



وزارة التعليم العالي والبحث العلمي

دليل الدراسة لكليات الصيدلة بالجامعات الليبية

2022



توطئة

الدول الحريضة على التعليم واكتساب المعرفة والخبرة اللازمة تعد أهم استثماراتها وثروتها ألا وهي عقول أبنائها. لهذا اقتضت المنهجية العلمية أن تطرح النتيجة التي جاءت بها والفكرة التي اهتمت إليها ومن ثم يتبعها التطبيق الكاشف عن دقائقها الموضح لجزئياتها. لهذا تم وضع هذا الدليل بشأن اللوائح التنظيمية لكليات الصيدلة بالجامعات الليبية والخطة الدراسية المعتمدة وفق توصيف المقررات الدراسية. من هنا ينبغي العمل بهذا الدليل للرفع من النتاج العلمي بحثاً وتديساً لشتى علوم الصيدلة. ولأنها توطئة سنأخذها ونسعى إلى تطبيقها للوصول إلى الجمع بمضمون الدليل بألية متبعة من أجل الهدف وتحقيق الفكرة. ونحن إذ نقدم هذه الجهود فإننا نأمل أن نكون قد قدمنا شيء يساعدا على فتح الأبواب أمام أهل العلم والمعرفة خدمة لوطننا الحبيب ليبيا مما يلبي احتياجات بلدنا لمؤهلين في مجال الصيدلة وعلومه الكافية تمكنهم من إحداث التطوير والتنمية في عالم يتسابق فيه الجميع نحو البناء ولا مكان فيه لغير العلماء والمتعلمين والمبدعين.

أ.د. عمران محمد القيب
وزير التعليم العالي والبحث العلمي





**قرار وزير التعليم العالي والبحث العلمي
رقم (511) لسنة 2022 م
بشأن اعتماد دليل الدراسة لكليات الصيدلة بالجامعات الليبية**

وزير التعليم العالي والبحث العلمي .

- بعد الاطلاع على الإعلان الدستوري المؤقت وتعديلاته .
- وعلى الاتفاق السياسي الليبي الموقع في (17 ديسمبر 2015 ميلادي) .
- وعلى القانون رقم (12) لسنة (2010 م) بشأن إصدار قانون علاقات العمل ولائحته التنفيذية .
- وعلى القانون رقم (18) لسنة 2010 م بشأن التعليم .
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**ق ر ر
مادة (1)**

يتم بموجب أحكام هذا القرار اعتماد دليل الدراسات لكليات الصيدلة بالجامعات الليبية المرفق بهذا القرار .

مادة (2)

يُعمل بهذا القرار من تاريخ صدوره وعلى الجهات المعنية تنفيذه .

**عمران محمد القيب
وزير التعليم العالي والبحث العلمي**



تسليم في طرابلس
يوم الاثنين
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الفصل الأول: أحكام عامة

مادة (1) - مصطلحات وتعريفات

تدل المصطلحات الآتية أينما وردت في هذه اللائحة على المعاني المبينة قرين كل منها:
الجامعة: مؤسسة للتعليم العالي والأبحاث، وتمنح شهادات أو إجازات أكاديمية للخريجين.
الكلية: كلية الصيدلة بالجامعة.
مجلس الكلية: المجلس المختص بتسيير وتنفيذ ومتابعة الشؤون العلمية والإدارية والفنية بالكلية.
القسم العلمي: هو القسم المنفذ للبرنامج الدراسي لمنح الإجازة الجامعية المتخصصة بالكلية.
قسم الدراسة والامتحانات: القسم الخدمي الموكل إليه الإشراف على إدارة البرامج الدراسية بالتنسيق مع الأقسام العلمية ومنظومة التسجيل والدراسة والامتحانات.
مسجل الكلية: هو الجهة الموكل إليها إدارة وتنفيذ إجراءات القبول والتسجيل والتخرج لطلبة الكلية بالتنسيق مع الجهات ذات العلاقة.
لجنة الدراسة والامتحانات: هي لجنة فنية يُوكَل إليها وضع خطط تنفيذ البرامج الدراسية بالأقسام العلمية ومتابعتها.
لجنة المعادلة: هي لجنة مختصة بالكلية لمعادلة مؤهلات الطلبة المنتقلين إليها.
البرنامج الدراسي بالكلية: هو المراحل المقررة على الطالب تنفيذها للحصول على الإجازة الجامعية المتخصصة.
الإجازة الجامعية المتخصصة: هي شهادة بكالوريوس في الصيدلة.
خطة الدراسة: هي البرنامج الزمني الذي ينظم إجراءات التسجيل والدراسة والامتحانات والتدريب بالعام الدراسي.
المقرر الدراسي: هو المنهج الدراسي الأساسي المعتمد بالبرنامج الدراسي بالكلية.
الوحدة الدراسية: هي الوعاء الزمني للساعات التدريسية النظرية أو العملية أسبوعياً بالعام الدراسي.
القدرة الاستيعابية: هي الإمكانيات التعليمية المتاحة بالكلية.
الجدول الدراسي: هو الجدول الذي يحدد فيه توزيع المحاضرات النظرية والعملية خلال الأسبوع وتوقيتها ومكان أدائها.
إيقاف القيد: هو إيقاف تسجيل قيد الطالب.
بطاقة الطالب الدراسية: هي الوثيقة التي تُدون بها بيانات الطالب الدراسية " خطة دراسته" من تاريخ تسجيله وحتى تاريخ تخرجه أو انتقاله أو فصله من الكلية.
إعادة تنسيب: هو الإجراء المعتمد لتوجيه الطالب للدراسة بكلية أخرى بالجامعة.



لجنة الامتحانات والمراقبة: هي لجنة فنية تكلف بتسيير الامتحانات وتنظيمها وفق الآلية المعتمدة لخطة الدراسة بالكلية.

الامتحان النهائي: هو طريقة تقييم الطالب في المقرر المسجل به بنهاية العام الدراسي، وبحسب طبيعة المقرر يشمل: امتحان نظري، امتحان شفوي، امتحان عملي.

الوحدات الدراسية المعتمدة: الوحدة المعتمدة تعادل ساعة نظرية واحدة أو درس عملي واحد (2-3 ساعات عملية أو (4 ساعات تدريبية (التدريب بالصيدليات والمرافق الصيدلانية ذات العلاقة بالصيدلة).

الطالب: هو الشخص المقيّد بكلية الصيدلة لنيل الدرجة المتخصصة.

الخريج: هو الطالب الذي أنجز متطلبات منح الدرجة المتخصصة بالكلية بمراحلها المقررة.

مادة (2) – التعريف بالكلية

يقصد بكلية الصيدلة في هذه اللائحة هي الكليات التابعة للجامعات الليبية بوزارة التعليم العالي والبحث العلمي، التي تدرس العلوم الصيدلانية.

كليات الصيدلة القائمة حالياً وسنة تأسيسها

ت	الجامعة	مقر كلية الصيدلة	سنة التأسيس	ت	الجامعة	مقر كلية الصيدلة	سنة التأسيس
1	جامعة طرابلس	طرابلس	1975	7	جامعة طبرق	طبرق	2003
2	جامعة بنغازي	بنغازي	1989	8	جامعة الزاوية	الزاوية	2005
3	جامعة المرقب	الخمس	2001	9	جامعة سبها	سبها	2015
4	جامعة عمر المختار	البيضاء	2002	10	الجامعة الاسمرية	زليتن	2015
5	جامعة درنة	درنة	2003	11	جامعة صبراتة	الجميل	2016
6	جامعة مصراتة	مصراتة	2003	12	جامعة غريان	غريان	2017

مادة (3) – إدارة الكلية

مجلس الكلية: تدار كل كلية بمجلس يتكون من عميد الكلية ورؤساء الأقسام العلمية ووكيل الشؤون العلمية ويجوز للعميد أن يدعو إلى حضور الاجتماع كل من مدير مكتب الدراسة والامتحانات، مسجل الكلية، مدير مكتب الشؤون الإدارية، مدير مكتب شؤون أعضاء هيئة التدريس ومدير مكتب الجودة وضمان الاعتماد ومدير مكتب الدراسات العليا والتدريب والمعيرين ومقرر الجلسة او من تستوجب الضرورة حضوره ولا يحق له التصويت على قرارات المجلس.

مادة (4) – تطبيق أحكام اللائحة

تطبيق أحكام اللائحة: تطبق أحكام هذه اللائحة على جميع مراحل الدراسة بكليات الصيدلة وذلك لنيل درجة الإجازة المتخصصة (البكالوريوس) في العلوم الصيدلانية، وتسري على جميع الطلاب الدارسين بالسنوات والمراحل المختلفة بكليات الصيدلة لنيل هذه الإجازة ويحدد صورها من وقت اعتمادها من الجهات المختصة.



مادة (5) – الدرجة العلمية

الدرجات العلمية التي تمنحها كليات الصيدلة:

1- درجة البكالوريوس: تمنح كليات الصيدلة الخاضعة لهذه اللائحة الإجازة الجامعية المتخصصة في العلوم الصيدلانية (بكالوريوس علوم صيدلانية).

2- درجة برنامج Pharm D: يحق لكليات الصيدلة وفقا لإمكاناتها وقدراتها وبعد الحصول على الموافقة من جامعاتها والجهات المختصة بالدولة فتح برنامج Pharm D ومنح درجة البكالوريوس في هذا المجال على أن يتم وضع لائحة تنظم البرنامج العلمي له.

