: Upon successful completion of the course, students will be able to:	
d1	Share successfully in team-work.
d2	Communicate effectively with his/her colleagues, members of health care team and patients.
d3	Display technical and time management skill.

COURSE CONTENT	
Topics	Weeks
1. Role of clinical pharmacist in clinical trails • mission of clinical pharmacist in clinical trails • types of clinical trials • clinical trial protocol. • clinical trial ethics	1
2. Clinical pharmaceutics: clinical adverse effects related topharmaceutics : introduction, reasons, avoidance ○ Adhesion and trapping of tablets to esophagus ○ Reaction to impurities: impurities of Heparin, penicillin's. ○ Allergic reactions due to transdermal patches	2
3. Diagnosis and management (drugs, non-drug therapy) and Case studiesthe following diseases:	
1) hypertension	3
2) Angina pectoris and myocardial infarction	4
3) congestive heart failure	5
4) peptic ulcer an Irritable bowel syndrome	6
Mid-semester exam	7
5) acute bronchial asthma attack (Bronchial asthmaticus)	8
6) Renal failure (Acute, chronic)	9
7) Amenorrhea	11
8) Glaucoma	12

9) Psoriasis	13
10) Anemias	14
Course review and discussion session	15

TEACHING & LEARNING METHODS

1) Lecture
2) Brainstorming
3) Seminar
4) Concepts map
5) Assignments and Feedback

LEARNING AIDS

- White board & Markers.
- Data show
- Charts
- Videos demonstrating clinical pharmacists during work.

REFERENCES

1) Alexander T Florence, An introduction to clinical pharmaceutics, 2010, pharmaceutical press
2) Joseph T. Diprio, Pharmacotherapy: a pathophysiologic approach
3) James M. Ritter , A text book of clinical pharmacology and therapeutics, 2008, Hodder Arnold
4) Widmann. Good clinical interpretation of laboratory tests
5) Tipnis. Clinical pharmacy

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Course title	
Phytochemistry II	
Course specification	
Academic year	Fourth
Academic semester	1st
Course code	PHRG 05
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks) ; Pract.(11 weeks)

COURSE DESCRIPTION:

This course is complementary to (phytochemistry I) course and both courses together with Pharmacognosy courses comprise the basis of phytotherapy as a part of complementary and alternative medicines. This course provides the students with study and knowledge of chemical structures extraction, isolation and identifications of phytochemicals present in medicinal plants including: phenyl propane derivatives, volatile oils, glycosides, tannins and others e.g., bitter principles.

Intended learning outcomes of the course (CILOs)
A: Knowledge and understanding: upon completion of the course, students will be able to:
a1. Explain the physicochemical properties of phenyl propane derivatives, volatile oils, glycosides, tannins and present in medicinal plant.
a2. Discuss the methods and techniques used to extract and isolate phenyl propane derivatives, volatile oils, glycosides tannins and bitter constituents present from medicinal plant.
a3. Define the botanical sources and therapeutic uses of phenyl propane derivatives, volatile oils, glycosides, tannins present in medicinal plant.
a4. Describe the role of pharmacist in extraction, isolation and identification of phytochemicals.
B:Intellectual skills: upon completion of the course, students will be able to:
b1. Express the chemical structure of phytochemicals using drawings.
b2. Differentiate between various types of phenyl propane derivatives, volatile oils, glycosides, tannins and others e.g., bitter principles.
b3. Classify phenyl propane derivatives, volatile oils, glycosides, tannins and others e.g., bitter principles.

b4. Compare between different types of phenyl propane derivatives, volatile oils, glycosides, tannins and others e.g., bitter principles.
b5. Select standard operation procedure to extract, isolate and identify phenyl propane derivatives, volatile oils, glycosides, tannins and others e.g., bitter principles from a plant sample**.**
C:Professional and practical skills: upon completion of the course, students will be able to:
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory
c2. Operate the instruments (Evaporator, **Soxhlet,** Grinder, Dryer and others) and perform experiments successfully in the laboratory.
c3. Screen for phenyl propane derivatives, volatile oils, glycosides, tannins and others drugs from plant sources.
c4. Search efficiently for information using documented and electronic sources of information.
C: Transferable skills: upon completion of the course, students will be able to:
d1. Communicate effectively and behave in discipline with colleagues.
d2. Participate efficiently with his colleagues in a team work.
d3. Demonstrate the skills of time management and self-learning.

COURSE CONTENT	
Topics	Weeks
1. Volatile oils Definition, classification, distribution and occurrence; Extraction : distillation methods and solvent extraction ; Chemical , physical and pharmacological properties examples of crude drugs containing volatile oils.	1, 2
2. Steroids Definition, classification, structures , biogenesis, chemical and physicalproperties and characterization.	**3**
3. Glycosides Introduction (definition, classification, distribution, extraction, isolationand pharmacological properties) Cardioactive glycosides (cardinolides, bufadienolides, sugars, structure activity relationship, distribution, extraction, chemical and physical properties, hydrolysis of cardiac glycosides, biogenesis, pharmacological properties , mechanism of action,	**4 - 6**

chemical tests. Chief drugs containing cardiac glycosides(Digitalis, strophanthus, Adonis, Convalaria and squill). Saponin glycosides (definition, classification, distribution, structures, biogenesis, chemical , physical properties , characterization, biological and pharmacological properties. Drugs as expectorant , antitusive, antiexudative, adaptogens and diuretic) Anthracen glycosides (classification, distribution, structures, biosynthesis, extraction , chemical, physical properties, characterization, pharmacological properties, Senna, Rhabarub and Aloe). Flavonoid glycosides(classification, biosynthesis, chemical structure, physic-chemical properties, rutin, hesperidin and flavonoid containing drugs) Cynogentic glycosides (cynogenesis, distribution, structures, biogenesis, detection, extraction, pharmacological activities and cynogenetic drugs) Glucosinolates (Thioglycosides): definition, distribution, structures, biogenesis , hydrolysis, toxicity and drugs containing glucosinolates.	
Mid-semester exam	**7**
4. Tannins definition, classification, structure, distribution, biosynthesis, physic- chemical properties, extraction, biological properties , examples ofcrude drugs containing tannins	**8, 9**
5. Phenyl propane derivatives Introduction(definition, classification, biogenesis) Phenols and phenolic acids**(** structures, physic-chemical properties, characterization, extraction, pharmacological properties and drugs containing phenols and phenolic acids). **Coumarins (** Definition, classification, biosynthesis, chemical structure, physic-chemical properties, extraction , pharmacological properties and uses, drugs containing coumarins**,** furocoumarins and pyrano coumarins **)** **Lignans (** definition, classification, distribution, biological and pharmacological properties and drugs containing lignans) **Lignin(** definition, classification, distribution, biological and pharmacological properties of some lignins)	**10 - 12**

6. Bitter principles definition, classification and chief examples of crude drugs containing bitter principle	**13, 14**
Course review and discussion session	**15**

Practical part

Order	Tasks/ Experiments	Number of Weeks	contact hours
physicochemical properties , extraction (maceration or percolation or Soxhlet extraction) , concentration (if necessary " rotary evaporation', isolation (Thin layer chromatography) and identification of the phytochemicals from crude drugs or parts of medicinal plants			
1.	Phenyl propane derivatives : (cinnamic aldehyde)	1	2
2.	Volatile oils (peppermint oil)	1	2
3.	Volatile oils (clove oil)	1	2
4.	Saponins(Glycyrrhizin)	1	2
5.	Flavonoids (Hesperetin)	1	2
6.	Flavonoids (apigenin)	1	2
7.	Anthracin Glycoside (sennosides)	1	2
8.	Cardiac Glycoside (digoxin)	1	2
9.	Tannins in Tea	1	2
10.	Miscellaneous: bitter principles (Khellin)	1	2
11.	Review	1	2
PRACTICAL EXAM		1	2
Total		12	24

TEACHING & LEARNING METHODS

1- Lecture
2- Brainstorming
3- Seminar
4- Concepts map
5- Assignments and Feedback
6- Lab Work

LEARNING AIDS

- White board & Markers.
- Data show
- Lab materials, tools and instrument

REFERENCES

1. W.C. Evans, Trease and Evans pharmacognosy, 2009, W.B.Saunders
2. Amritpal Singh Saroya, Herbalism, Phytochemistry and Ethnopharmacology, 2011, CRC press Jarald.
3. Bhandari. Textbook of pharmacognosy.

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Course title	
Cosmetic Preparations	
Course specification	
Academic year	Fourth
Academic semester	1st
Course code	PHRT 15
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks) ; Pract.(11 weeks)

COURSE DESCRIPTION:

This course provide the students with knowledge of cosmetics, which is one of the newer disciplines in pharmacy education since the role of pharmacists in cosmetic industry has been established. Therefore, this course is designed to provide knowledge and skills necessary for preparation of cosmetics used in cleaning, perfuming, making-up and other purposes and cosmeceuticals preparations used as antiaging, treatment of skin-pigmentation and other purposes.
The course is preceded by (pharmaceutics I & II) courses since the design of most cosmetic products depends on principles similar to that of liquid and semisolid pharmaceutical dosage forms. The practical part of the course provides with skills of preparation of cosmetics in pharmaceutics lab.

The Course Intended Learning Outcomes (CILOs)
A:Knowledge and understanding: upon completion of the course, students will be able to:
a1. Explain the general properties, advantages , disadvantages and requirements of cosmetics and cosmeceuticals.
a2. Discuss the principles, methods of preparation of various types of cosmetic preparations.
a3. Describe the role of pharmacist in formulation of cosmetic preparations.
a4. Identify the types of cosmetic preparations.
B:Intellectual skills: upon completion of the course, students will be able to:
b1. Classify cosmetic preparations according to their use and physical form.
b2. Compare between various types of cosmetic preparations. .
b3. Design cosmetic preparations
b4. Evaluate the quality of the prepared cosmetic preparations.
b5. Select appropriate standard operation procedures for preparation and analysis of cosmetic products.

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b6. Calculate the amount of ingredient required to prepare an enlarged or reduced amount of a cosmetic preparation. ..
C: Professional and practical skills: upon completion of the course, students will be able to:
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory
c2. Operate the instruments and perform experiments successfully in the laboratory
c3. Employ the relevant way to prepare cosmetic preparations
D: Transferable skills: upon completion of the course, students will be able to:
d1. Participate efficiently with his colleagues in a teamwork.
d2. Demonstrate the skills of time management and self-learning.
d3. Communicate effectively and behave in discipline with colleagues.