3- درجتى الماجستير والدكتوراه: يحق لكليات الصيدلة وفقا لإمكاناتها وقدراتها وبعد الحصول على الموافقة من جامعاتها والجهات المختصة بالدولة فتح برنامج الدراسات العليا لمنح درجة الإجازة العالية (الماجستير) والإجازة الدقيقة (الدكتوراه)، على أن يتم تنظيم البرنامج العلمي بموجب لائحة مستقلة خاصة تستمد بنودها من اللائحة العامة للدراسات العليا بجامعتها.

مادة (6) – لغة التدريس

لغة الدراسة: اللغة الإنجليزية هي لغة الدراسة والتعليم والامتحان بكليات الصيدلة ويمكن الاستعانة باللغة العربية للتوضيح.

مادة (7) – الأقسام العلمية

الأقسام العلمية بكليات الصيدلة والمقررات التي يشرف عليها كل قسم

ت	القسم العلمي	المقررات التي يشرف عليها
1	قسم الصيدلانيات والصيدلة الصناعية Department of Pharmaceutics and Industrial pharmacy	Pharmaceutics I, II; Physical pharmacy; Pharmaceutical technology; Industrial pharmacy; Pharmacokinetics and biopharmaceutics; Account and pharmaceutical management
2	قسم العقاقير Department of Pharmacognosy	Pharmacognosy; Phytochemistry; Applied Pharmacognosy.
3	قسم علم الأدوية وعلم السموم Department of Pharmacology and Toxicology	Pharmacology I, II; Toxicology and first aid; Bioassay; Physiology.
4	قسم الكيمياء الصيدلانية Department of Pharmaceutical Chemistry	Organic Chemistry I,II, Analytical Chemistry, Quality control and drug analysis, Medicinal chemistry I,II; Instrumental analysis



Histology; Anatomy; Pharmaceutical microbiology I,II; Biochemistry; Clinical biochemistry; Pharmaceutical biotechnology;	قسم العلوم الطبية الحيوية Department of Biomedical science	5
Pharmacy practice; Hospital pharmacy; Pathology; Clinical pharmacy	قسم الرعاية الصيدلانية Department of Pharmaceutical care	6

مادة (8) - استحداث الأقسام وإلغاؤها

استحداث أقسام أو إلغاؤها: يجوز استحداث أقسام علمية أو إلغاء بعضها بحسب الإمكانيات والظروف المتاحة بعد إعداد مقترح بالقسم المراد استحداثه من إحدى الكليات مشتملا على كل المتطلبات الدراسية، واعتمادها من مجالس الجامعات.

مادة (9) - إضافة وحذف المقررات

يجوز إضافة بعض المقررات الدراسية أو إلغاء بعضها أو استبدالها بعد إعداد مقترح من لجنة علمية من أحد الكليات وموافقة بقية الكليات على ذلك واعتمادها من مجالس الجامعات.

مادة (10) - شروط تدريس المقررات

يشترط فيمن يقوم بتدريس مقرر أو جزء من مقرر أن يكون من حملة الإجازة العالية (الماجستير) أو الإجازة الدقيقة (الدكتوراه) في نفس مجال تخصص المقرر الدراسي.

مادة (11) - تحديث المقرر الدراسي

يحق للقسم العلمي بالكلية تقديم محاضرة بواقع 1-2 ساعة في المقررات التي يشرف عليها بحيث تكون في موضوع حديث، كما يجوز تحديث محتوى المقررات بعد إعداد مقترح من لجنة علمية من احد أو عدد من الكليات وموافقة بقية الكليات على ذلك واعتماده من مجالس الجامعات.

مادة (12) - المراحل الدراسية

1- مرحلة الإعداد: وتتكون من سنة دراسة واحدة، درجة النجاح بها 50%، لا تدخل ضمن المعدل التراكمي للطلاب، لا ينقل الطالب إلى المرحلة التي تليها إلا بعد انجاز كل مقررات هذه المرحلة وهي: (الكيمياء، الفيزياء، الأحياء (علم الحيوان وعلم النبات)، الإحصاء، اللغة العربية، اللغة الإنجليزية)، وتتولى تدريسها كليات العلوم.

2- المرحلة الأولى: وتشمل السنة الأولى والسنة الثانية.

3- المرحلة الثانية: وتشمل السنة الثالثة والسنة الرابعة.



مادة (13) - متطلبات الحصول على الدرجة العلمية

المتطلبات الدراسية للحصول على درجة البكالوريوس في علوم الصيدلة

1- متطلبات مرحلة الإعداد:

المجموع من 100 درجة	نهائي نظري	نهائي عملي	أعمال السنة	عدد الساعات				الوحدات المعتمدة	رمز المقرر	اسم المقرر		تسلسل المقرر
				عملي		نظري						
				الإجمالي	أسبوعياً	الإجمالي	أسبوعياً					
100%	50%	20%	30%	32	2	84	3	4	GP1	Chemistry	كيمياء	1
100%	50%	20%	30%	32	2	56	2	3	GP2	Physics	الفيزياء	2
100%	50%	20%	30%	32	2	84	3	4	GP3	Biology	الأحياء (حيوان ونبات)	3
100%	70%	-	30%	-	-	56	2	2	GP4	Statistics	الاحصاء	4
100%	70%	-	30%	-	-	56	2	2	GP5	Arabic language	اللغة العربية	5
100%	70%	-	30%	-	-	56	2	2	GP6	English language	اللغة الانجليزية	6
100%	70%	-	30%	-	-	28	2	2	GP7	National education	التربية الوطنية	7
							16	19				المجموع

2- متطلبات السنة الأولى:

المجموع من 100 درجة	نهائي نظري	نهائي عملي	أعمال السنة	عدد الساعات				الوحدات المعتمدة	رمز المقرر	اسم المقرر		تسلسل المقرر
				عملي		نظري						
				الإجمالي	أسبوعياً	الإجمالي	أسبوعياً					
100%	40%	20%	40%	32	2	48	2	3	PH101	Organic Chemistry I	كيمياء عضوية 1	1
100%	40%	20%	40%	32	2	56	3	4	PH102	Physical pharmacy	صيدلة فيزيائية	2
100%	40%	20%	40%	32	2	84	3	4	PH103	Pharmaceutics I	صيدلانيات 1	3
100%	40%	20%	40%	32	2	84	3	4	PH104	Pharmacognosy	عقاقير	4
100%	40%	20%	40%	32	2	84	3	4	PH105	Analytical chemistry	كيمياء تحليلية	5
100%	40%	20%	40%	32	2	84	2	3	PH106	Physiology	وظائف الأعضاء	6
100%	40%	20%	40%	32	2	56	1	2	PH107	Histology	علم الأنسجة	7
100%	60%	-	40%	-	-	28	1	1	PH108	Anatomy	علم التشريح	8
							18	25				المجموع



3- متطلبات السنة الثانية:

المجموع من 100 درجة	نهائي نظري	نهائي عملي	أعمال السنة	عدد الساعات				الوحدات المعتمدة	رمز المقرر	اسم المقرر	تسلسل المقرر
				عملي		نظري					
				الإجمالي	أسبوعيا	الإجمالي	أسبوعيا				
100%	40%	20%	40%	32	2	56	2	3	PH201	Organic chemistry II	كيمياء عضوية 2
100%	40%	20%	40%	32	2	56	2	3	PH202	Biochemistry	كيمياء حيوية
100%	40%	20%	40%	32	2	84	3	4	PH203	Phytochemistry	كيمياء العقاقير
100%	40%	20%	40%	32	2	84	2	3	PH204	Pharmaceutics II	صيدلانيات 2
100%	40%	20%	40%	32	2	84	3	4	PH205	Pharmacology I	علم الأدوية 1
100%	40%	20%	40%	32	2	56	2	3	PH206	Pathology	علم الأمراض
100%	40%	20%	40%	32	2	56	2	3	PH207	Pharmaceutical microbiology I	أحياء دقيقة 1
100%	40%	20%	40%	32	2	84	3	4	PH208	Pharmaceutical technology	تقنية صيدلانية
100%	40%	20%	40%	32	2	56	2	3	PH209	Instrumental analysis	تحليل آلي
							21	30			المجموع

4- متطلبات السنة الثالثة:

المجموع من 100 درجة	نهائي نظري	نهائي عملي	أعمال السنة	عدد الساعات				الوحدات المعتمدة	رمز المقرر	اسم المقرر	تسلسل المقرر
				عملي		نظري					
				الإجمالي	أسبوعيا	الإجمالي	أسبوعيا				
100%	40%	20%	40%	32	2	84	3	4	PH301	Biopharmaceutics and Pharmacokinetics	الصيدلة الحيوية وحركية الدواء
100%	40%	20%	40%	32	2	84	3	4	PH302	Industrial pharmacy	صيدلة صناعية
100%	40%	20%	40%	32	2	56	2	3	PH303	Applied Pharmacognosy	عقاقير تطبيقية
100%	40%	20%	40%	32	2	56	2	3	PH304	Clinical biochemistry	كيمياء حيوية سريرية
100%	40%	20%	40%	32	2	84	3	4	PH305	Pharmacology II	علم الأدوية 2
100%	40%	20%	40%	32	2	84	3	4	PH306	Medicinal chemistry I	كيمياء طبية 1
100%	40%	20%	40%	32	2	56	2	3	PH307	Pharmaceutical microbiology II	أحياء دقيقة صيدلانية 2
100%	40%	20%	40%	32	2	56	2	3	PH308	Hospital pharmacy	صيدلة مستشفيات
							20	28			المجموع



5- متطلبات السنة الرابعة:

المجموع من 100 درجة	نهائي نظري	نهائي عملي	أعمال السنة	عدد الساعات				الوحدات المعتمدة	رمز المقرر	اسم المقرر	تسلسل المقرر	
				عملي		نظري						
				الإجمالي	أسبوعيا	الإجمالي	أسبوعيا					
100%	60%	-	40%	-	-	56	2	2	PH401	Pharmaceutical biotechnology	1	التقنية الحيوية الصيدلانية
100%	40%	20%	40%	32	2	84	3	4	PH402	Clinical pharmacy	2	صيدلة سريرية
100%	40%	20%	40%	32	2	84	1+2	4	PH403	Toxicology and First aid	3	علم السموم والإسعافات الأولية
100%	40%	20%	40%	32	2	56	2	3	PH404	Bioassay	4	معايير إحيائية
100%	40%	20%	40%	32	2	84	3	4	PH405	Medicinal chemistry II	5	كيمياء طبية 2
100%	40%	20%	40%	32	2	84	3	4	PH406	Quality control and drug analysis	6	رقابة الجودة وتحليل أدوية
100%	40%	20%	40%	32	2	56	2	3	PH407	Pharmacy practice	7	ممارسة الصيدلة
100%	60%	-	40%	-	-	84	2	2	PH408	Account and pharmaceutical management	8	محاسبة وإدارة أعمال صيدلة
100%	70% مشروع (30% المشرف، 40% لجنة المناقشة)	30 % طرق البحث		32	2	28	1	2	PH409	Research Methodology and Graduation Project	9	طرق البحث ومشروع تخرج
							21	28				المجموع

مادة (14)- طرق البحث ومشروع التخرج

مقرر طرق البحث ومشروع التخرج Research Methodology and Graduation Project: كل قسم يشرف على المشاريع التي تكون في تخصص أحد المقررات التي تتبع القسم. وفيما يخص جانب تدريس طرق البحث يتم بتكليف من عميد الكلية أو من يخوله.

مادة (15)- إجراءات التقييم

1. يتم تقييم الطالب من خلال إجراء امتحانات تحريرية جزئية ونهائية، إجراء تجارب عملية وإجراء اختبارات قصيرة (quizzes) وتقديم تقارير علمية وتمارين وتقديم مشروع تخرج وعروض تقديمية وأسئلة شفوية لامتحانات الجزئية والعملية. وفي كل ذلك يكون الطالب على علم بدرجة التقييم وأن يتم توثيق حضور الطالب والدرجة التي تحصل عليها.
2. جميع المقررات تحسب درجاتها النهائية من 100 درجة.



3. درجة أعمال السنة: تعطى 40% من الدرجة النهائية مقسمة كالتالي: 20% اختبار جزئي، 10% اختبارات قصيرة وتقارير و10% للجانب العملي موزعة على نشاط الطالب والتقارير العملية والاختبار العملي الجزئي.

مادة (16)-الإشراف على الامتحانات الجزئية

تجرى الامتحانات الجزئية بإشراف الأقسام العلمية بالتنسيق مع مكتب الدراسة والامتحانات بالكلية ويستعان بلجان إشراف بتكليف من القسم المختص أو مكتب الدراسة والامتحانات حسب الأحوال.

مادة (17)-الامتحانات ونتائجها

1. الامتحانات الجزئية النظرية: تبدأ الامتحانات الجزئية النظرية بعد انتهاء الأسبوع العاشر من بداية الدراسة وتستمر لفترة أربعة أسابيع (28 يوماً) وتكون في حدود 40% من المنهج الذي تم تقديمه للطالب، وخلالها تتوقف المحاضرات النظرية والعملية ويجوز لمجلس الكلية اتحاد قرار بالاستمرار في الدراسة إذا دعت الضرورة لذلك. ويجوز للكلية استبدال هذا النظام كلياً أو جزئياً بنظام التقييم المستمر عن طريق إعداد البحوث أو أوراق العمل أو التجارب أو القيام بالدراسات الميدانية أو التطبيقية ويشترط لذلك موافقة مجلس الكلية.
2. يتولى أستاذ المقرر أو منسق المقرر إعلان نتائج الامتحانات الجزئية وعليه إعادة أوراق الإجابة للطلاب للاستفادة منها في معرفة أوجه القصور في إجاباتهم ومراجعة درجاتهم مع أستاذ المقرر، وعليه تقديم كشف النتائج كاملاً لإدارة القسم قبل بداية الامتحانات النهائية بوقت كاف.
3. الامتحانات العملية النهائية: يتم إنجازها من قبل أستاذ المقرر وبإشراف القسم المختص ويتم توثيق حضور الطلاب للامتحانات العملية والاحتفاظ بهذه المستندات بالدراسة والامتحانات.
4. الامتحانات النهائية: تكون من دورين أول وثان ويسمح للطلاب بدخول الدور الثاني مهما كان عدد المواد التي لم ينجح فيها وترصد للطالب الناجح بالدور الثاني درجته المتحصل عليها كاملة، كما يسمح للطالب بالانتقال من سنة إلى أخرى محملاً بمادتين على الأكثر حسب المادة (12) والمادة (20) من هذه اللائحة.
5. تعطى 60% من الدرجة الكلية للمقرر مقسمة كالتالي: 40% اختبار نظري نهائي و20% اختبار عملي نهائي.
6. الامتحانات النهائية (الدور الأول): تبدأ امتحانات الدور الأول عند انتهاء تقديم المقررات الدراسية وتكون مدتها ستة أسابيع (42 يوماً) على أن يسبقها أسبوع استعداد للامتحانات. يعقبها إعلان النتيجة المبدئي وتقديم طلبات الطعون في النتيجة خلال ثلاثة أيام (72 ساعة) ويتم النظر فيها على وجه السرعة وإعلان نتيجة الطعون واعتماد النتيجة النهائي.
7. الدرجة النهائية للدور الأول: هي حاصل جمع درجة أعمال السنة (الجزئية) للمقرر (40%) مقسمة كالتالي (20% جزئي و10% امتحانات قصيرة و10% حضور ونشاط معلمي) ودرجة الامتحانات النهائية (النظري



- 40% والعملية 20%). المقررات التي ليس بها عملي تكون الدرجة النهائية للدور الأول حاصل جمع أعمال السنة (40% مقسمة كالتالي (20% جزئي 20% اختبارات قصيرة) والدرجة النهائية لامتحان النظري (60%). وفي جميع الأحوال يشترط أن يتحصل الطالب على نسبة 35% على الأقل من درجات الامتحان النهائي النظري للمقرر حتى تجمع له درجات أعمال السنة والعملي.
8. الامتحانات النهائية (الدور الثاني): تكون مدتها خمسة أسابيع على أن يسبقها أسبوع استعداد للامتحانات ويعقبها إعلان النتيجة المبدئي وتقديم طلبات الطعون في النتيجة والنظر في الطلبات وإعلان واعتماد النتيجة النهائية للدور الثاني.
9. الدرجة النهائية للدور الثاني: هي حاصل جمع درجة الامتحان النهائي للجانب النظري والعملي ولا تتضمن درجة الامتحان الجزئي أي تكون (80% للجانب النظري النهائي + 20% للجانب العملي النهائي). المقررات التي ليس بها عملي تكون درجة الامتحان النظري النهائي من 100%.
10. كراسات الإجابة لامتحانات النهائية: أوراق إجابات الامتحانات النهائية النظرية تسلم إلى لجنة الامتحانات والمراقبة بعد تصحيحها ولا يجوز إتلافها إلا بعد سنة من إعلان النتائج.
11. امتحانات المقررات المحمل بها الطالب: تجرى في نفس موعد الامتحانات الاعتيادية الأخرى.
12. درجة النجاح في المقرر: يعتبر الطالب ناجحاً إذا تحصل على نسبة 60% فأكثر من الدرجة النهائية للمقرر ماعدا سنة الإعداد تكون درجة النجاح في المقرر 50% من الدرجة النهائية للمقرر.
13. إعادة السنة: يجوز للطالب الراسب في السنة الدراسية إعادة دراسة المواد التي رسب فيها فقط.

مادة (18) - الوحدات الدراسية المطلوبة للتخرج

على الطالب اجتياز ما لا يقل عن 160 وحدة تدريسية (عملية ونظرية وتدريبية).

لا يمنح الطالب شهادة بتخرجه من الكلية إلا بعد اجتيازه لجميع الوحدات المقررة البالغة 160 وحدة طيلة دراسته بالكلية مقسمة كالتالي:

مجموع الوحدات التدريبية	مجموع الوحدات العملية	مجموع الوحدات النظرية	مجموع الوحدات الدراسية (نظري + عملي + تدريب)
30 وحدة	34 وحدة	96 وحدة	160 وحدة

مادة (19) - الساعات التدريبية

يجب ألا تقل الساعات التدريبية عن 120 ساعة (30 وحدة).