COURSE CONTENT	
Topics	Weeks
1. Introduction: definitions (cosmetic products, cosmeceuticals),requirements cosmetics products registration, classification of cosmetic products	**1**
2. Cosmetic formulations: types, basic composition, examplesof cosmetic products prepared as : a) Cosmetic solutions and oils b) Cosmetic suspensions and foams c) Cosmetic emulsions Cosmetics solids and semisolids	**2 , 3**
3. Skin-care cosmetic products : active agents, formulations,method of preparations, examples of : a) Anti-wrinkle or anti-aging products including face-masks b) Demulcents and moisturizing products c) Anti-acne products d) Skin- tanning products e) Skin-whitening products f) Hygienic and baby care products	**4 - 6**
Mid-semester exam	**7**

4. Make-up and removing make-up products: active agents, formulations, method of preparations**:** a) Lipsticks b) pencils c) Make up powder d) Make up removing products	**8**
5. Bath and cleansing products : Shampoos and Soaps	**9**
6. Hair care products a) hair tints (coloring) and bleaches (discoloring), b) conditioning products for waving, straightening and fixing, c) Depilatories (hair removals). d) hair cleansing products (lotions, powders, shampoo). e) Shaving products (creams, foams, lotions, etc.).	**10- 12**
7. 7. Perfumes, toilet waters and eau de Colog.	**13**
8. Oral and dental hygiene products a) Toothpaste **b)** Mouthwashes **c)** Dental gels	**14**
Course review and discussion session	**15**

Practical Part

Order	Tasks/ Experiments	Number of Weeks	contact hours
1.	Introduction to lab: list of experiments, how to report, etc.	**1**	**2**
2.	preparation of anti-aging skin creams, ant-acne dermatological form.	**2**	**2**
3.	preparation of lipsticks	**1**	**2**
4.	preparation of antiseptic soap	**1**	**2**
5.	preparation of antidandruff shampoo	**1**	**2**
6.	preparation of hair nutrient oil	**1**	**2**
7.	preparation of after-shaving product	**1**	**2**
8.	preparation of perfumes	**1**	**2**
9.	preparation of toothpaste	**1**	**2**
10.	preparation of dental gel	**1**	**2**
PRACTICAL EXAM		**1**	**2**

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Total	11	22
TEACHING & LEARNING METHODS		
1- Lecture 2- Seminar 3- Concepts map		
LEARNING AIDS		
• White board & Markers. • Data show • Lab materials, tools and instrument		
REFERENCES		
1. Hans Mollet, Arnold Grubenmann. Formulation Technology: Emulsions, Suspensions, Solid Forms, 2001 Wiley-VCH Verlag, Wells. 2. Ernest W. Flick. Cosmetic and toiletry formulations, 1996, Noyes Publications 3. Saraf. Cosmetics		

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Course title	
Pharmaceutical instrumental analysis III	
Course specification	
Academic year	4
Academic semester	1st
Course code	PHRM 10
Credit hours	Theory (2) ; Practical (1); Total : 3
COURSE DESCRIPTION:	
The course provides the student with knowledge and skills of advanced analytical techniques used for analysis of substances including drugs. The course focuses on the study of principles, instrumentation and applications of advanced analytical techniques including HPLC , gas chromatography (GC), gel filtration chromatography (GFC), electrochromatography (EC), Nuclear magnetic resonance (NMR) and advanced coupled techniques such as HPLC/MS and GC-MS. The practical part of the course provides the student with skills to operate those equipment and perform analysis of compounds by those techniques.	
INTENDED LEARNING OUTCOMES (ILOS):	
At the end of this course, the student should be able to:	
I. Cognitive (knowledge & thinking) outcomes	1. Demonstrate the principle, apparatus components, procedures, applications of instruments used for chromatographic and chromatographic/spectroscopic coupled analysis in pharmacy.
II. Psychomotor (practical and professional skills) outcomes	2. Prepare material samples for instrumental analysis. 3. Operate effectively different types of equipments used in pharmaceutical analysis
III. Affective (feelings, attitudes) outcomes	3) Share and collaborate actively in a team-work for accomplishing laboratory experiments and assignments. 4) Comply the rules of safety during laboratory practice.

COURSE CONTENT

Topics	Weeks
Theoretical principle and components , interactions , types, instrumentation, factors affecting, output data, applications in quantitative/qualitative analysis, , data interpretation : 1. High performance liquid chromatography (HPLC)	1-8

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2. Gas Liquid Chromatography 3. Capillary-Column Chromatography 4. Gel Filtration Chromatography 5. Electrochromatography	
Mid-term Exam	9
Theoretical principle and components , interactions , types, instrumentation, factors affecting, output data, applications in quantitative/qualitative analysis, , data interpretation : 1. HPLC-MS 2. HPLC-CD 3. GC-MS 4. Others	10-14
Course Review	15

Practical Part

Order	Tasks/ Experiments	Number of Weeks	contact hours
1.	**Analyss of drugs by** ▪ Gas Chromatography ▪ Capillary-Column Chromatography ▪ Gel Filtration Chromatography ▪ Electrochromatography	**4**	**12**
2.	**Analysis of drugs by** ▪ HPLC-MS ▪ HPLC-CD ▪ GC-MS	**3**	**6**
3.	▪ **Analysis of drugs by** ▪ Nuclear Magnetic spectroscopy	**2**	**4**
PRACTICAL EXAM		**1**	**2**
Total		**10**	**20**

TEACHING METHODS

1. Lecture
2. Brainstorming
3. Seminar
4. Concepts map
5. Assignments and Feedback
6. Lab Work

LEARNING AIDS

- White board & Markers.

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• Data show • Lab materials, tools and instrument
REFERENCES
1.Gareth Thomas, Medicinal chemistry: an introduction to, 2007 John Wiley & Sons Ltd, 2.Ashutoch Kar. Medicinal chemistry, 2007, New age international publisher 3.Siddique. A textbook of medicinal chemistry 4.Rajie. Pharmaceutical chemistry 5.Wermuth. The practice of medicinal chemistry

4th YEAR						
Second Semester						
No.	Code	Course	Credit hours			
			T	P	Train	Total
1.	PHRG 06	Complementary and alternative medicine	2	-		2
2.	PHRT 23	Advanced drug delivery systems	2	-		2
3.	PHRT 11	Biopharmaceutics	2	-		2
4.	PHRT 18	Industrial pharmacy	3	-		3
5.	PHRT 16	Hospital pharmacy	2	-		2
6.	PHRT 22	Pharmaceutical Quality Control	2	1		3
7.	PHRC 09	Toxicology	2	-		2
8.	PHRT 20	Pharmacy Training I (320 Training Hours)	-		2	2
		Total	15	1	2	18

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Course title	
Complementary and alternative medicine	
Course specification	
Academic year	Fourth
Academic semester	2nd
Course code	PHRG 06
Credit hours	Theor. (2) ; Pract. (-); Total : 2 Theor. (15 weeks)

COURSE DESCRIPTION:

This course, in its first part, provide students with knowledge in the evidence-based applications of herbal medicines and other natural types as complementary and/or alternative methods for classical Medicine for treatment of human diseases. It helps the students to utilize their knowledge and skills attained from previous courses of (Pharmacognosy I, II and phytochemistry I, II) to achieve that purpose. The second part of the course deals with the techniques and approaches employed to screen active ingredients from plants and other natural sources and to evaluate the specifications of natural products.

Intended learning outcomes of the course (CILOs)
A:Knowledge and understanding: upon completion of the course, students will be able to:
a1. Describe the methods employed to screen active ingredients from plants and other natural sources and to evaluate specifications of natural products.
a2. Identify the actions of products of complementary and alternative medicine on human and their misuse or abuse.
a3. Explain the basis of complementary and alternative medicine.
B:Intellectual skills: upon completion of the course, students will be able to:
b1. Classify the products and methods of complementary and alternative medicine.
b2. Select a suitable standard operation procedure to evaluate specifications of natural products.
b3. Design a suitable method to screen active ingredients from natural sources.
C: Professional and practical skills: upon completion of the course, students will be able to:
c1. Assess and resolve problems independently react effectively with other health care professionals and patients
c2. Take Patient history and patient assessment based upon history taken

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c3. Prepare Herbal prescription and treatment plans
D: Transferable skills: upon completion of the course, students will be able to:
d1. Communicate effectively and behave in discipline with colleagues.
d2. Take responsibility for adaption to change misleading and adulteration that may occur in complementary and alternative medicine.
d3. Retrieve the essential evidence-based references to obtain correct information relevant to complementary and alternative medicines.

COURSE CONTENT	
Topics	Weeks
1. Introduction: ➢ The complementary ad alternative concept of healthcare ➢ Comparison with classical methods of therapy ➢ Integrative medicine – incorporating complementary andalternative medicine into practice ➢ Delivering complementary and Complementary andalternative medicine ➢ The evidence base for complementary and alternativemedicine ➢ Pharmacovigilance of complementary medicines	**1 , 2**
2. Traditional medicine ➢ The traditional healthcare environment ➢ Traditional Chinese medicine ➢ Indian Ayurveda medicine ➢ Traditional medicine in Yemen	**3, 4**
3. Principles of therapies involving use of medicines ➢ Homeopathy and anthroposophy ➢ Aromatherapy ➢ Flower remedy therapy	**5 , 6**
Mid-semester exam	**7**

➢ Herbal medicine (**Phytotherapy)** ▪ Topical products : demulcents, antiinflammtories, antiseptic disinfectants, treatment of burn and wounds. ▪ Oral products: recommended herbals or herbal combinations , their doses and preparations for treatmentof: - Respiratory diseases (common cold, asthma, cough) ❖ GIT disorders (diarrhea, constipation, peptic ulcer,intestinal colic) ❖ Renal disorders: stones, real colic ❖ CVS disorders: hypertension, angina ❖ Endocrinology disorders: diabetes mellitus ❖ Pain and inflammation ❖ Hepatic dysfunction ❖ Bacterial infections ❖ Fungal infections ❖ Parasital infections: malaria, helminthes ❖ Erectile dysfunction ❖ Amenorrhea ❖ Infertility ❖ Mental disorders: depression and psychosis	**8 - 10**
4. Principles of therapies involving no medicines ➢ Naturopathy and its associated methods ➢ Hydrotherapy ➢ Diagnostic therapies ➢ Manual therapies ➢ Mind and body therapies including physiotherapy ➢ Other therapies : e.g. electrotherapy	**11- 13**
Course review and discussion session	**15**

TEACHING & LEARNING METHODS
1) Lecture 2) Brainstorming 3) Seminar 4) Concepts map

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LEARNING AIDS
• White board & Markers. • Data show • Videos illustrating the method of therapy
REFERENCES
1. Steven B Kayne. Complementary and alternative medicine,2009, Pharmaceutical press. 2. Karin Kraft. Pocket guide to herbal medicine, 2004 Georg Thieme Verlag 3. Joshi. Essentials of orthopaedics and applied physiotherapy 4. Sanjay Pandya. Practical Guidelines on Fluid Therapy 5. Basanta kumar Nanda. Electrotherapy simplified

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Course title	
Advanced drug delivery systems	
Course specification	
Academic year	Fourth
Academic semester	2nd
Course code	PHRT 23
Credit hours	Theor. (2) ; Pract. (-); Total : 2 Theor. (15 weeks)

COURSE DESCRIPTION:

This course is complementary to (Pharmaceutics I, II and III) courses studied in the previous semesters and all these courses concern with study of designs of dosage forms capable to deliver the drug to human body. In contrast to pharmaceutics courses, which deal with conventional dosage forms, this course concerns with study of newer, unique and advanced systems, including controlled & targeted delivery systems. The course, therefore, is designed in order to provide students with the last and updated knowledge in the field of dosage forms design. The course is co-requisite with Biopharmaceutics course in order to link between dosage forms and kinetics of drug in human body.

The Course Intended Learning Outcomes (CILOs)
A:Knowledge and understanding: upon completion of the course, students will be able to:
a1. Explain techniques and approaches applied in novel drug delivery systems.
a2. Explain the principles of designing targeted drug delivery systems.
a3. Describe the role of pharmacist in designing novel drug delivery systems.
a4. Identify the properties and objectives of novel drug delivery systems**.**
a5. Describe the advantages and disadvantage of novel drug delivery systems.
B:Intellectual skills: upon completion of the course, students will be able to:
b1. Classify Novel and novel drug delivery systems.
b2. Compare between conventional and novel drug delivery systems
b3. Design a novel drug delivery system.
b4. Evaluate novel drug delivery systems from its advantage/disadvantage.
C: Professional and practical skills: upon completion of the course, students will be able to:

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c1. Search efficiently for information using documented and electronic sources of information.
c2. Present and report his/her works correctly using appropriate writing rules and technologies media.
D: Transferable skills: upon completion of the course, students will be able to:
d1. Demonstrate the skills of time management and self-learning.
d2. Participate efficiently with his colleagues in a teamwork.