مادة (20) - نظام الدراسة

1. نظام الدراسة بكليات الصيدلة: تكون الدراسة بكليات الصيدلة بنظام المقررات الدراسية وفق نظام السنة الدراسية الكاملة ما لم يصدر قرار من الجهات المختصة بخلاف ذلك.
2. مدة الدراسة: خمس سنوات دراسية تتضمن سنة الإعداد يدرس خلالها الطالب مقررات في العلوم الأساسية، وأربعة سنوات تخصصية يدرس بها الطالب علوم الصيدلية التطبيقية والعلوم الطبية ذات العلاقة بعلوم الصيدلة.
3. نقل المواد: لا يسمح بنقل المواد بين المرحلة والأخرى ويسمح بالترحيل داخل المرحلة بمادة واحدة أو مادتين فقط.
4. الفرصة الممنوحة من الكلية: تضاف سنتان دراستين للمدة السابقة في حالة الرسوب كحد أقصى لتخرج الطالب بشرط عدم حصوله على تقدير ضعيف جداً في مرحلة الإعداد أو السنة الأولى من المرحلة الأولى من مدة الدراسة بالكلية.
5. الفرصة الممنوحة من الجامعة: وفقاً لما نصت عليه لائحة الدراسة والامتحانات والتأديب لطلاب الجامعات رقم (501) لسنة 2010م يجوز بقرار من مجلس الجامعة منح فرصة استثنائية واحدة ولمدة سنة دراسية واحدة للطالب خلال الفترة الدراسية المحددة للدراسة والفرصة الممنوحة من الكلية، وذلك بناءً على اقتراح من الكلية وتمنح هذه الفرصة في السنوات الثالثة والرابعة (المرحلة الثانية).
6. العام الدراسي: يتراوح العام الدراسي الكامل بكليات الصيدلة من 42-44 أسبوعاً اعتباراً من بداية إجراءات التسجيل إلى إعلان النتيجة النهائية للدور الثاني ولا تدخل ضمنها إجازة أعضاء هيئة التدريس.
7. أسلوب الدراسة: تقدم المحاضرات النظرية والعملية بالطريقة التي تكفل وصول المعلومة للطالب واستيعابها واستحضارها في الوقت المناسب وبما يرسخ لديه مبدأ العمل الجماعي والتعاون وخروجه من الملل الدراسي. لذلك يجب التنوع في طريقة تقديم الدروس النظرية والعملية. تعطى الدروس باستعمال الأسلوب التقليدي وباستعمال الوسائل التعليمية الحديثة بكافة أنواعها وإجراء حلقات النقاش وباستعمال المواقع الإلكترونية للكلية والشبكة التعليمية الإلكترونية والتعليم الذاتي وتقديم التقارير والزيارات الميدانية للمرافق ذات العلاقة مع التركيز على التطبيق العملي للدروس العملية وإجراء التجارب وإجراء المشاريع البحثية في مجموعات طلابية أو فردية.
8. الفترة الزمنية للمحاضرات: المدة المطلوبة لتقديم المحاضرات النظرية والعملية بكليات الصيدلة ثمانية وعشرون (28) أسبوعاً ولا تدخل ضمنها فترة الامتحانات النهائية للدور الأول والثاني ولا تشمل على عطلة نصف السنة



الفصل الثاني - القبول والتسجيل والقيود والانتقال

مادة (21) - القبول والقيود

في بداية كل عام دراسي، تحدد إدارة الكلية بالتنسيق مع الجامعة، الأعداد التي يمكن قبولها لطلبة مستجدين من حملة الشهادة الثانوية (القسم العلمي) وفق النسبة المحددة من قبل اللوائح والقرارات المعممة في سنة القبول من جهات الاختصاص للدراسة بالكلية، وذلك وفق المستهدف والإمكانات والشروط التالية:

- 1- أن يكون الطالب حاصلًا على الشهادة الثانوية العامة (القسم العلمي) من إحدى المدارس الليبية أو ما يعادلها من الشهادات المعترف بها من جهات الاعتراف المختصة.
- 2- أن يكون حاصلًا على النسبة المئوية المعتمدة للقبول بكليات الصيدلة وهي 85% للسنة المتقدم فيها الطالب ما لم يصدر خلاف ذلك من الجهات المختصة بالدولة.
- 3- أن يكون لائقًا صحيًا وقادرًا على متابعة الدروس النظرية والعملية.
- 4- أن يكون حسن السيرة والسلوك وغير محكوم عليه في جنائية أو جنحة مخلة بالشرف ما لم يرد له اعتباره.
- 5- ألا يكون قد سبق فصله من أي جامعة أخرى بالداخل أو الخارج لأسباب علمية أو تأديبية.
- 6- يشترط لقبول غير الليبيين بالإضافة إلى الشروط السابقة ما يلي:
 - أ. أن يكون المتقدم مقيمًا بدولة ليبيا إقامة اعتيادية طيلة فترة دراسته.
 - ب. أن يلتزم بدفع رسوم ونفقات الدراسة وفق اللوائح المعمول بها بالجامعات ما لم يكن متحصلًا على منحة دراسية، وذلك دون الإخلال بقواعد المعاملة بالممثل المنصوص عليها في الاتفاقيات بهذا الشأن.
 - ج. أن يقوم بمعادلة الشهادة الثانوية المتحصل عليها خارج ليبيا من الجهات المختصة بذلك خلال مدة تحددها الكلية.

وفي جميع الأحوال على الطالب اجتياز امتحان القبول أو المقابلة الشخصية بنجاح في الكليات التي تشترط إجراءات قبولها ذلك.

مادة (22) - تنسيب الطلاب

الطلبة المنسبين: تلتزم الكليات بقبول الطلبة المنسبين إليها من جهات الاختصاص وفقاً للقوانين واللوائح المعمول بها، ولا تلتزم بقبول ما عداهم إلا في حدود قدرتها الاستيعابية وفقاً للشروط المذكورة بالمادة السابقة، وعلى كل طالب أن يقدم للكلية كل المستندات المطلوبة لاستكمال مسوغات قبوله، وإلا يعتبر قبوله لاغياً بعد منحه فرصة نهائية لاستكمال مسوغات التسجيل.



مادة (23) –الفترة الزمنية للقبول

انتهاء فترة القبول: تتم إجراءات القبول لطلبة كليات الصيدلة خلال المدة التي تحددها كل كلية بالاتفاق مع جامعتها، وفي جميع الأحوال لا يجوز قبول أي طالب بعد انتهاء الشهر الأول من بداية العام الدراسي، ويكون لكل طالب ملف شخصي يحفظ بمكتب التسجيل بالكلية، ويحفظ به النسخ الأصلية من مسوغات القبول المطلوب من الطالب إحضارها.

مادة (24) – التفرغ للدراسة والطلاب الوافدين

1. يتم قيد الطلاب وقبولهم على أساس طلاب نظامين وتشمل هذه الفئة المتفرغين للدراسة فقط، وذلك وفق الشروط المنصوص عليها في المادة (21) من هذه اللائحة.
2. يتم قبول الطلاب الوافدين المسجلين على منح دراسية، وفقاً للأسس والقواعد التي تقرر بشأنهم من قبل الوزارة أو مجالس الجامعات والتي تعلن سنوياً فور الإعلان عن نتائج امتحانات الثانوية العامة أو التخصصية بدورها.

مادة (25) –الانتقال من وإلى الكلية

- الطلبة المنتقلين: لكل كلية الحق في قبول الطلبة الراغبين في الانتقال للدراسة بها، من كليات الصيدلة والطب البشري وطب الأسنان من الجامعات العامة فقط داخل البلاد أو خارجها، وفقاً لما يلي:
- 1- أن يكون الطالب حاصلًا على الشهادة الثانوية (قسم علمي) أو ما يعادلها على النسبة المعتمدة للقبول بالكلية.
 - 2- أن يتقدم الطالب إلى إدارة الكلية الراغب في الانتقال إليها بمبررات جديّة توضح سبب انتقاله.
 - 3- أن يلتزم الطالب بتقديم المستندات المطلوبة معتمدة من جهات الاختصاص متضمنة المقررات التي درسها ومحتوياتها.
 - 4- ألا يكون مفصولاً من جامعته الأصلية لأسباب علمية أو تأديبية.
 - 5- أن يلتزم الطالب بقضاء سنتين دراسيتين على الأقل قبل تخرجه من الكلية.
 - 6- أن تكون لغة التدريس في الكلية المنتقل منها الطالب هي اللغة الإنجليزية أو يجيد اللغة الإنجليزية.
 - 7- على الطالب الراغب في الانتقال من جامعة غير ليبية معادلة شهادته لدى الجهات المختصة داخل ليبيا.
 - 8- تحدد لجان المعادلة بالكليات السنة الدراسية التي سيقبل بها الطالب وكذلك المقررات المعادلة والمقررات المطلوب دراستها.

مادة (26) – لجنة معادلة المؤهلات العلمية

- 1- تنشأ بكل كلية وبقرار من عميدها لجنة مختصة لمعادلة مؤهلات الطلاب المنتقلين إليها، وعلى لجان المعادلة البث في طلبات الطلاب في أجل لا يتجاوز شهراً من تاريخ تقديم الطلب.



- 2- تتكون لجنة المعادلة من ثلاثة أعضاء هيئة تدريس على الأقل من ذوي الخبرة والأقدمية ولها الحق في الاستعانة بمن تراه مناسباً لتحقيق عملها.
3. يجوز للكلية إلحاق الطالب بالدراسة وفق معادلة أوليه وذلك إلى حين استكمال إجراءات المعادلة النهائية ولا يعد الطالب منتقلاً فعلياً إلا بعد استيفاء كافة الإجراءات المطلوبة.
- 4- يجوز للجنة أن توصي بقبول انتقال الطالب أو مطالبته باستكمال مواد استدرائية أو توصي برفض الانتقال لأسباب علمية أو متعلقة بالقدرة الاستيعابية.
- 5- تحدد السنة الدراسية التي سيلتحق بها الطالب وفقاً لنتيجة المعادلة دون الإخلال بأحكام هذه اللائحة.
- 6- يتم الانتقال بقرار من إدارة الكلية بعد اعتماد نتائج المعادلة.
- 7- إذا وجدت اللجنة أن طالب النقل قد درس وفق أنظمة تعليمية مغايرة لما هو معمول به في الجامعات الليبية توجب عليها إحالة الأمر للجنة المختصة في معادلة المؤهلات العلمية بوزارة التعليم العالي والبحث العلمي في الآجل المنصوص عليه سابقاً.

الفصل الثالث - نظام الدراسة والامتحانات

مادة (27)- متطلبات الدراسة والتفرغ للدراسة

1. المتطلبات الدراسية: الجداول المذكورة بالمادة (13) من هذه اللائحة توضح المتطلبات الدراسية المطلوب النجاح فيها للحصول على درجة البكالوريوس في العلوم الصيدلانية.
2. التفرغ للدراسة: على طلاب كليات الصيدلة أن يكونوا متفرغين للدراسة المستمرة بها، وهم مطالبون بحضور محاضرات المقررات الدراسية، ومن يتخلف دون عذر مقبول يعتبر غيابه عن الدراسة غياباً غير مشروع يستوجب الجزاء.
3. متابعة المحاضرات: على الطالب في جميع مراحل الدراسة بكليات الصيدلة الالتزام بمتابعة المحاضرات والدروس العملية وأداء ما يطلب منه من واجبات وبحوث وتجارب، ولا يحق للطالب التقدم لامتحان النهائي بدورية (الأول والثاني) لأي مادة تزيد نسبة غيابه فيها عن (25%) من مجموع الساعات المقررة للمادة نظرياً وعملياً كل على حده وترصد له درجة صفر في المقرر.
4. تسجيل الحضور: يقوم عضو هيئة التدريس بقيد الطلاب الحاضرون في كل المحاضرات النظرية والعملية وإحالاته إلى مسجل الكلية بعد اعتماده عن طريق رئيس القسم المختص شهرياً ليتولى مسجل الكلية توثيقه وإبلاغ الطلاب المتغييبين بعدم تكرار الغياب ولفت نظرهم للآثار التي تترتب على ذلك.



وتحدد اللوائح المعمول بها في الدولة النسبة المطلوبة لحضور المحاضرات باعتبارها شرطاً لأداء الامتحان .

مادة (28) - تجديد القيد

على الطالب تجديد قيده في بداية كل عام دراسي، وذلك بالتوقيع على النموذج المعد لذلك، متضمناً المواد الدراسية المقيد بها الطالب، ويتم تجديد القيد في المواعيد التي تحددها الكلية، فإذا لم يقم الطالب بالتجديد يعتبر منقطعاً لسبب غير مشروع ما لم تقبل الكلية عذره وتوقف قيده، ويكون تجديد القيد بسداد الرسوم المحددة لذلك من الجهات المختصة بالدولة، ويؤدى الرسم للمؤسسة التعليمية ولا يجوز استرداده.

مادة (29) - وقف القيد والمدة المحتسبة

وقف القيد: يجوز للطالب وقف قيده خلال ثلاثة أشهر من بداية العام الدراسي، على أن يكون هذا الطلب مستنداً إلى مبررات جدية تقبلها إدارة الكلية، وفي جميع الأحوال لا يجوز طلب وقف القيد إلا مرة واحدة طيلة فترة الدراسة، وفي حال رغبة الطالب في إيقاف قيده للمرة الثانية، يجب عليه التقدم بطلب إلى رئيس الجامعة للبت فيه بعد أخذ رأي عميد الكلية بالخصوص.

احتساب مدة إيقاف القيد: لا تحسب مدة إيقاف القيد ضمن مدة الدراسة.

مادة (30) - لجنة الامتحانات والمراقبة

يشكل مجلس الكلية أو عميدها بالتشاور مع رؤساء الأقسام العلمية في نهاية كل سنة لجنة لتسيير الامتحانات النهائية والإشراف عليها تسمى (لجنة الامتحانات والمراقبة)، تتولى كافة الأمور المتعلقة بسير الامتحانات وتنظيمها، ويكون عملها على وجه الخصوص ما يلي:

1. استلام أوراق الأسئلة من أعضاء هيئة التدريس، وتوزيعها على الطلبة في موعد الامتحان.
2. توثيق حضور الطلاب للامتحانات والاحتفاظ بهذه المستندات.
3. استلام كراسات الإجابة فور انتهاء الامتحان.
4. وضع الأرقام السرية على كراسات الإجابة وإعادةها عند الاستلام.
5. تسليم أوراق الإجابة واستلامها من المصححين.
6. مراجعة صحة ودقة تصحيح كراسات الإجابة وجمع الدرجات، وإن تطلب الأمر يمكن استدعاء أستاذ المقرر.
7. حساب درجات كل طالب ورصدها.



8. إعداد قوائم النتائج وقوائم الخريجين.
9. تخضع أعمال اللجنة فيما يتعلق بنتائج الامتحانات لأسس وضوابط اللائحة "501"، وللجنة أن تستعين بأعضاء هيئة التدريس وغيرهم لوضع الجداول ومراقبة سير الامتحانات.

مادة (31)-ضوابط سير الامتحانات

1. لجنة الامتحانات والمراقبة لها الحق في وضع الضوابط القانونية اللازمة التي من شأنها إنجاح مهمتها وذلك بعد اعتماد هذه الضوابط من مجلس الكلية. في جميع الأحوال سواء في الامتحانات الجزئية أو النهائية، يحظر على الطالب أثناء الامتحانات ممارسة أعمال الغش وذلك باصطحاب الكتب أو الأوراق أو الأدوات أو الأجهزة المحمولة أو أي أجهزة لا تقبل بدخولها لجنة الامتحانات والمراقبة كما يحظر عليهم كل ما من شأنه الإخلال بنظام الامتحانات.
2. تحسب تقديرات النجاح في كل مادة وفقاً للنسب التالية من الحد الأعلى للدرجات:

الدرجة	التقدير	ت
من 85% إلى 100%	ممتاز	1
من 75% إلى أقل من 85%	جيد جداً	2
من 60% إلى أقل من 75%	جيد	3
من 60% إلى أقل من 65%	مقبول	4
من 35% إلى أقل من 60%	ضعيف	5
من 0% إلى أقل من 35%	ضعيف جداً	6
المقررات التي درجة نجاحها 50% فأكثر تحسب كالتالي		
من 50% إلى أقل من 65%	مقبول	7
من 35% إلى أقل من 50%	ضعيف	8
من 0% إلى أقل من 35%	ضعيف جداً	9

4. حساب المعدل السنوي والتراكمي والساعات الدراسية: تحسب كالتالي:

$$\text{المعدل السنوي} = \frac{\text{مجموع النقاط السنوية}}{\text{مجموع الوحدات السنوية}}$$



- النقاط السنوية = حاصل ضرب الدرجة المتحصل عليها الطالب في مقرر ما في وحدات المقرر (الدرجة × عدد الوحدات).

- المعدل التراكمي للطالب = $\frac{\text{مجموع النقاط التراكمية}}{\text{مجموع الوحدات التراكمية}}$

مجموع النقاط التراكمية: يساوي حاصل جمع النقاط السنوية.
مجموع الوحدات التراكمية: يساوي حاصل جمع الوحدات لكل سنة عدا سنة الإعداد.
الوحدة الدراسية = ساعة تدريس نظرية واحدة (1) أو ساعتين (2) عمليتين أسبوعيا طيلة السنة أو أربع (4) ساعات تدريبية.

مادة (32) – التقدير العام للطالب

يحسب التقدير العام للطالب على أساس متوسط درجاته التي تحصل عليها في جميع المقررات الدراسية في كل سنة (مجموع النقاط لجميع السنوات مقسومة على مجموع الوحدات لجميع السنوات) ما عدا مواد مرحلة الإعداد، فلا تدخل ضمن احتساب المعدل التراكمي، مع مراعاة أنها من ضمن الساعات التي يدرسها الطالب.

مادة (33) – اعتماد النتائج النهائية

تعتمد النتائج النهائية لامتحانات سنوات النقل من عميد الكلية بعد توقيعها من طرف رئيس لجنة الامتحانات والمراقبة، وتعتمد النتائج النهائية لسنة التخرج من قبل رئيس الجامعة بعد التصديق عليها من طرف عميد الكلية والتوقيع عليها من طرف رئيس لجنة الامتحانات والمراقبة.