COURSE CONTENT	
Topics	Weeks
1- Modified release systems: definition, purposes, advantages, limitations, single-unit coating, multiple units coating (microencapsulation), floating tablets.	**1, 2**
2- Transdermal delivery systems ➢ Patches ➢ Phoophoresis ➢ Inotophoresis ➢ Electroporation ➢ Needle array and needless injection systems ➢ Percutaneous enhancers	**3, 4**
3- Advanced Parenteral systems : implants	**5**
4- Advanced Ophthalmic systems : Ocuserts	**6**
Mid-semester exam	**7**
5- Dry solid inhaler systems	**8**
6- Advanced Intravaginal delivery systems	**9**
(a) Targeted delivery systems a. Types, advantages, requirements **(b)** Cellular systems: T lymphocytes, lysosomes (c) Particle systems a. Liposomes	**10- 13**

b. Monoclonal antibodies c. Plasma proteins d. Polymeric micelles (d) Prodrug systems a. Conjugation with peptides **b.** Gene (or antibodies)-directed enzyme system **c.** Drug-linkage-ligand system	
8- Concepts and Application of nanotechnology in advanced drug delivery systems	**14**
Course review and discussion session	**15**

TEACHING & LEARNING METHODS
1- Lecture 2- Brainstorming 3- Seminar 4- Concepts map
LEARNING AIDS
• White board & Markers. • Data show • Videos or charts illustrating the advanced delivery systems
REFERENCES
1- Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins. 2- Kewal k. Jain. drug delivery systems. 3- Ottenbrite. Polymeric drugs & drug delivery system. 4- Aulton M.E., Pharmaceutics: the science of dosage form design, 2002, Churchill Livingstone.

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Course title	
Biopharmaceutics	
Course specification	
Academic year	Fourth
Academic semester	2nd
Course code	PHRT 11
Credit hours	Theor. (2) ; Pract. (-); Total : 2 Theor. (15 weeks)

COURSE DESCRIPTION:

The course examines the factors that influence medication pharmacokinetics and bioavailability, which can have a significant impact on the medicine's therapeutic efficacy. These aspects include biological factors such as anatomical/physiological, pathological, pharmacological factors such as physicochemical features of the medicine, roles of excipients contained, and dosage form type, as well as the impact of genetic variation and concurrent use of other drugs and foods. The course also covers basic biopharmaceutical information, such as in vitro, ex vivo, and in vivo correlation investigations.

The Course Intended Learning Outcomes (CILOs)
A: Knowledge and understanding: upon completion of the course, students will be able to:
a1. Show understanding of the influence of human body structure including physiological/anatomical, pathological and genetic characters on drug pharmacokinetics and bioavailability.
a2. Explain the physicochemical properties of the drug, excipients, dosage forms, co-administered drugs and food that affect drug pharmacokinetics and bioavailability.
a3. Explain the relationship of drug absorption, distribution and elimination to its bioavailability
a4. Describe the principles of biopharmaceutics, pharmacokinetics, biopharmaceutics, bioavailability, and bioequivalence.
a5. Describe the biopharmaceutical classification system (BCS) of drugs.
B: Intellectual skills: upon completion of the course, students will be able to:
b1. Interpret figures and graphs of biopharmaceutical studies.
b2 . Classify drugs biopharmaceutically.

b3. Examine the effect of different formulation, different pathological factors affecting on absorption
b4. Explore the appropriate dosage form for a specific absorption
C: Professional and practical skills: upon completion of the course, students will be able to:
c1. Instruction patients and other health care professionals about safe and effective use of drugs and medicines.
c2. Choose rationally the appropriate dosage form and route of drug administration for specific bioavailability
c3. Demonstrate critical thinking, synthesis and interpretation of pharmaceutical information, and responsibility**.**
D: Transferable skills: upon completion of the course, students will be able to:
d1. Demonstrate the skills of time management and self-learning.

COURSE CONTENT	
Topics	Weeks
1. Introduction to biopharmaceutics • Definition and significance of biopharmaceutics and bioavailability. • Introduction to steps for drug bioavailability (in vivo-stability, drugrelease, dissolution, absorption, distribution, metabolism and excretion)	**1**
2. Drug Release • Definition, significance , Expression parameters (cumulative % release, drug release rate) • Mechanisms and governing equations : Fick`s law, Higuchi equation, Peppas equation (matrix diffusion, membrane diffusion, Fickian, Non- Fickian, controlled) • Factor affecting ○ Biological : Anatomical and physiological features of administrationsite (influence of route of administration: buccal, sublingual, transdermal, intramuscular, subcutaneous, oral) ○ Pharmaceutical factors: physicochemical properties of the drug, influence of excipients and type of dosage form Exogenous factors: interaction with other drugs and food	**2**

3. Drug dissolution • Definition, significance , Expression parameters (cumulative % dissolved, dissolution rate), Mechanisms and governing equations : Noyes-Whitney equation, Factor affecting (Biological , Pharmaceutical factors, Exogenous factors)	**3, 4**
4. Drug absorption • Definition, significance • Expression parameters (cumulative % absorbed, absorption rate, absorptionrate constant) Mechanisms and governing equations , properties and examples of drugsabsorbed by each mechanism. ○ Passive diffusion (transcellular) : Fick`s law. ○ Carrier-mediated : Active transport, facilitated diffusion, ○ Convective (paracellular) transport, ion-pair transport, endocytosis • Factor affecting ○ Biological : Anatomical and physiological features of administrationsite (influence of route of administration: buccal, sublingual, transdermal, intramuscular, subcutaneous, oral) ; pathological factors, age (pediatric, geriatric, adult), gender (male, female) ○ Pharmaceutical factors: physicochemical properties of the drug, influence of excipients and type of dosage form Exogenous factors : interaction with other drugs and food	**5, 6**
Mid-semester exam	**7**
5. Drug distribution • Definition, significance of , Expression parameters: volume of distribution and related equations (related to blood flow, dose and plasma concentration, Mechanisms (passive diffusion, active transport), steps and sites of distribution Factor affecting: Biological , Pharmaceutical factors and Exogenousfactors	**8**
6. drug metabolism (biotransformation) • Definition, significance of drug biotransformation, Outcomes (products: active, inactive metabolite) with examples of drugs • Sites of metabolism: resystemic (first-pass effect), hepatic with examples of drugs highly influenced by presystemic	**9, 10**

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metabolism. • Mechanisms (phases Reaction): phase I and phase II: types of reactions, examples of drugs , Affecting factors : Biological Factors , pharmaceutical factors and Exogenous factors	
7. Biological factors affecting drug excretion • Definition, significance • Renal excretion : the nephron anatomy ➢ Properties of drugs excreted by the kidneys, Mechanisms: glomerular filtration, active tubular secretion, Tubular reabsorption, Factors affectingeach excretion mechanism: biological, pharmaceutical and exogenous factors. ➢ Excretion from the liver and other organs and the enterhepatic circulation	**11, 12**
8. Biopharmaceutical studies • Biopharmaceutical classification scheme In vivo studies: Pharmacokinetic and pharmacodynamics Bioavailabilitystudy (For a new drug): absolute bioavailability, definition, equation, Bioequivalence study : relative bioavailability, definition, equation. • In vitro studies : Drug release and dissolution studies (in fasted and feed state) in fluid simulant to that the g.i.t fluid, In vitro Stability of drug in fluid simulant to those of g.i.t, Permeability studies (partition coefficient determination, Ex vivo permeation studies. IVIVC : in vivo in vitro correlation studies	**13, 14**
Course review and discussion session	15

TEACHING & LEARNING METHODS
1) Lecture 2) Brainstorming 3) Seminar 4) Concepts map
LEARNING AIDS
• White board & Markers. • Data show • Illustrative videos
REFERENCES

1. Shargel. Biopharmaceutics and pharmacokinetics, 2002, McGraw Hill Inc.
2. Gibaldi. Biopharmaceutics and clinical pharmacokinetics
3. Harle. Pharmacokinetics and biopharmaceutics

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Course title	
Industrial pharmacy	
Course specification	
Academic year	Fourth
Academic semester	2nd
Course code	PHRT 18
Credit hours	Theor. (3) ; Pract. (-); Total : 3 Theor. (15 weeks) ;

COURSE DESCRIPTION:

This course deals with the study of criteria of good practices relevant to manufacturing of medications in drug plants. These criteria include current good manufacturing practice (cGMP), good storage practice (cGSP) and good laboratory practice (cGLP) that are based on global guidelines such as ICH, WHO and ISO. The course also concerns with and the substantial unit operations utilized during manufacturing of these products including those involved in transfer of materials, those applied prior and after mixing of ingredients and those employed in filling and packaging of finished products. The second part also deals with the steps that accompany the drug manufacturing processes in the factory, such as mixing, drying, evaporation, extraction, distillation, grinding and granulation, as well as crystallization processes, the study of heat transfer in bodies, and examples of devices used in all these processes and their advantages and disadvantages.

The Course Intended Learning Outcomes (CILOs)
A:Knowledge and understanding: upon completion of the course, students will be able to:
a1. Identify criteria for good practice of pharmaceutical manufacturing including cGMP, cGSP, cGLP based on ICH, WHO and ISO guidelines.
a2. Describe the role of pharmacist in employment GMP criteria and to operate unit operations for manufacturing of drug products.
a3. Describe the different types unit-operation methods used for pharmaceutical manufacturing and their advantages/disadvantages.
B: Intellectual skills: upon completion of the course, students will be able to:
b1. Select standard operation procedure to obtain in-process and finished products with specific criteria.
C: Professional and practical skills: upon completion of the course, students will be able to:

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c1. Handle efficiently and safely the chemical materials and tools used in the laboratory
c2. Operate the instruments and perform experiments successfully in the laboratory
c3 . Search efficiently for information using documented and electronic sources of information.
c4. Present and report his/her works correctly using appropriate writing rules and technologies media.
D:Transferable skills: upon completion of the course, students will be able to:
d1. Participate efficiently with his colleagues in a teamwork.
d2. Demonstrate the skills of time management and self-learning.
d3. Communicate effectively and behave in discipline with colleagues.

COURSE CONTENT	
Topics	Weeks
1) Criteria of good manufacturing practice (GMP) based on WHO-GMP guidelines	**1, 2**
2) Definition, advantages, disadvantages, factors affecting, types , operation and selection of equipments, applications of the following unit operations	
(i) Particle-size involved operations: a) Particle size reduction: milling b) Particle size enlargement: granulation. c) Particle size separation: sieving - sedimentation	**3 - 5**
(ii) Fluid- clarification operations: a. Filtration. b. Centrifugation	**6**
Mid-semester exam	**7**
(iii) Transfer- involved operations: a) Fluid flow b) Heat transfer	**8**
(iv) Heat- involved operations: a) distillation b) evaporation	**9- 12**

c) drying d) hot extraction e) crystallization	
(v) Mixing operations: a) Solid-solid mixing b) Solid-fluid and fluid-fluid mixing. c) Semisolid mixing	**4**
Course review and discussion session	**15**

TEACHING & LEARNING METHODS
1) Lecture 2) Brainstorming 3) Seminar
LEARNING AIDS
• White board & Markers. • Data show • Videos demonstrating various types of unit operation
REFERENCES
2- Aulton M.E., Pharmaceutics: the science of dosage form design, 2002, Churchill Livingstone. 3- Lachman, Theory and Practice of Industrial Pharmacy 3- Vidya. pharmaceutical industrial management. 4- Chandrasekhar. Pharmaceutical engineering 5- Jyothi. pharmaceutical engineering.

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Course title	
Hospital pharmacy	
Course specification	
Academic year	Fourth
Academic semester	2nd
Course code	PHRT 16
Credit hours	Theor. (2) ; Pract. (-); Total : 2 Theor. (15 weeks)

COURSE DESCRIPTION:

The course provides students with the knowledge and skills necessary to undertake all aspects of hospital pharmacy. It includes organizational structure of the hospital pharmacy, patient-care activities, hospital formulary, purchasing, drugs storage, medication distribution system, handling of controlled substances, dispensing of emergency drugs, and pharmacist technical services in hospital pharmacy.

Course Intended Learning Outcomes (CILOs) :	
A. Knowledge and Understanding: Upon successful completion of the course, students will be able to:	
a1	Define the principles of different aspects of hospital pharmacy
a2	Describe the role of the pharmacist in hospital pharmacy (procurement, storage, prescribing, transcription, dispensing, administration, monitoring and documentation).
B. Intellectual Skills: Upon successful completion of the course, students will be able to:	
b1	Distinguish the tasks of different hospital pharmacy organizations in hospital setting
b2	Identify the components of typical medication use systems in different pharmacy practice settings.
C. Professional and Practical Skills: Upon successful completion of the course, students will be able to:	
c1	Apply properly regulations, policies, and standard guidelines in practice processes to optimize medication use.
c2	Correctly use human, financial, and physical resources to optimize the medication use system.
D. Transferable Skills: Upon successful completion of the course, students will be able to:	

d1	Display self-learning and decision making skills to improve his problem solving abilities
d2	Communicate effectively with healthcare team and patients.

COURSE CONTENT	
Topics	Weeks
1. **Introduction :** definition of hospital pharmacy, difference between community, clinical and hospital pharmacy, requirements of a pharmacist to practice hospital pharmacy, design of ideal hospital pharmacy	1
2. **Hospital pharmacists:** personnel organization of hospital pharmacists, dutiesand mission of hospital pharmacists,pharmacy-therapeutic committee (PTC), hospital formulary (H.F)	2
3. **Specific types of medications in the hospital pharmacy** **(a)** Emergency drugs : types , significance of each type, example of each type (including generic, trade name, dose, strength), storage and dispensing rules. **(b)** Operative and pre-operative medication: types , significance of each type, example of each type (including generic, trade, name, dose, strength), storage and dispensing rules.	3 , 4
4. In-patient oriented services	
(a) drug distribution system: comparison of advantages and disadvantages of floor (ward) stock system, individual prescription system, combined system, unit dose system (procedures), patient`s medications record; checking to avoid duplication and drug interactions	4
(c) **Mixed I.V. preparations (1) I.V. admixtures:** definition, composition, advantages, incompatibilities. Chart of incompatibilities, measures to avoid incompatibilities, aseptic techniques of preparation	5, 6

Mid-semester exam	7
(d) **Mixed I.V. preparations (2) Total parenteral nutrition (TPN):** definition, advantages, indications, properties (compatibility, sterility), Components :water (required daily amount) , energy sources (lipids, carbohydrates, proteins: required daily as Kcal), electrolytes and trace elements (types, daily required), vitamins (types, daily required)	8
(e) Solving of mathematical problems related to I.V. admixtures and TPN.	9, 10
5. Out-patients oriented services: dispensing of hospital prescriptions, types of hospital prescriptions (written, electronic), checking of prescription, checking of medications, checking of drugdoses and interactions, using British national formulary(BNF) and other references, patient`s counseling services.	11, 12
6. Pharmacy procurement (medical supply) and storage **Medications to be supplied**: types, criteria of procurement (price,quality, availability, capacity and size , approval of PTC and reviewof H.F.). **Packaging and labeling** of drugs from large-capacitycontainers to smaller one**. Store of products:** arrangement andseparation of products based on their properties (physical states, toxicity, etc.)	13
7. Hospital pharmacists as pharmaceutical development providers: development of quality control, system of work, essential drug lists, educational activity	14
Course review and discussion session	**15**

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TEACHING & LEARNING METHODS
1- Lecture 2- Assignment and feedback 3- Concepts map
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• White board & Markers. • Data show • Videos demonstrating hospital pharmacists during work.
REFERENCES
1. Martin Stephens. Hospital pharmacy. 2nd Edition, ,2011Pharmaceutical press. 2. Paradkar. Hospital and clinical pharmacy 3. Qadry. A text book of hospital pharmacy 4. Mark Jackson, Andrew Lowey. Handbook of extemporaneous preparation,, 2010, The NHS Pharmaceutical Quality Assurance Committee, pharmaceutical press. 5. Wasfi Abbas ElTayeb. Lecture notes in Hospital pharmacy, King Saud University

Course title	
Pharmaceutical Quality Control	
Course specification	
Academic year	Fourth
Academic semester	2nd
Course code	PHRT 22
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks); Pract. (12 weeks)
COURSE DESCRIPTION:	
This course provides the students with the knowledge and capability to control the quality of drugs and other medical substances by the study of quality tests and knowledge of allowed limits in pharmacopeia. Also, this course deals with the study of the quality management, requirements, procedures as well as pharmacopeia tests to evaluate the quality of raw materials, in-process products and finished pharmaceutical products and QC tests of raw finished products, package and labels.The practical part of the course provides with skills of quality control of drugs that done in pharmaceutical instrumental analysis and pharmaceutics lab.	
Intended learning outcomes of the course (CILOs)	

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A:Knowledge and understanding: upon completion of the course, students will be able to:
a1. Identify the physicochemical properties of raw materials, in-process products and finished products that are used to evaluate their qualities.
a2. Explain the analytical methods and procedures applied to evaluate the quality of pharmaceutical raw materials, in-process products and finished products.
a3. Describe the role of pharmacists in implementing quality control rules and in evaluating the quality of pharmaceutical products.
B:Intellectual skills: upon completion of the course, students will be able to:
b1. Interpret the out-coming data obtained after qualitative or quantitative analysis of raw materials, in-process products and finished pharmaceutical products
b2. Select suitable standard operation procedures to investigate quality of pharmaceutical raw materials, in-process products and finished products
b3. Evaluate different types of pharmaceutical dosage forms.
b4. Apply calculations to assess the quality of raw materials, in-process products and finished pharmaceutical products
C:Professional and practical skills: upon completion of the course, students will be able to:
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory
c2. Operate the instruments (UV-Visible, HPLC, Hardness, Disintegrator, Dissolution and others) and perform experiments successfully in the laboratory
c3. Carry out quality control tests for different dosage forms of number of drugs.
D:Transferable skills: upon completion of the course, students will be able to:
d1. Communicate effectively and behave in discipline with colleagues.
d2. Participate efficiently with his colleagues in a team work.
d3. Demonstrate the skills of time management and self-learning.

COURSE CONTENT	
Topics	Weeks
1. Introduction to Quality control definition of quality, quality control QC, specifications (qualitative and quantitative) , governmental and drug plant QC lab, Relation and mission of quality management system (QMS), quality assurance (QA), GMP and QC	**1**

2. Units of QC lab: missions of a) Raw materials unit. b) In-process unit. c) Validation unit. d) Microbiology unit. e) Finished-product unit	**2**
3. **Procedures of sampling for QC purposes:** sampling methods, number of samples based on batch size	**3**
4. QC tests and pharmacopeial specifications: 5. **Tests of raw materials and In-process mixtures:** identification, assay, microbial content, impurities content, othertests with examples from the pharmacopeia	**4**
6. **Tests of package** and labels	**5**
7. Examples of In-process tests: during tablets, capsules, solutions	**6**
Mid-semester exam	**7**
8. Finished –products : solid dosage forms (tablets, capsules, granules, powders)	**8, 9, 10**
9.Finished –products : liquid dosage forms (solutions, suspensions, emulsions, drops)	**11, 12**
10.Finished –products : semisolid dosage forms: ointments, pastes, creams, gels	**13**
11.Finished –products : sterile dosage forms (ophthalmic, parenteral	**14**
Course review and discussion session	**15**

Practical part

Order	Tasks/ Experiments	Number of Weeks	contact hours
1.	QC sampling , checking of equipments & reporting	1	2
2.	QC of raw materials : paracetamol BP	1	2
3.	QC of in-process products after : mixing	1	2
4.	QC of in-process finished products : solution chlorpheniramine syrup BP	1	2
5.	QC of in-process finished products : suspension metronidazole suspension USP	1	2
6.	QC of in-process finished products : creams miconazole cream BP	1	2
7.	QC of in-process finished products : suppositories		2

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	paracetamol suppositories		
8.	QC of in-process finished products : paracetamol tablet friability hardness	1	2
9.	QC of in-process finished products : paracetamol tablet (dissolution, disintegration)	1	2
10.	QC of in-process finished products : capsules amoxicillin capsules USP	1	2
11.	QC labels of labels & package	1	2
PRACTICAL EXAM		1	2
Total		12	24

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1) Lecture
2) Assignment and feedback
3) Lab. work

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- White board & Markers.
- Data show
- Lab. Materials, tools and equipments

REFERENCES

1. Marayya. Quality assurance and quality management in pharmaceutical industry
2. Manohar. pharmaceutical quality assurance
3. A. P. Kulkarni. Process instrumentation And control
4. British pharmacopeia, 2013
5. Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins, USA

Course title	
Toxicology	
Course specification	
Academic year	Fourth
Academic semester	2nd
Course code	PHRC 09
Credit hours	Theor. (2) ; Pract. (-); Total :2 Theor. (15 weeks)

COURSE DESCRIPTION:

This course deals with the study of sources, mode of action, toxic pathophysiological effects, detection, diagnosis and management of poisonous materials including acids,

alkalis, metals, metalloids, pesticides, heavy metals, specific chemicals, simple organic compounds, poisoning with materials killing harmful Living organisms and Poisoning with some medicinal agents. The course also involves several methods for management of poisoning with some medicinal agents.
Intended learning outcomes of the course (CILOs)
A:Knowledge and understanding: upon completion of the course, students will be able to:
a1. Identify the mechanism of toxicity with poisonous materials.
a2. Identify the types of poisonous materials that can threaten human life.
a3. Describe the clinical features associated with poisoning
a4. Discuss the methods of poisons detection, diagnosis and management.
a5. Describe the role of pharmacist in detection, preventing and management of poisoning.
B:Intellectual skills: upon completion of the course, students will be able to:
b1. Classify poisonous materials.
C: Professional and practical skills: upon completion of the course, students will be able to:
c1. Search efficiently for information using documented and electronic sources of information.
D: Transferable skills: upon completion of the course, students will be able to:
d1. Demonstrate the skills of time management and self-learning.

COURSE CONTENT	
Topics	Weeks
(1) General Toxicology: Definitions, fundamentals and scope of toxicology.	**1**
(2) General Approach to Poisoned Patient; Principles of toxin Elimination	**2**
(3) Sources and mode of action of poisons, Factors modifying toxicity.	**3, 4**
(4) Industrial and Household Toxicology; Radiation hazards and industrial toxicants, Ethanol, Ethylene Glycol.	**5, 6**
(5) Toxicity caused by metal and non-metals: copper, selenium, Molybdenum, phosphorus, nitrates and nitrites, common salt and Fluoride	

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Mid-semester exam	**7**
(6) Toxicity due to Methanol and Isopropyl Alcohols and Hydrocarbons.	**8**
(8) Toxicity due to Cyanide and Hydrogen Sulphide.	**9**
(9) Toxicity due to Acids and Alkalis.	**10**
(10) Toxicity due to Lead, Mercury and Arsenic.	**11**
(11) Toxicity due to Iron intoxication, Drug toxicity and toxicity caused by agrochemicals: Insecticides and Pesticides and Herbicides.	**12**
(12)Toxicity due to Rodenticides, Fungicides and Carbon Monoxide.	**14**
Course review and discussion session	**15**

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1. Lecture
2. Brainstorming
3. Seminar
4. Concepts map
5. Assignments and Feedback

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- White board & Markers.
- Data show

REFERENCES

1. kokate, text book of forensic pharmacy
2. Peter Viccellio, Handbook of Medical Toxicology
3. Casarett & Doull's , Essentials of Toxicology
4. Frank A. Barile, Principles o f toxicology Testing

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Course title	
Pharmacy Training I (320 Training Hours)	
Course specification	
Academic year	Fourth
Academic semester	2nd
Course code	PHRT 20
Credit hours	Pract. (2); Total :2
Contact hours	320 hours (14weeks/ 3 days/week, 8hours/ day): 80 hours (Pharmaceutical industries) b) 240 hours (Hospital Pharmacy): (i) 120 hours (Hospital Pharmacy) (ii) 120 hours (Clinical Pharmacy part I)

COURSE DESCRIPTION:

The student is assigned to complete 320 hours in 2 pharmacy practice fields': (1) drug plant and (2) Hospital. The drug plant training is designed to acquire the student skills of how to practice and control preparation of pharmaceutical dosage forms in industrial scale. Training at hospital focuses on pharmaceutical care services offered by pharmacist and involves training in two sections (i) Hospital pharmacy (ii) Clinical pharmacy (part I). The first section is designed to acquire the students skills of Hospital pharmacy practice including dispensing and checking of medical prescriptions and distributing of drugs to inpatients , storing and management of medical supply administration, while the second section focuses on clinical pharmacy skills at Internal Medicine , Cardiology, pediatric and emergency departments including designing therapeutic regimens and drug therapy monitoring.. The Through active participation in day-to-day services, students will have the opportunity to apply knowledge and skills previously learned in related courses.