مادة (34) – طلبات التظلم

1. يحق للطالب الراسب طلب المراجعة فيما لا يزيد عن مقررين وذلك وفقا للشروط والضوابط التي تحددها الجهات المختصة بالدولة.
2. تشكل بكل كلية في نهاية كل سنة دراسية لجنة تختص بمراجعة إجابات الطلاب المتقدمين بالتظلم على نتائجهم للتأكد من دقة عملية التقييم، وتتكون كل لجنة من ثلاثة أعضاء هيئه تدريس لهما اختصاص في مجال المقرر موضوع المراجعة، وبحضور الطالب المعنى، فإذا ثبت صحة ادعاء الطالب يتم تعديل النتيجة، وإذا لم يثبت صحة ادعائه فتبقى النتيجة المطعون فيها على حالها. ويجب أن يتم نظر الطعن والبث فيه على وجه السرعة.

مادة (35) – التقييم وقواعد النجاح

مراحل الدراسة بكليات الصيدلة: مرحلة الإعداد، المرحلة الأولى وتشمل السنة الأولى والسنة الثانية، والمرحلة الثانية وتشمل السنة الثالثة والسنة الرابعة.



- (1) لا يسمح بنقل المواد بين المرحلة والأخرى ويسمح بالترحيل داخل المرحلة بمادة أو اثنتين فقط.
- (2) يشترط لانتقال الطالب من مرحلة إلى أخرى النجاح في جميع مقررات تلك المرحلة.
- (3) الترحيل (النقل) يكون بمادة أو مادتين كحد أعلى حسب المراحل المحددة أعلاه.
- (4) الطالب المرحل بمادة أو مادتين بالنسبة للمرحلتين بعد الإعداد يدخل الامتحانات النهائية غير مطالب بأعمال سنة في المواد المرحل بها.
- (5) يعتبر الطالب راسبا إذا لم يتحصل على 35% من مجموع الدرجات النهائية النظرية بغض النظر عن درجات أعمال السنة.
- (6) يحق للطالب الراسب إعادة المواد التي رسب فيها وترصد له درجته كاملة ويحفظ له التقدير.
- (7) يعفى الطالب الراسب من إعادة دراسة المواد التي سبق نجاحه فيها إلا إذا طلب غير ذلك بقصد الرفع من معدله، ولا يسمح له إلا بإعادة المواد التي تقل نسبة النجاح فيها عن 65%، ويجب ألا تزيد عدد المواد المعادة لغرض رفع المعدل عن مادتين في السنة الدراسية.

مادة (36) - إفادة التخرج

1. إفادة التخرج: يمنح الخريج إفادة تخرج وكشف بالدرجات للمقررات التي درسها بعد أداء الرسوم المقررة وفقا للتشريعات النافذة، ويجوز للخريجين إعادة الحصول على الإفادة وكشف الدرجات لأكثر من مرة، وتحدد بقرار من الجهات المختصة مقدرا رسوم الحصول على الإفادة وكشف الدرجات في المرة الأولى وفي المرات التالية.
2. سجل الإفادات: على الكليات إعداد سجلات خاصة بالإفادات وكشوف الدرجات يبين فيها أسماء وتوقيعات من أعدها ومن راجعها ومن أتمدها، وتعد هذه السجلات من واقع النتائج والبيانات الواردة من الدراسة والامتحانات والأقسام العلمية وتحال نسخ منها إلى مكتب التوثيق والمعلومات بالكلية والجامعة ومكتب شؤون الخريجين.
3. اعتماد إفادة التخرج وكشف الدرجات: يتم اعتماد إفادة تخرج الطالب وكشف درجاته من قبل مسجل الكلية وعميد الكلية وذلك بعد إعدادها من قبل مكتب التسجيل بالكلية وتوقيع معدها.
4. اعتماد الشهادة الجدارية: تعتمد الشهادات الجدارية للطالب من قبل مسجل عام الجامعة وعميد الكلية ورئيس الجامعة.

الفصل الرابع - الإنذار وإعادة التنسيب والفصل من الدراسة

مادة (37) - الإنذارات

ينذر الطالب في الحالتين التاليتين:



أ- إذا انقطع عن متابعة دراسته بدون عذر يقبله مجلس الكلية مدة لا تزيد عن شهر خلال السنة الدراسية.
ب- إذا تحصل على تقدير ضعيف في نهاية أي سنة من السنوات الدراسية.

مادة (38) - إعادة التنسيب

يعاد تنسيب الطالب إلى كلية أو معهد عال آخر في الحالات التالية:
أ- إذا تحصل على تقدير ضعيف جدا في نتائج امتحانات مرحلة الأعداد أو في نتائج امتحانات السنة الأولى من المرحلة الأولى من مدة الدراسة بالكلية.
ب- إذا رسب الطالب سنتين دراسيتين متتاليتين أيا كان متوسط تقديره العام.
ت- يجوز للطلاب المتعثرين في السنوات النهائية من الدراسة والحالتين الموضحتين في الفقرتين (أ، ب) من هذه المادة الاستمرار في الدراسة بنفس الكلية مقابل القيام بدفع الرسوم الدراسية الكاملة للتخصص، وتحدد هذه الرسوم بقرار من الجهات المختصة.
ث- كما يجوز إعادة التنسيب إلى كلية أو معهد عال يكون معدل القبول به أقل من الكلية التي استنفذ الطالب بها سنوات الرسوب وذلك لمرة واحدة فقط.

مادة (39) - الفصل من الدراسة

يفصل الطالب وينتهي حقه في الدراسة على حساب الدولة في الحالات الآتية:

1. إذا انقطع عن الدراسة بدون سبب مشروع مدة سنة دراسية كاملة.
2. إذا أعيد تنسيب الطالب وتحصل على تقدير عام ضعيف جدا في نهاية الإعداد أو السنة الأولى.
3. إذا أعيد تنسيب الطالب ورسب سنتين دراسيتين متتاليتين، أيا كان متوسط تقديره العام.
4. إذا قضى ضعف المدة المقررة بالنسبة للطالب الذي اختار الاستمرار في الدراسة عن طريق دفع الرسوم الدراسية للتخصص.

ويجوز للطلاب المتعثرين في المراحل النهائية أو المفصولين بمقتضى أحكام هذه المادة التسجيل كطلاب منتسبين بكليات أخرى وذلك على النحو الذي يصدر بشأنه قرار من وزير التعليم العالي والبحث العلمي، كما يجوز لهم الانخراط في نظام التعليم المفتوح .



الفصل الخامس - المخالفات التأديبية

المادة (40) - الالتزام بأداء الواجبات

على الطالب الالتزام بأداء واجباته التعليمية على أحسن وجه والحفاظ على كرامة الجامعة أو الكلية بأن يسلك في تصرفاته مسلكاً يتفق مع وضعه باعتباره طالباً جامعياً وأن تتفق تصرفاته مع القوانين واللوائح والنظم المعمول بها في مؤسسات التعليم العالي والأصول والتقاليد الجامعية المستقرة.

المادة (41) - المخالفة للقوانين واللوائح

يخضع الطالب للتأديب إذا ارتكب فعلاً يشكل مخالفة للقوانين واللوائح والأنظمة المعمول بها في الجامعة سواء تم الفعل داخلها أو في أي مكان من ملحقاتها، وتقع المخالفة بارتكاب فعل محظور قانوناً، ويظل الطالب خاضعاً لأحكام التأديب من تاريخ تسجيله بالدراسة وحتى زوال هذه الصفة بتخرجه أو إلغاء تسجيله .

المادة (42) - ارتكاب المخالفات

لا يجوز للطالب ارتكاب المخالفات التالية:

1. الاعتداء على أعضاء هيئة التدريس أو الطلاب أو العاملين بالجامعة.
2. الاعتداء على أموال الجامعة أو المرافق التابعة لها.
3. الإخلال بنظام الدراسة والامتحانات.
4. ارتكاب أي سلوك مناف للأخلاق أو يمس النظام العام والآداب العامة.

المادة (43) - أنواع المخالفات

يعد من مخالفات الاعتداء على أعضاء هيئة التدريس أو العاملين أو الطلاب أعمال الشجار أو الضرب أو الإيذاء أو السب أو القذف أو التهديد، ويتحقق الاعتداء إذا تم بصورة علنية وبحضور المعتدى عليه سواء ارتكب الفعل شفاهية أو كتابة أو بالإشارة. أو باستعمال أي من وسائل التواصل الاجتماعي.

المادة (44) - إتلاف المعدات والأدوات

يعد من مخالفات الاعتداء على أموال الجامعة كل استيلاء أو إتلاف للمعدات أو الأدوات التابعة للجامعة أو إحدى المرافق التابعة لها مما يجعلها غير صالحة للاستعمال كلياً أو جزئياً وتقع المخالفة سواء تمت بصورة متعمدة أو غير متعمدة.