Course Intended Learning Outcomes (CILOs)

A. Knowledge and Understanding:

a1	Explain the standards of GMP and principles of pharmaceutical unit-processes applied in manufacturing different types of dosage forms in drug plants.
a2	Show knowledge and understanding of the concepts of pharmaceutical quality control applied during manufacturing different types of dosage forms in drug plants.

a3	Describe the responsibilities of hospital and clinical pharmacists in ensuring rational drug use in healthcare facilities.
a4	Explains first aid in some emergency situations, such as exposure to emergency situations.
B. Intellectual Skills:	
b1	Interpret terms, symbols and abbreviations used in medical prescriptions, patient`s medication administration records and during pharmaceutical industry practice
b2	Perform accurate pharmaceutical calculations related to drug dosing, dispensing , administration and dosage form preparation and quality control.
C. Professional and Practical Skills:	
c1	Practice missions in R &D, QC/OA and production area departments in a drug plant
c2	Employ clinical skills to design appropriate therapeutic regimens for in-patients admitted from Internal Medicine, Cardiology, pediatric and Emergency departments.
c3	Monitor drug therapy in order to assess drug benefit (patient response to drug) and risk (side and adverse effects)
c4	Check medication prescriptions for errors in particular (drug interactions-Contraindications- drug dose) and dispense them using the rules of Good Dispensing practice (GDP)
D. Transferable Skills:	
d1	Efficiently practice team-work with his colleagues, trainer, patients and healthcare workers.
d2	Use reliable Internet websites, computer-based programs Smart phone-applications (e.g. Medscape, Micromedix, Lexicomb) to search for drug information

Training program		
Field training		**No .of hour**
Training at Drug plant (80 Hours)		
Identification of the drug plant departments, missions and employees of each department	Research & development (R & D) Quality control department Quality assurance **Production area**	**(8 hours)**

Training at R & D department	Preformulation studies Formulations designing Formulations primary evaluation Stability studies **Master File**	(16 **hours)**
Training at Q C department	Types of analytical instruments Protocol of testing raw materials Protocols of testing finished products In-process Quality control Microbiological evaluation **Documentations**	**(24 hours)**
Training at production areas (lines)	Liquid dosage forms lines Semisolid dosage forms line Solid dosage forms line **Sterile dosage forms line**	**(32 hours)**
2- Hospital (a). Hospital Pharmacy (120 Hours)		
Hospital pharmacy (Inpatient pharmacy)	Drug distribution systems Sterile medication area (IV admixtures and total parenteral nutrition) Prepackaging area Controlled medications Compounding extemporaneous preparations Stores	(40 hours)
Hospital pharmacy (Outpatient pharmacy)	Medications arrangements Dispensing of prescriptions Hospital formulary: generic & trade names Controlled-drugs Regulations	(40 hours)
Hospital pharmacy (Medical stores & Medical supply administration)	• Inventory control • Systems of storing • Systems of issuing • Reception of medications **Documents**	(40 hours)
3- Hospital (b). Clinical Pharmacy part I (120 Hours)		
Hospital training: Clinical pharmacy: Inpatients (Internal medicine, cardiology	Morning Rotation (Round) Reading and understanding medical file and medication administration records of patients Review therapeutic regimen	(40 hours)

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ward)	Drug therapy monitoring	
Clinical pharmacy: Inpatients (Pediatrics ward)	Morning Rotation Reading and understanding medical file and medication administration records of patients Review therapeutic regimen **ug therapy monitoring**	(40 hours)
Clinical pharmacy; Emergency ward)	Morning Rotation Reading and understanding medical file and medication administration records of patients Review therapeutic regimen **Drug therapy monitoring**	24 **hours**
Final Oral and Written exam		**16 hours**

REFERENCES

1. Parthasarathi. A text book clinical pharmacy practice
2. References of " industrial pharmacy" and " hospital pharmacy"

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5th YEAR						
First semester						
No.	Code	Course	Credit hours			
			T	P	Training	Total
1.	MSC 11	Biostatistics	2	-		2
2.	MSC 12	Research methodology	2	1		3
3.	PHRT 12	Pharmacy Practice skills	3	-		3
4.	PHRC 10	Pharmacogenomics and gene therapy	2	-		2
5.	PHRT 24	Pharmacy Training II (250 Training Hours)	-		2	2
6.	PHRT 17	Pharmacokinetics	3	-		3
7.	PHRT 25	Nuclear Pharmacy	2	-		2
8.	PHRT 21	Pharmaceutical Biotechnology	2	-		2
Total			16	1	*2*	*19*

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Course title	
Biostatistics	
Course specification	
Academic year	Fifth
Academic semester	1st
Course code	MSC 11
Credit hours	Theor. (2); Pract. (-); Total : 2 Theor. (15 weeks)

COURSE DESCRIPTION:

This course is designed to acquire students with basic principles of statistics and how to deal with different data at various clinical settings and researches. Also this course focuses on descriptive inferential statistics as applied to health sciences student.

Intended learning outcomes of the course (CILOs)
A: Knowledge & Understanding: Upon successful completion of the course, students will be able to:
a1: Recall the basic concepts of sample selection, data collection and interpretation of results needed for the research.
a2: Identify the types of variables, method of collecting data and hypothesis
a3: Describe the knowledge and understanding from scientific research to practice evidence-based dentistry.
B: Intellectual skills: Upon successful completion of the course, students will be able to:
b1: Analysis the data and tabulation and interpret the results.
b2: Impart basic principles of biostatistics into research.
C: Professional & practical skills: Upon successful completion of the course, students will be able to:
c1: Implement the principles of research methodology to evaluate the prevalence of diseases in community and the effectiveness of preventive measures.
c2: Apply the different methods of data processing and analysis.
D: Transferable skills: Upon successful completion of the course, students will be able to:
d1: Employ modern technology and informatics in dental practice.
d2: Performing survey observations, data collection which is a fundamental part in the team work experience.

COURSE CONTENT	
Topics	Weeks
Introduction: definition and significant of statistics, types of data, interval scale data, ordinal scale data, nominal scale data	1

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Descriptive statistics: mean, mode, median, standard deviation, coefficient of variation	**2- 4**
Normal distribution	**5**
Sampling from population	**6**
Mid-semester exam	**7**
95 % confidence interval	**8**
F-test : P-value , significance of differences in variances between two sets of data	**9**
Student t-test : P-value, significance of differences in means between two sets of data , one-sided test, two-sided test, assuming equal variance, assuming unequal variance	**10, 11**
ANOVA : P-value, significance of differences in variances between more than two sets of data , single-factor test, two-factors with replication test, two-factors without replication test	**12, 13,**
Chi-square test : compare the differences in categorized data	**14**
Course review and discussion session	**15**

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1(Lecture 2(Brainstorming 3) Assignment and feedback
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REFERENCES
1. Philip Rowe. Essential statistics for the pharmaceutical sciences, 2007 John Wiley & Sons Ltd. 2. Arun Bhadra Khanal. Methods in Biostatistics For Medical students and Research workers 3. Singh. Biostatistics and introductory calculus

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Course title	
Research methodology	
Course specification	
Academic year	Fifth
Academic semester	1st
Course code	MSC 12
Credit hours	Theor. (2) ; Pract. (1); Total : 3 Theor. (15 weeks)

COURSE DESCRIPTION:

The research methodology course deals with the principles of research methods at the undergraduate level. It encompasses the understanding of presentation, analysis, interpretation of collected data and philosophy of medicine and health science research methods with the application of each type to various research questions and community problems.

Course Intended Learning Outcomes (CILOs):

A: Knowledge & Understanding: Upon successful completion of the course, students will be able to:	
a1	- Identify methods of data collection
a2	- Describe different methods of data presentations
a3	- List the different sampling techniques
B: Intellectual skills: Upon successful completion of the course, students will be able to:	
b1	- Apply the mean, median, mode, range, variance and standard deviation according to their characteristics and indications
b2	- Apply observational and experimental studies to different research topics according to characteristics, advantages and disadvantages of each method
C: Professional & practical skills: Upon successful completion of the course, students will be able to:	
c1	- Choose the research topic, with the professor's prior agreement.
c2	- Apply conceptual and theoretical frameworks to the chosen research topic
D: Transferable skills: Upon successful completion of the course, students will be able to:	
d1	Work effectively with their colleagues
d2	Use computer and internet as tool for self-learning and getting information

COURSE CONTENT

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Topics	Weeks
1. Components of a research thesis o Dedication o Acknowledgment o Contents o Lists of Abbreviations and symbols o Lists of tables and figures o Abstract • Chapter I : Introduction • Scope of the work and Objectives • Chapter II: materials and methods ❖ Materials ❖ Instrumentations ❖ Methods ❖ Experimental studies ❖ Clinical studies (study Population/sample/Samplingtechnique, Sample size, Variables definition ❖ Data analysis • Chapter III: Results : presentation of tables and figures • Chapter IV: Discussion Chapter V: Conclusions and Recommendations ○ References ○ Appendix ○ Arabic abstract	1- 5
1. How to write a proposal	6
Mid-semester exam	7
3. How to write a thesis **paper**, title, abstract, experimental,results & discussion, references, **4.** Publishing of articles and preparation of reports	8, 9
5. Training on Presentation skills	10 - 14
Course review and discussion session	15

TEACHING & LEARNING METHODS
1) Lecture 2) Presentation 3) Role play

4) Assignment and feedback
LEARNING AIDS
• White board & Markers. • Data show
REFERENCES
C. R. Kothari. Research methodology.

Course title	
Pharmacy Practice skills	
Course specification	
Academic year	Fifth
Academic semester	1st
Course code	PHRT 12
Credit hours	Theor. (3) ; Pract. (-); Total : 3 Theor. (15 weeks) ;

COURSE DESCRIPTION:
This course deals with the role of pharmacist in the "community pharmacy" as providers of pharmaceutical care services, including dispensing of medication and counseling, to patients and as administrators of the pharmacy. The course also provides students the essential knowledge and skills in order to properly recommend safe and effective over the counter (OTC) medications to patients based on benefit: risk evaluation and also to promote drug safety in the community and avoid drug abuse/misuse. The course follows completion of (pharmacology I, II) courses in which the student attain knowledge in actions of drugs covered in this course.
Intended learning outcomes of the course (CILOs)
A:Knowledge and understanding: upon completion of the course, students will be able to:
a1. Explain the impact of good behavior of pharmacists on their communication and relationship to patients and healthcare professionals.
a2. Identify the actions of OTC medications on patients and abuse/misuse of different types of those and other medications.
a3. Define the basis of effective pharmacy administration.
a4. Describe the pharmacist's role in community pharmacists to dispense and recommend safe and effective OTC medications to patients.
B: Intellectual skills: upon completion of the course, students will be able to:
b1. Plan a modern system to effectively administer the "community pharmacy"

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b2. Formulate and evaluate a plan of patient need and rational use of OTC medications to improve patient safety and efficacy
C: Professional and practical skills: upon completion of the course, students will be able to:
c1. Advise the patient to optimize medicine use.
c2. Apply rules for effective" pharmacy administration"
D: Transferable skills: upon completion of the course, students will be able to:
d1. Communicate effectively and behave in discipline with colleagues.
d2. Participate efficiently with his colleagues in a team work.
d3. Take responsibility for adaption to change needs in pharmacy practice
d4. Demonstrate the skills of time management and self-learning.
d5. Use essential references of evidence-based practice to achieve maximum safety and efficacy of medicines.