المادة (45) - مخالفات الإخلال بنظام الدراسة والامتحانات

يعد من مخالفات الإخلال بنظام الدراسة والامتحانات ما يلي:

1. تزوير المحررات الرسمية مثل الشهادات والإفادات والوثائق سواء كانت صادرة عن الجامعة أو عن غيرها إذا كانت ذات صلة بإجراءات الدراسة.
2. انتحال الشخصية سواء لتحقيق مصلحة للفاعل أو لغيره، ويعد انتحالا للشخصية دخول طالب بدلا عن طالب آخر لأداء الامتحان وتسري العقوبة على الطالبين وكل من كان شريكا فيه من الطلاب.
3. إثارة الفوضى أو الشغب وعرقلة سير الدراسة أو الامتحانات بأية صورة كانت.
4. التأثير على الأساتذة أو العاملين فيما يخص سير الامتحانات أو التقييم أو النتائج أو غيرها مما يتعلق بشؤون الدراسة والامتحانات.
5. ممارسة أعمال الغش في الامتحانات أو الشروع فيها بأية صورة من الصور، ويعتبر من قبيل الشروع في الغش إدخال الطالب إلى قاعة الامتحانات أية أوراق أو أدوات أو أجهزة ذات علاقة بالمنهج الدراسي موضوع الامتحانات ما لم يكن مرخصاً بإدخالها من قبل لجنة الامتحانات.
6. الامتناع عن الإداء بالشهادة أمام لجان التحقيق أو مجالس التأديب المشكلة وفقا لأحكام هذه اللائحة.
7. أية مخالفة للقوانين واللوائح والنظم المتعلقة بالتعليم العالي .

المادة (46) - السلوك المخالف للآداب العامة

يعد سلوكٌ منافياً للأخلاق والنظام العام والآداب العامة الأفعال الآتية:

1. الاعتداء على العرض ولو تم برضا الطرف الآخر وفي حالة الرضا يعد الطرف الآخر شريكا في الفعل.
2. خدش الحياء العام.
3. تعاطي المخدرات أو المسكرات أو التعامل فيها بأية صورة من الصور.
4. تداول الأشياء الفاضحة أو توزيعها أو عرضها.
5. الظهور بمظهر غير لائق داخل المؤسسة التعليمية أو إحدى مكوناتها أو ارتداء الأزياء المنافية للحشمة أو المبالغة في الزينة، وتبين اللوائح الداخلية للكليات شروط الزي الجامعي.
6. كل ما من شأنه الإخلال بالشرف أو المساس بالآداب العامة والأخلاق المرعية وفقا للتشريعات النافذة.



المادة (47) - الجرائم الجنائية

تعد المخالفات الواردة في المواد سالفة الذكر مخالفات على سبيل المثال لا الحصر، ويعتبر السلوك مكونا لأي من المخالفات أو الجرائم المذكورة في المواد السابقة ما دام مخالفا للتشريعات والنظم المعمول بها ويتنافى مع الأخلاق والآداب العامة.

وفي جميع الأحوال إذا شكل السلوك جريمة جنائية توجب على الكلية إبلاغ الجهات المختصة.

الفصل السادس - العقوبات التأديبية

المادة 48- الإيقاف عن الدراسة

يعاقب الطالب بالإيقاف عن الدراسة لمدة لا تقل عن سنتين دراسيتين إذا ارتكب أحد الأفعال المنصوص عليها في المادة (35) من هذه اللائحة ويفصل الطالب من الكلية إذا كان عائدا.

المادة 49- مدة الإيقاف عن الدراسة

يعاقب الطالب بالإيقاف عن الدراسة لمدة لا تقل عن سنة دراسية إذا ارتكب أحد الأفعال المنصوص عليها في المادة (42، 43) وتضاعف العقوبة عند العود. وفي جميع الأحوال لا يجوز عودة الطالب لمواصلة الدراسة إلا إذا دفع قيمة الأضرار التي أحدثها بأموال الجامعة.

المادة 50- عقوبات الإخلال بالنظام العام للدراسة والامتحانات

يعاقب الطالب عند ارتكابه لإحدى المخالفات المنصوص عليها في المادة (45) من هذه اللائحة بالعقوبات الآتية:

1. الإيقاف عن الدراسة لمدة لا تقل عن سنة دراسية ولا تزيد على سنتين دراسيتين كل من ارتكب المخالفات الواردة في الفقرتين (1 و2) من المادة المذكورة، ويفصل الطالب عن الدراسة فصلاً نهائياً عند العود.
2. الحرمان من دخول الامتحانات كلياً أو جزئياً إذا ارتكب المخالفات المحددة في الفقرتين 3 و4 من المادة المذكورة، وفي جميع الأحوال يعتبر امتحانه ملغياً في المادة التي ارتكب فيها المخالفة.



3. إلغاء نتيجة امتحان الطالب في دور واحد على الأقل إذا ارتكب المخالف الوارد بيانها في الفقرة 5 من المادة المذكورة ويجوز لمجلس التأديب إلغاء امتحانه لسنة كاملة ويفصل الطالب فصلا نهائيا عند العود.
4. الحرمان من حقوق الطالب النظامي أو الإيقاف عن الدراسة مدة لا تزيد على سنة دراسية واحدة إذا ارتكب إحدى المخالفات المنصوص عليها في الفقرات (6 و7) من المادة المذكورة .

المادة (51) -صلاحيات رئيس لجنة الامتحانات

يجوز لرئيس قاعة الامتحان أو رئيس لجنة الامتحانات والمراقبة أو المشرفين على قاعة الامتحان أو وكيل الكلية للشؤون العلمية أو عميد الكلية تفتيش الطالب إذا وجدت قرائن تدعو للاشتباه بأن في حيازته أوراقا أو أدوات أو أجهزة لها علاقة بالمقرر موضوع الامتحان، وإذا كان المشتبه فيه طالبة يجب الاستعانة بأثنى في عملية التفتيش.

كما يجوز لهم إخراج الطالب من قاعة الامتحان إذا خالف تعليمات لجنة الامتحان أو شرع في ارتكاب أعمال الغش وفي جميع الأحوال يعتبر امتحانه ملغيا ويعطى فيه درجة صفر.

مادة (52)-عقوبة الغش في الامتحانات

كل طالب يحاول الغش بأية صورة كانت أو يضبط معه كل ما له علاقة بالمقرر عدا ما هو مسموح به مع ورقة الأسئلة موضوع الامتحان يعتبر امتحانه ملغيا في المقرر الذي ارتكب فيه المخالفة ويمنح درجة صفر في جميع المواد ويجوز لمجلس التأديب إلغاء امتحانه لسنة كاملة ويفصل الطالب نهائيا عند العود.

أما في الأحوال الأخرى فتلغى الامتحانات بقرار من لجنة التأديب ويترتب على إلغاء الامتحان بطلان الشهادة إذا كانت قد منحت للطالب قبل اكتشاف حالة الغش.

يوقف الطالب عن الدراسة مدة لا تزيد عن سنة دراسية واحدة إذا ارتكب المخالفة المنصوص عليها في الفقرة (6) من المادة (45).

المادة (53)-عقوبة الإيقاف عن الدراسة

يعاقب بالإيقاف عن الدراسة لمدة لا تقل عن سنة ولا تزيد على سنتين كل طالب ارتكب إحدى الأفعال المنصوص عليها في المادة (46) من هذه اللائحة، ويفصل الطالب نهائيا عند العود، ويتوجب على عميد الكلية عند ارتكاب



المخالفة المنصوص عليها في الفقرات 5 من المادة المذكورة استدعاء ولي أمر الطالب ولفت نظره إلى سلوكه وتحذيره من مغبة هذا السلوك، فإذا أصر الطالب على مسلكه توجب الاستمرار في إجراءات التأديب.

المادة (54)-الإيقاف المؤقت عن الدراسة

يترتب على الإيقاف المؤقت عن الدراسة حرمان الطالب من التقدم إلى الامتحانات التي تعقد أثناء سريان مدة الوقف بما في ذلك الامتحانات النهائية، ولا يجوز للطالب الانتقال إلى أي كلية أخرى أثناء مدة سريان العقوبة.

الفصل السابع - إجراءات التأديب

المادة (55)-الإبلاغ عن المخالفات

على كل من علم بوقوع مخالفة للقوانين واللوائح والأنظمة المعمول بها في الكليات أو الجامعة أن يقدم بلاغاً عن هذه المخالفة، يتضمن تقريراً مكتوباً عن الواقعة إلى عميد الكلية أو وكيلها أو رئيس الجامعة أو وكيل الشؤون العلمية بالجامعة .

المادة (56)-تشكيل لجان التحقيق

فور الإبلاغ عن المخالفة يتعين على عميد الكلية تكليف لجنة للتحقيق مكونة من ثلاثة أعضاء هيئة تدريس يكون أحدهم مقررراً للجنة.

المادة (57)-إعلام الطالب بموعد التحقيق

يتم إعلام الطالب بالتحقيق معه قبل مواعده بيوم كامل على الأقل، ولا يحتسب اليوم الذي تم فيه إعلامه، ويجوز أن يتم التحقيق فوراً في حالات الضرورة والاستعجال .

المادة (58) - تقرير التحقيق

يقدم المكلف بالتحقيق تقريره بعد الانتهاء من التحقيق، أو عدم حضور الطالب للتحقيق بالرغم من إعلامه به إلى اللجنة التي كلفته.



المادة (59) - تشكيل المجلس التأديبي

إذا ما انتهت لجنة التحقيق إلى الرأي بمعاقبة الطالب تأديبياً يتم تشكيل مجلس للتأديب بقرار من عميد الكلية، ويتكون من ثلاثة أعضاء هيئة تدريس من ذوي الخبرة والدراية، وعضو من المكتب القانوني بالجامعة ومندوب عن اتحاد الطلبة بالكلية أو ما في حكمه، ويرأس المجلس أقدم أعضاء هيئة التدريس. ويتم إعلام من تقرر إحالته على المجلس المذكور بالموعد الذي ينبغي فيه المثول أمامه وذلك خلال مدة لا تقل عن ثلاثة أيام، ولا يحتسب اليوم الذي تم فيه الإعلان من بينها، وفي حال عدم الحضور يصدر المجلس قراره غيابياً، ويتم إعلان الطالب عن طريق لوحة الإعلانات بالمؤسسة التعليمية، ولا يجوز لمن اشترك في لجنة التحقيق أن يكون عضواً بمجلس التأديب .