COURSE CONTENT	
Topics	Weeks
1. Introduction : • Filed of pharmacy practices, community pharmacy practice: objectives, requirements (pharmacist skills, knowledge, source of information: medical indexes "BNF", personal elegance). • Pharmaceutical product specifications: generic name, strength, • brand name, manufacturer, country, leaflet components, Services offered to patients in community pharmacies (in brief)	1, 2
➢ **Skills and knowledge of Dispensing of medication** • Items (details) of medical prescription • Skills of dispensing : Standard Operating procedures (SOPs) of preparing a prescription: : careful reading, identifying the items of the prescription, checking of legality, making necessary calculation,checking,	3, 4

bringing medication, second checking, packaging, giving necessary instructions, answering patient`s questions • Case studies and training on the SOPs of dispensing: examples of written prescriptions	
➢ **Specific requirements for dispensing of controlled medications** ➢ Types of medications : Prescription Only medications(POMs) risks and need of awareness ! ➢ Types of controlled drugs ➢ Regulations for prescription: legal prescribers, legallysigned ➢ Prescription forms ➢ Addict (installment) prescriptions for controlled drugs ➢ Requisitions forms ➢ Record-keeping on a register (example of a register form) ➢ Case study: training on controlled drug prescriptions	5 , 6
Mid-semester exam	7
➢ **Preparation and dispensing of extemporaneous products** ➢ Types of extemporaneous preparations: from raw materials,from dosage forms (e.g. preprations of oral liquids from capsules, tablets and injectons) ➢ Requirements of pharmaceutical lab. In the pharmacy ➢ Information references e.g. British pharmacopeia ➢ Challenge and troubles: Ingredients quality, stability, qualitycontrol testing ➢ Packaging of extemporaneous preparations ➢ Patient`s instruction guidelines	8, 9
➢ **Recommending of OTC medications in response to**	10, 11

symptoms ➢ Types of medications (OTC) dispensed without a prescription. ➢ Factors to be considered when responding to symptoms in thepharmacy. ➢ Observation of patient`s symptoms ➢ Making a differential diagnosis ➢ acronyms (SIT, ASMETHOD, ENCORE)used whenresponding to symptoms in a pharmacy ➢ Taking a case history ➢ Case study examples	
➢ **Patient`s counseling** ➢ Skills for patients counseling: communication with the patient ➢ Products-specific counseling points: explaining to the patient ➢ how to use (apply and take dose) of the following productscorrectly and what precautions should he/she avoid • Ophthalmic preparations: eye drops and ointments. • Nasal drops and sprays • Inhalers • Oral products: tablets, capsules, liquids, powders/granules • Suppositories, pessaries an vaginal creams • Topical dermatological preparations	12
➢ **Pharmacy management** ➢ Documentation, indexing ➢ Pricing, procurement, selling ➢ Stock control ➢ Storage areas I community pharmacy	13, 14

Course review and discussion session	15

TEACHING & LEARNING METHODS

1) Lecture
2) Seminar
3) Concepts map
4) Assignments and feedback

LEARNING AIDS

- White board & Markers.
- Data show
- Videos demonstrating community pharmacists during work.

REFERENCES

1. Lillian M Azzopardi. Lecture notes on pharmacy practice, Pharmaceutical press.Christopher
2. A Langley, Dawn Belcher. Applied pharmaceutical skills, Pharmaceutical press.
3. Agarwal. Dispensing and community pharmacy
4. Jain. A text book of professional pharmacy
5. Sachin. pharmaceutical management
6. Jon Waterfield. Hand book of community pharmacy, ,2008Pharmaceutical press.
7. Tindall. Pharmaceutical care ; Insights from community pharmacists

Course title	
Pharmacogenomics and gene therapy	
Course specification	
Academic year	Fifth
Academic semester	1st
Course code	PHRC 10
Credit hours	Theor. (2) ; Pract. (-); Total : 2 Theor. (15 weeks)

COURSE DESCRIPTION:

The course deals with the study of influence of gene on drugs efficacy and toxicity. Moreover, the course also concerns with the principle and applications of gene to treat diseases.

Intended learning outcomes of the course (CILOs)

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A: Knowledge & understanding: Upon successful completion of the course, students will be able to:
a1. Identify the role of genes in affecting drug disposition in the body.
a2. Determine the types of genes used to treat of diseases.
a3. Define pharmacogenomics and recognize its main purposes and techniques.
a4. Explicit the medical applications of gene therapy
a5. Comprehend his/her role as a pharmacist in recognizing and researching of pharmacogenomics & gene therapy
B: Intellectual skills: Upon successful completion of the course, students will be able to:
b1. Interpret symbols and abbreviations related to pharmacogenomics & gene therapy.
b2. Classify pharmacogenomic studies and gene therapy techniques.
b3. Compare between various types of gene therapy techniques.
b4. Assess the advantages and disadvantages of pharmacogenomics and gene therapy.
b5. Select appropriate gene therapy techniques to produce drugs.
C: Professional & practical skills: Upon successful completion of the course, students will be able to:
c1. Search efficiently for information using documented and electronic sources of information.
D: Transferable skills: Upon successful completion of the course, students will be able to:
d1. Share successfully in team-work.
d2. Communicate effectively with his/her colleagues.
d3. Demonstrate time management and self-learning during performing practical and professional works and assignments.
D4. Show respect to life.

COURSE CONTENT	
Topics	Weeks
Part I : Pharmacogenomics	
1- Pharmacogenomics: definitions (pharmacgenetics, pharmacogenomics), brief history of pharmacogenomics.	**1**
2- Genetic elements: human chromosomes, DNA, nucleotides, genes, genotype, phenotype), role of genes in production of proteins suchas enzymes, receptors, some hormones and drug carriers **3-** Genetic variations: mutation, single-nucleotides polymorphism (SNP),	**2 - 4**
Influence of genetic variations on drug pharmacokinetics: metabolizing	**5, 6**

enzymes, distribution and absorption carriers; with examples of affected drugs.	
Mid-semester exam	**7**
Influence of genetic variations on drug pharmacodynamics: receptors with examples of affected drugs	**8**
Part II : Gene therapy	
Definition and brief history, Stem cells , somatic cells : differences Types of gene therapy: germline gene therapy, somatic gene therapy	**9**
Gene delivery systems: viral vectors, non-viral vehicles	**10**
Application of gene therapy to treat diseases (e.g. CVS disorders, Alzheimer, diabetes, etc.)	**11- 13**
Limitation and ethical issues of gene therapy	**14**
Course review and discussion session	**15**

TEACHING & LEARNING METHODS
1- Lectures 2- Seminar 3- Assignment and feedback
LEARNING AIDS
• White board & Markers. • Data show
REFERENCES
1. Shargel. Biopharmaceutics and pharmacokinetics, 2002, McGraw Hill Inc. 2. Anthony Meagre. Gene therapy technologies, applications and regulations, 1999 John Wiley & Sons Ltd 3. Connor. Medical genetics

Course title	
Pharmacy Training II (320 Training Hours)	
Course specification	
Academic year	Fifth
Academic semester	1st
Course code	PHRT 24
Credit hours	Pract. (2); Total :2
Contact hours	320 hours (8 hours/day -3 days/week -14 weeks):

	a) Hospital : 120 hours (Clinical **Pharmacy).** b) 200 hours (Community Pharmacy)

COURSE DESCRIPTION:

This is the second part of training courses for pharmacy Bachelor students. In this part the student is assigned to complete 320 hours in 2 pharmacy practice fields': (1) Hospital and (2) community pharmacy. The Hospital training focuses on completion the clinical pharmacy training of pharmacy training 1. The student is trained for clinical pharmaceutical care services at Gynecological & Obstetrician, Orthopedic and Urogenital departments. Departments. The Through active participation in day-to-day services, students will have the opportunity to apply knowledge and skills previously learned in related courses. Training at Community pharmacies is designed to help the student to attain the skills of patient counseling, dispensing medication prescription, management and organization of community pharmacies and reach contact to the drug market including trade names and pharmaceutical companies.

INTENDED LEARNING OUTCOMES (ILOS):

At the end of this training, the student shall have applied knowledge and skills in performing services to out-patients in community pharmacies.

Intellectual Skills	1. Classify medications in the community pharmacy according to their therapeutic categories and storage recommendations.
	2. Compare between pharmaceutical equivalents, pharmaceutical alternatives and therapeutic alternatives in community pharmacy.
	3. Assess risks of medications on specific population of patients e.g. pregnant, breastfeeding women and geriatrics.
C. Professional & Practical Skills	4. Check medical prescription for potential errors e.g. drug interactions and dispense prescriptions accurately according to the standards of Good Dispensing practice (GDP)
	5. Perform patient`s counseling to provide patients information of rational drug use.
	6. Store medications in and out refrigerator according to their specific storage recommendation.
	7. Employ clinical skills to design therapeutic regimen for in-patients in the hospital.
	8. Monitor drug therapy in order to assess drug benefit (patient response to drug) and risk (side and adverse effects).

Training program:

Field training	No .of hour

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1- Hospital: Clinical pharmacy part II (120 Hours)		
Clinical pharmacy: Inpatients (Gynecology & Obstetrician Departments)	Morning Rotation Reading and understanding medical file and medication administration records of patients Review therapeutic regimen • Drug therapy monitoring	(40 hours)
Clinical pharmacy: Inpatients (Orthopedics)	Morning Rotation Reading and understanding medical file and medication administration records of patients Review therapeutic regimen **Drug therapy monitoring**	(40 hours)
Clinical pharmacy (Urogenital department)	Morning Rotation Reading and understanding medical file and medication administration records of patients Review therapeutic regimen **Drug therapy monitoring**	(40 hours)
2- Community Pharmacy (200 Hours)		
Identification of a drug product, Medication storage, Controlled-drugs	Identification of a drug product Medications classification and Ordering Label information Brand names and manufacturers Medication storage Storage conditions Storage according to type of the dosage form Medications need specific storage (refrigerator, breakable package, etc) Controlled-drugs Types Specific regulations of dispensing	(40 hours)
Over the counter (OTC) medications	Selecting an OTC based on patient case (skills of patient counseling) OTC for pain and fever OTC for community GIT disorders	(80 hours)

	OTC for oral health care OTC for dermatological community cases OTC for respiratory community cases Other OTC	
Dispensing of Prescriptions (under supervision)	Prescription data: physician data, patient data, medication data Checking drug information Picking and assembly of medications **Instruction of patients to use the medications: telling the patient and writing directions to use**	(40 hours)
Protocols for Requesting, Receiving, documentation and Sale of medications	Supplier lists (Agents and domestic manufacturer) Medication prices, bonuses, discounts Protocols of medication requesting Checking of medications received Sale: calculation from the purchase price, sale computer-based software **Documents and documentation**	(24 hours)
Final written and Oral Exam		16

REFERENCES

References books of " Pharmacy practice skills".

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Course title	
Pharmacokinetics	
Course specification	
Academic year	Fifth
Academic semester	1nd
Course code	PHRT 17
Credit hours	Theor. (3) ; Pract. (-); Total : 3 Theor. (15 weeks)

COURSE DESCRIPTION:

This course is follow (Biopharmaceutics course) and both provide knowledge in drug pharmacokinetics and bioavailability. However, this course provides the student with the knowledge and skills required to use data, obtained from pharmacokinetic/ biopharmaceutical studies, for mathematical calculations of drug concentrations in body and the rate and extent of drug absorption, distribution, elimination and bioavailability. In addition, this course has a practical part in order to provide students with skills required to carry out pharmacokinetic and biopharmaceutical experiments

The Course Intended Learning Outcomes (CILOs)
A: Knowledge and understanding: upon completion of the course, students will be able to:
a1. Explain the procedures employed during pharmacokinetic/biopharmaceutical studies.
a2. Describe the role of pharmacist in determination of pharmacokinetic/ biopharmaceutical parameters.
a3. Explainthe basic mathematical principles of pharmacokinetic/ biopharmaceutical calculations.
a4. Identify the order of changing drug amount in the body and the models of drug distribution**.**
B: Intellectual skills: upon completion of the course, students will be able to:
b1. Interpret the numerical and graphical data relevant to drug pharmacokinetic / biopharmaceutical
b2. Apply calculations to graphically & mathematical solve pharmacokinetic/biopharmaceutical problems.
C: Professional and practical skills: upon completion of the course, students will be able to:
c1. Handle efficiently and safely the chemical materials and tools used in the laboratory
c2. Operate the instruments successfully in the laboratory

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c3. Carry out pharmacokinetic / biopharmaceutical experiment
D: Transferable skills: upon completion of the course, students will be able to:
d1. Participate efficiently with his colleagues in a teamwork.
d2. Demonstrate the skills of time management and self-learning.
d3. Communicate effectively and behave in discipline with colleagues.

COURSE CONTENT	
Topics	Weeks
I. Introduction: definition and significance of pharmacokinetics ,abbreviations and brief definitions of pharmacokinetic data . Definitions , significance, related equations of substantial pharmacokinetic data : half-life ($t_{1/2}$), clearance (Cl), volume of distribution, (V_d), Area under the curve ($AUC\infty$) ➢ Mathematical fundamentals of pharmacokinetics: Common logarithm (log) , natural logarithm (ln), base exponent (e^{-x}), Demonstrating of X Y data : tabular form, graphical form (semilog paper, rectangular coordinate paper), Straight line : general equation, determination of slope and rate constant graphically on, semilog paper, rectangular coordinate paper ***with Solved and homework problems***.	**1**
II. Pharmacokinetic study Dosing : drug administration. Sampling: blood, urine , others (advantages, disadvantage), interval of sampling, considerations of sampling. Analyzing of sample. Data from urine samples analysis : curves of cumulative amount of drug excreted ($\sum Du$) versus time, excretion rate ($\sum Du/dt$) versus time, amount of drug remaining to beexcreted ($ARE= Du^{\infty}-\sum Du$) versus time. Data from blood samples analysis : drug concentration in plasma (Cp) versus time curve after intravenous and extravascular administration	**2**
III. Analysis of data ***(i)*** Determination Area under the curve ($AUC\infty$) mathematically bytrapezoidal method with ***Solved and homework exercises*** ***(ii)*** **Pharmacokinetic models of distribution:** definition, significance, types (one-compartment, two compartments, three compartment) and principle of each model, graphical figures illustratingeach model after intravenous and extravascular administration, determination of pharmacokinetic model	**3 - 5**

mathematically and graphically with ***Solved and homework problems*** **The order of kinetic rate :** definition, significance and types (first order, zero order), Determination of the order of elimination rate from the last points : mathematically, graphically (semilog paper, rectangular paper) ***with Solved and homework problems.*** Determination of the distribution rate in two compartment model, fromthe points after the maximum Cp , graphically (semilog paper, rectangular paper) by extrapolation residual line method ***with Solved and homework problems***	
Pharmacokinetics of drugs given by intravenous administration (graphical and tabular representation, general equations of drug concentration in plasma at a given time, determination of rates constant, volume of distribution, half-life, clearance and other pharmacokinetic data) ***with Solved and homework problems*** for **1- I.V. single bolusBlood data** ➢ One-compartment : first-order elimination, zero order elimination ➢ Two compartment: first-order elimination, zero order elimination **Urine data** One-compartment : first-order elimination, zero order elimination, excretion rate versus time, ARE versus time	**6**
Mid-semester exam	**7**
IV. Pharmacokinetics of drugs given by intravenous administration (graphical and tabular representation, general equations of drug concentration in plasma at a given time, determination of rates constant, volume of distribution, half-life, clearance and other pharmacokinetic data) ***with Solved and homework problems*** for **2. I.V. multiple dosing :** One-compartment assuming first orderelimination , specific data (C_{max}, C_{min}, $C_{max\infty}$, $C_{min\infty}$, $C_{P\infty}$, C_{SS},) **3. I.V. infusion: one-compartment model:** specific data (rate of infusion(R), steady state concentration C_{ss}, maintenance dose D_m, loading dose D_L) . General equations and how to determine specific data and substantial data (half-life ($t_{1/2}$), clearance (Cl), volume of distribution, (V_d)) When the rate of infusion is constant ,the rate of infusion changes, when I.V. bolus dose is proceeded the i.v. infusion , multiple intermittent infusion	**8, 9**
4. Pharmacokinetics of drugs given by extravascularadministration (oral, intramuscular,	**10-12**

sublingual, buccal, rectal, etc) graphical and tabular representation of pharmacokinetic data (graphical and tabular representation, general equations of drug concentration in plasma at a given time, determination of rates constant, volume of distribution, half-life, clearance and other pharmacokinetic data) ***with Solved and homework problems*** for **1. extravascular Single dosing(A)Blood data** Definitions of Specific data of absorption phase: K_a, F, C_{max}, $T_{max}D_{ab}$, D_{ab}^{∞}, f_{ab} (fraction absorbed), f_{ua} (fraction unabsorbed), ○ Determination of elimination rate constant and half-life from thelast points of elimination phase ○ determination of K_a by residual method fromCp versus time curve. ○ determination *of* C_{max}, T_{max}, mathematically ○ determination of D_{ab}, D_{ab}^{∞}, f_{ab}, f_{ua} ○ determination of K_a by Wagner – Nelson method from f_{ua} versus time curve **(B)Urine data** ➢ One-compartment : first-order elimination, zero order elimination,ARE versus time 2. **extravascular multiple dosing :** One-compartment assuming first order elimination: One-compartment assuming first order elimination , specific data (C_{max}, C_{min}, $C_{max\infty}$, $C_{min\infty}$, $C_{P\infty}$, C_{SS},)	
5. Clinical Pharmacokinetics : (i) Loading and maintenance doses (ii) Doses and dosage interval at change from I.V. infusion to oraladministration. (iii) Changes in plasma concentration with change in route ofadministration. Dose based on creatinine clearance (iv) Dose in the elderly **Determination of absolute ad relative bioavailability** fromblood and urine data	**13, 14**
Course review and discussion session	**15**

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1- Lecture 2- Assignment and feedback 3- Concepts map
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• White board & Markers. • Data show • Computers: Microsoft Excel program
REFERENCES
1. Shargel. Biopharmaceutics and pharmacokinetics, 2002, McGraw Hill Inc 2. Malcolm Rowland. Clinical pharmacokinetics: concepts an applications, 1996, Lippincott's Williams & Wilkins 3. Wagner. Pharmacokinetics for the pharmaceutical scientist 4. Venkaeswarlu. Biopharmaceutics and pharmacokinetics

Course title	
Nuclear Pharmacy	
Course specification	
Academic year	Fifth
Academic semester	1st
Course code	PHRT 25
Credit hours	Theor. (2) ; Pract. (-); Total : 2 Theor. (15 weeks);
COURSE DESCRIPTION:	
This course concerns with the study of radiopharmaceuticals. In the first part, it introduces knowledge of general radiations, types of radiations, elements that emit radiation, and study of production and labeling methods, risks management. The second part focus on radiopharmaceuticals used for diagnosis and treatment of human diseases.	
The Course Intended Learning Outcomes (CILOs)	
A: Knowledge and understanding: upon completion of the course, students will be able to:	
a1. Explain the physicochemical properties of radionuclides, radioisotopes, radioisomers and radiopharmaceuticals.	
a2. Describe the analytical methods used for measurement of radioactivity, radiodiagnosis of human diseases and quality evaluation of radiopharmaceuticals.	
a3. Identify actions of radiations and radiopharmaceuticals in human.	
a4. Describe the role of pharmacist in safe and effective radiopharmaceutical administration.	
B: Intellectual skills: upon completion of the course, students will be able to:	

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b1. Classify radiations, radionuclides and radiopharmaceuticals.
b2. Apply calculations to measure radioactivity and radiopharmaceutical doses.
C: Professional and practical skills: upon completion of the course, students will be able to:
c1. Search efficiently for information using documented and electronic sources of information.
c2. Present and report his/her works correctly using appropriate writing rules and technologies media.
D: Transferable skills: upon completion of the course, students will be able to:
d1. Demonstrate time management and self-learning skills.

COURSE CONTENT	
Topics	Weeks
1.Introduction: definition (radiopharmaceuticals, nuclear medicine), brief history, components of a radiopharmaceutical , advantages and disadvantages.	**1**
2. Radioactivity: types of radioactive elements, radioactive decay, radioactive half-life, equations of radioactivity, unit of radioactivity and dose *curie* (Ci), mCi,	**2**
3. Radioactive decay rays: alpha, beta, gamma: properties, ability to penetration, risks and benefits	**3**
4- Diagnostic imaging Raiopharmaceuticals: products used for diagnostic purposes; types , uses, components, risks, benefits	**4 , 5**
5- Radiopharmaceuticals drug products : types , uses, components,risks, benefits of drug products from USP lists of radiopharmaceuticals	**6**
Mid-semester exam	**7**
Continue: Radiopharmaceuticals drug products : types , uses, components, risks, benefits of drug products from USP lists of radiopharmaceuticals.	**8, 9**
6- Positron emission tomography : principle, applications	**10**
7- Drug antidote for radiation exposure	**11**
8- Nonradioactive pharmaceutical use in nuclear medicine	**12**

9- Practice of nuclear pharmacy	**13**
10- Drugs known to interfere with radiopharmaceuticals	**14**
Course review and discussion session	**15**

TEACHING & LEARNING METHODS
1) Lecture 2) Assignment and feedback 3) Seminar
LEARNING AIDS
• White board & Markers. • Data show
REFERENCES
1.Gopal B. Saha. Fundementals of nuclear pharmacy, 2010, Springer. 2.Ansel`s Pharmaceutical dosage forms and drug delivery system, 2011, Lippincott Williams and Wilkins. 3.British pharmacopeia, 2013

Course title	
Pharmaceutical Biotechnology	
Course specification	
Academic year	Fifth
Academic semester	1st
Course code	PHRT 214
Credit hours	Theor. (2) ; Pract. (-); Total : 2 Theor. (15 weeks)
COURSE DESCRIPTION:	
This course deals with the study of applications of biotechnological methods such as recombinant DNA, polymerase chain reaction (PCR) and peptide technologies in pharmacy in particular the use of these techniques in analysis of genes and also the recent production of certain medicines such as monoclonal antibodies and others and their therapeutic uses. Also, this course concerns with the study of genetic therapy for complicated diseases (treatment by replacement of the defected genes with normal genes).	
Intended learning outcomes of the course (CILOs):	

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A: Knowledge & understanding: upon completion of the course, students will be able to:
a1. Explain the physicochemical properties of biotechnology drug products.
a2. Identify the actions, therapeutic uses and adverse effects of biotechnology-drug products.
a3. Explain the approaches and analytical techniques applied in biotechnology relevant to gene analysis and production of biotechnology-drug products.
a4. Describe the role of pharmacist in developing and employing biotechnology techniques in pharmacy practice.
B: Intellectual skills: upon completion of the course, students will be able to:
b1. Classify biotechnology drugs.
b2. Design a suitable method to extract, isolate and purify DNA and genes from human samples
C: Professional and practical skills: upon completion of the course, students will be able to:
c1. Search efficiently for information using documented and electronic sources of information.
c2. Present and report his/her works correctly using appropriate writing rules and technologies media.
D: Transferable skills: upon completion of the course, students will be able to:
d1. Demonstrate the ability of time management and self-learning.

COURSE CONTENT	
Topics	Weeks
1. Introduction to Biotechnology definition of biotechnology, relation of biotechnology to advancement in intracellular chemistry, molecular biology, rDNA technology, pharmacogenomics and immunopharmacology, advantage and disadvantages of biotechnology products as compared to classical medications, brief history on proteins as the first biotechnology products	**1, 2**
2. Techniques of biotechnology: brief history, principle, equipment's:	
1. recombinant DNA (rDNA) **2.** Monoclonal antibodies **3.** Polymerase chain Reaction (PCR) **4.** Nucleotide blockade/antisense	**3 – 6**

5. Peptide technology	
Mid-semester exam	7
Products of biotechnology Indication, mechanism of action, dose, route of administration, precautions, biotechnology by which is obtained for the following products.	
•Anticoagulant drug: Lepirudin (Refludan). •Antisense drugs : Fomivirsen sodium (Vitravene), efavirenz(Sustiva). •Clotting factors : Systemic antihemophilic factors (Kogenate) . •colony-stimulating factors: granulocyte colony–stimulating factor (Filgrastim). •Erythropoietins : Epoetin alfa (Epogen, Procrit). •Fusion inhibitors: Enfuvirtide (Fuzeon). •Growth factor: becaplermin (Regranex). •Human growth hormone: ystemic growth hormone (Humatrope, protropin). •Interferons: interferon beta-1b (betaseron), interferon beta-1a (Avonex). •Interleukins: Aldesleukin (Proleukin). •tissue plasminogen activators: recombinant Alteplase (Activase). • Vaccines: hepatitis B vaccine recombinant (Engerix-b) . •haemophilus B conjugate vaccine (Hibtiter) .	**8- 13**
7. The future of biotechnology products	**14**
Course review and discussion session	**15**

TEACHING & LEARNING METHODS
1) Lecture 2) Brainstorming
LEARNING AIDS
• White board & Markers. • Data show.
REFERENCES
1. Ansel`s Pharmaceutical dosage forms and drug delivery system,2011, Lippincott Williams and Wilkins, USA. **2.** Nagori. Foundation s in pharmaceutical biotechnology **3.** R. S. GAUD. Practical biotechnology.

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5th YEAR					
Second Semester					
No.	Code	Course	Credit hours		
			T	P	Total
1.	PHRT 26	Pharmaceutical Marketing	2	-	2
2.	MSC 13	Professional ethics and regulations	2	-	2
3.	MSC 14	Graduation research Project	-	3	3
4.	PHRT 19	Pharmacoeconomics	2	-	2
5.	PHRO 02	Public health and First aid	2	-	2
Total			8	3	11

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Course title	
Pharmaceutical Marketing	
Course specification	
Academic year	Fifth
Academic semester	2nd
Course code	PHRT 26
Credit hours	Theor. (2) ; Pract. (-); Total : 2 Theor. (15 weeks);

COURSE DESCRIPTION:

This course is designed to provide the students with knowledge, ability and skills required to effectively promote pharmaceutical and cosmetic products. The course also concerns with skills of self-promotion including preparation of CV and practicing effective Job interview. The course also concerns with skills of self-supporting of pharmacist in the work market.

III. Intended learning outcomes of the course (CILOs)

A:Knowledge and understanding: upon completion of the course, students will be able to:

a1. Define the basis of marketing and its strategies and applications in pharmacy.

a2. Describe the role of pharmacist in promoting pharmaceutical and cosmetic products

B: Intellectual skills: upon completion of the course, students will be able to:

b1. Plan a modern marketing strategy to promote pharmaceutical and cosmetic products.

C: Professional and practical skills: upon completion of the course, students will be able to:

c1. Apply marketing rules to apply to jobs and to promote pharmaceutical and cosmetic products.

D: Transferable skills: upon completion of the course, students will be able to:

d1. Interact and communicate effectively with healthcare professional during marketing of pharmaceutical and cosmetic products.

COURSE CONTENT

Topics	Weeks
1. **Introduction to marketing :** definitions, elements (place, time, product, customer, market)	**1**
2. **Requirements of a successful marketing professional:** personnel, mental, skills communication and relationship building ; **Strategy of marketing:** planning, execution, evaluation	**2**

3. **Designing a marketing plane**	**3**
4. **Understanding the customers:** customers need and satisfaction **Products:** costs versus quality	**4**
5. **Pharmaceutical marketing:** significance , Who is the med. Rep., ethical issues **Pharmaceutical products:** differences from other products, essential information to be full known on pharmaceutical products (pharmaceutical, pharmacological, commercial) properties	**5, 6**
Mid-semester exam	**7**
6. **Pharmaceutical Promotional materials:** brochures, gifts, charts, etc.	**8**
7. **Role play: Training on visiting to customers (physicians)** : pre-visit preparation ad skills of effective visit (meeting, opening, offering, closing), post-visit evaluation	**9- 12**
8. Prepare your C.V.	**13**
9. Skills of Job applications and interview	**14**
Course review and discussion session	**15**

TEACHING & LEARNING METHODS
1) Lecture 2) Role play 3) presentation
LEARNING AIDS
• White board & Markers. • Data show
REFERENCES
1. Ross Mulner. Pharmaceutical marketing, Journal of Consumer Marketing, 2005

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Course title	
Professional ethics and regulations	
Course specification	
Academic year	Fifth
Academic semester	2nd
Course code	MSC 13
Credit hours	Theor. (2) ; Pract. (-); Total : 2 Theor. (15 weeks);

COURSE DESCRIPTION:

The course deals with the study of local and global regulations controlling the medical professions. Besides, the course provides code of ethics the medical professionals should consider during practicing of their professions.

Course Intended Learning Outcomes (CILOs) :

Knowledge and Understanding: Upon successful completion of the course, students will be able to:	
a1	Identify concept of ethics, medical ethics, bioethics, moral, morality and moral dilemma, codes, principles and theories of ethics, legislation and laws affecting the professional.
B. Intellectual Skills: Upon successful completion of the course, students will be able to:	
b1	Discuss professional values, the seven human rights and types of ethical problems.
C. Professional and Practical Skills: Upon successful completion of the course, students will be able to:	
c1	**Not applicable**
D. Transferable Skills: Upon successful completion of the course, students will be able to:	
d1	Describe professional rules and responsibilities toward patient and health team.
d2	Deal effectively with patients, their families and the health care team.
d3	Practice within ethical and legal framework professional.

COURSE CONTENT

Topics	Weeks
Introduction: medical regulations: history	**1 - 3**
Professional organization for medical ethics and regulation : local, Arabic and Global	**4 , 5**
Code of Ethics for medical professions and regulation : Old (Oath of Hippocrates) , and in Yemen	**6**
Mid-semester exam	7

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Global Code of Ethics for medical professions: - Arab countries - Asian - Europe. - USA	**8 - 14**
Course review and discussion session	**15**

TEACHING & LEARNING METHODS
1) Lecture 2) Seminar
LEARNING AIDS
• White board & Markers. • Data show
REFERENCES
1. Agarwal. pharmaceutical jurisprudence & Ethics code of ethics, council of health ministers in Arab gulfcountries, 2009 2. code of ethics, pharmacy council of New Zealand, 2011 3. 2009 Iowa code chapter 155a Iowa pharmacy practice act, USA

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Course title	
Pharmacoeconomics	
Course specification	
Academic year	Fifth
Academic semester	2nd
Course code	PHRT 19
Credit hours	Theor. (2) ; Pract. (-); Total : 2 Theor. (15 weeks)

COURSE DESCRIPTION:

The course deals study of the study of measuring and comparing the costs of therapies and medical care services individually or in healthcare facilities and determining which alternative produces the best health outcome for the available budget .

Intended learning outcomes of the course (CILOs)
A: Knowledge and understanding: upon completion of the course, students will be able to:
a1. Describe the analysis methods of Pharmacoeconomics, pharmacoepidemiology and Pharmacovigilance
a2. Define the basis of Pharmacoeconomics, pharmacoepidemiology and Pharmacovigilance
a3. Describe the role of pharmacists to evaluate drug products and therapies using pharmacoeconomically and pharmacoepidemiologic methods
B: Intellectual skills: upon completion of the course, students will be able to:
b1. Interpret outcome data of pharmacoeconomic and pharmacoepidemiology analysis.
b2. Apply pharmacoeconomic and pharmacoepidemiologic calculations to evaluate drug products or therapies.
C: Professional and practical skills: upon completion of the course, students will be able to:
c1. Apply rules of Pharmacoeconomics and pharmacoepidemiology in pharmacy practice.
D: Transferable skills: upon completion of the course, students will be able to:
d1. Demonstrate skills of time management, problem-solving and decision making.
d2. Take responsibility of adaptation to changes need in pharmacy practice.

COURSE CONTENT	
Topics	Weeks
1- Introduction: definition of (economy, pharmacogenomics,	**1**

cost), significance and mission of Pharmacoeconomics, relation between Pharmacoeconomics and pharmaceutical care	
2- Cost perspective (patient perspective, payer perspective, Societal perspective)	**2, 3**
3- Costs: definition, classification (direct medical costs, directnon-medical costs, indirect non-medical costs, intangible costs, opportunity costs, incremental costs)	**4, 5**
4- outcomes (consequences) of therapy or medical care services: ○ types (economic outcomes, clinical outcomes, humanisticoutcomes). ○ positive versus negative outcomes, intermediate and finalconsequences	**6**
Mid-semester exam	**7**
4. Pharmacoeconomics methods: a. Economic evaluation methods cost-of-illness evaluation b. cost-minimization analysis c. cost-benefit analysis d. cost-effectiveness analysis e. cost-utility analysis f. humanistic evaluation methods	**8 - 11**
6. Problems in Pharmacoeconomics Analysis	**12**
7. applications of Pharmacoeconomics **(i)** drug therapy evaluation. **(ii)** clinical pharmacy service evaluation	**13, 14**
Course review and discussion session	**15**

TEACHING & LEARNING METHODS
1) Lecture 2) Brainstorming

3) Seminar 4) Concepts map
LEARNING AIDS
• White board & Markers. • Data show
REFERENCES

1. Brian L. Strom. Textbook of pharmacoepidemology. Chapter 22: Pharmacoeconomics: Economic Evaluation of Pharmaceuticals, 2006, John Wiley & Sons Ltd.
2. Joseph D. Dipiro, pharmacotherapy: a pathological.
3. approach, chapter: Pharmacoeconomics, 2005 McGraw-Hill Inc.
4. Andrew A. Carmen. Pharmacoeconomics From Theory to Practice, 2010, CRC press.
5. David Taylor. Pharmacoeconomics in psychiatry, 2002 Martin DunitzLtd.

Course title	
Public health and First aid	
Course specification	
Academic year	Fifth
Academic semester	2nd
Course code	PHRO 02
Credit hours	Theor. (2) ; Pract. (-); Total : 2 Theor. (15 weeks);
COURSE DESCRIPTION:	
The course deals with the study of basic issues relate to health of the community. Besides, the course provides necessary knowledge of how to provide aid to injured and accidental causalities.	
INTENDED LEARNING OUTCOMES (ILOS):	
At the end of this course, the student shall have attained the required knowledge to recognize health problems in community and the measures to be done at accidental conditions.	
COURSE CONTENT	
Topics	Weeks

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Part I : Public Health	
Introduction to Public health: -Concept of health ,public health -Determination of health: (hereditary ,environment ,life style ,socioeconomic condition) Health problems in the community	1, 2
Primary health care	3
Epidemiology of Communicable diseases: -Malaria-TB-bilharzia-rabies-leprosy-AIDS and other sexual transmitted disease-hepatitis.	4 , 5
Part II: First aid	
Introduction -concept of fist aid - objectives and responsibilities of first aid - first aid for Accidents and injury	6
Mid-semester exam	7
- First aid for Fractures& dislocation	8
First aid for Bleeding and Shock	9
First aid for Burns	10
First aid treatment for each: animals bites, sting, foreign bodies (ear, eye and nose) and Frost bites and sunburn.	11
First aid for Asphyxia , Drowning	12
First aid for Poisoning	13
First aid for Epilepsy , Diabetic coma	14
Course review and discussion session	15

TEACHING & LEARNING METHODS
1) Lecture 2) Assignment and feedback
LEARNING AIDS
• White board & Markers. • Data show • Videos illustrating first aid
REFERENCES
1. David Pencheon. Oxford handbook of public health Practice 2. N. Murugesh Health Education and community pharmacy

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