المادة (60) - قرار مجلس التأديب

يصدر مجلس التأديب قراره بعد سماع أقوال الطالب، ويجوز للمجلس استدعاء الشهود، كما يجوز له استدعاء من قام بالتحقيق.

المادة (61) - صلاحيات تشكيل مجلس التأديب

يتولى رئيس الجامعة تشكيل لجان التحقيق أو مجالس التأديب فيما يتعلق بالقضايا التي تخص أكثر من كلية في إطار الجامعة، ويتولى وزير التعليم العالي والبحث العلمي أو من يخوله بذلك، تشكيل لجان تحقيق أو مجالس تأديب فيما يتعلق بالقضايا التي تخص أكثر من جامعة.

المادة (62) - الإعلان عن موعد التحقيق

يتم الإعلان عن موعد التحقيق أو التأديب بلوحة الإعلانات في الكلية المسجل بها الطالب، ويعتبر ذلك قرينة على العلم به.

المادة (63) - آلية إصدار قرار التأديب

يصدر مجلس التأديب قراراته بأغلبية أصوات الأعضاء، ولا تعد نافذة إلا بعد اعتمادها من مجلس الكلية أما القرارات الصادرة عن المجلس بالفصل فلا تعد نافذة إلا بعد اعتمادها من الجامعة، وتبلغ كافة الجامعات والمعاهد العليا الليبية بقرار الفصل وذلك للحيلولة دون تسجيل الطالب المفصول في أي منها .



المادة (64) – الإعلان عن قرار التأديب

يعلن قرار مجلس التأديب بلوحة الإعلانات في الكلية المسجل بها الطالب، وتودع نسخة ثانية بالملف الشخصي للطالب.

المادة (65) – انقضاء الدعوى التأديبية

تنقضي الدعوى التأديبية بوفاة الطالب أو انسحابه من الكلية ولا يؤثر انقضاء الدعوى التأديبية أو الحكم فيها على الدعوى الجنائية أو المدنية الناشئة عن الواقعة.

المادة (66) – اعتماد قرارات التأديب

تعتبر قرارات المجلس التأديبية التي تصدر طبقاً لأحكام هذه اللائحة نهائية بعد اعتمادها ولا يجوز الاعتراض عليها إلا بالطعن فيها أمام المحكمة المختصة.

الفصل الثامن - أحكام عامة

مادة (67) علاوة الصيدلي

تصرف علاوة الصيدلي لكل أعضاء هيئة التدريس من حملة بكالوريوس الصيدلة طبقاً للمادة (1) من قرار الأمين المساعد لشؤون الخدمات رقم (326) لسنة 1372 ور وقرار اللجنة الشعبية العامة رقم (199) لسنة 1369 ور بخصوص العلاوة السريرية.

مادة (68) تعديل أحكام اللائحة

يجوز تعديل الأحكام الواردة في هذه اللائحة بالإضافة أو الإلغاء وفقاً للتشريعات النافذة.

مادة (69) سريان أحكام اللائحة

تسري أحكام هذه اللائحة اعتباراً من تاريخ اعتمادها، وتسري أحكام لائحة تنظيم التعليم العالي الصادرة بقرار اللجنة الشعبية العامة "سابقاً" رقم (501) لسنة 2010م على كل ما لم يرد بشأنه نص في هذه اللائحة، ولا يسري أي حكم يخالفها.

يعتمد /

تاريخ الاعتماد:/...../..... م 2022



المقررات الدراسية



مقررات مرحلة الإعداد Subjects for premedical students

Chemistry

1	Course name	Chemistry
2	Course Code	GP 1
3	Course type: /general/specialty/optional	General
4	Accredited units	4 units (Theoretical 3 Lecture/Week 1Lab/Week)
5	Educational hours	5hrs/week
6	Pre-requisite requirements	Non
7	Program offered the course	Science college
8	Instruction Language	English Language
9	Date of course approval	12/2021

Brief Description:	The chemistry course includes the study of general chemistry and organic chemistry. In general chemistry the student studies the following topics: Atomic structure and periodic table, atomic structure, chemical bonding, Chemical equations, and Stoichiometry. Also, the course provides Physical properties of solutions, types of chemical reactions, chemical thermodynamics, and chemical kinetics. While he receives in organic chemistry lessons the following topics: Difference between organic and inorganic compounds, Saturated hydrocarbons, Aromatic compounds, Stereochemistry, Organic acids, Amines, and amides.
Textbooks required for this Course:	<ol style="list-style-type: none"> 1. Ebbing and Gammon. General Chemistry 11th edition. Belmont: Brooks/Cole Cengage Learning, 2016. (Hardcover, Loose Leaf, or eBook). 2. Moog and Farrell. Chemistry: A Guided Inquiry (Pitt Custom Edition), 2018. 3- Solomons, Fundamentals of organic chemistry textbook, fourth edition. by T.W Graham Solomon. John Wiley and Sons INC. last edition. 4- Experimental organic chemistry textbook, principles and practice. BlackWell Scientific publications.
Course Duration	28 weeks
Delivery	<p>Lectures (Tools: board, data show). The lectures were added on the internet site of the faculty to be available to the students all the time as an e-learning.</p> <p>Practical Session (Tools: labs., boards, instruments, chemicals, glassware, equipment).</p> <p>Assignments, seminars, research and posters.</p>
Course Objectives:	<p>Upon successful completion of the course the student should be able to:</p> <ol style="list-style-type: none"> a) understand how the atoms are arranged in molecules and ions b) Name chemical compounds



	c) Balance chemical equations and use variety of problems d) Describe properties of solution e) Know Energy changes with reactions f) Describe the electronic structure of atoms g) Know the properties of elements in the periodic table h) Differentiate between types of bonds i) Knowledge of properties and behavior of Gases	
Course Assessments	Midyear Examination	20.0%
	Practical continuous Assessment	10.0%
	Final practical Examination	20.0%
	Final written Examination	50.0%
	Total	100.0%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage	
Session 1 (Week 1)	A. General chemistry: 1. Chemistry and Measurement of concentration: Introduction, scientific measurements, conversion of units, significant figures, length mass and weight, density, temperature, pressure, heat and other forms of energy.	
Session 2 (Week 2)	2. Atomic structure and periodic table: (5 hr.) a) State and kinds of matter, b) The atomic theory, c) The structure of atom, d) Electronic configuration.	
Session 3 (Week 3)	a) Structure of periodic table b) Correlation with electron configuration, c) Horizontal and vertical relationships, d) Properties of elements important for life. e) Pauli Exclusion principle. f) Hunds Rule	
Session 4 (Week 4)	3. Chemical bonding, general concept: (3 hr) a) Lewis symbols, b) Types of chemical bonds, c) the ionic bonds factors, d) Influencing the Formation of ionic compounds, e) Covalent and coordinate bonds, f) Drawing Lewis structures.	
Session 5 (Week 5)	4. Chemical equations and Stoichiometry: (6 hr) a) The language of chemical equations,	



	<ul style="list-style-type: none"> b) Balancing of chemical equations involving changes or no changes in valency, c) Molecular weights and formula weights, a) Chemical formula an empirical formula,
Session 6 (Week 6)	<ul style="list-style-type: none"> b) The chemical mole, c) Percentage composition, d) Calculations based on chemical equation a) Limiting reactant calculation, b) Theoretical yield and percentage yield. c) Molar concentration, Equivalents, and mill equivalents ions,
Session 7 (Week 7)	<p>5. Physical properties of solutions: (4hr)</p> <ul style="list-style-type: none"> a) Hydrogen bonding in water, a) Kinds of mixtures, Types of solutions, b) Concentration units (M, PPT, PPM, PPB, %w w, v v, w v mole fraction and mass fraction) c) The solution processes in liquid solutions. d) Surface tension, Surfactants, e) Types of Homogeneous mixture, f) Water as solvent, g) Saturated solutions, h) Hydrates
Session 8 (Week 8)	<p>6. chemical reaction in aqueous solution and chemical equilibrium: 14 hr</p> <ul style="list-style-type: none"> a) Acids and bases in aqueous solutions Bronstead-Lowry acids and bases, b) Lewis and bases c) The strength of acids and bases. d) Solution terminology: chemical equilibrium factors ionization constant of weak acids and bases,
Session 9 (Week 9)	<ul style="list-style-type: none"> a) Hydrolysis of salt, b) Ionic product of water, c) pH concept, d) buffers. e) Oxidation reduction, redox system, f) oxidation number, g) balancing oxidation reduction equations, h) important oxidizing reducing agents.
Session 10 (Week 10)	<ul style="list-style-type: none"> a) Saturated and super saturated solution solubility and solubility product constant, b) common ion effect, c) complex ions their equilibria.
Session 11 (Week 11)	Assessment
Session 12 (Week 12)	



Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	7. Chemical thermodynamics: (4 hr.) <ol style="list-style-type: none"> General concept 1th law of thermodynamics, Thermal capacity and enthalpy, Second law of thermodynamics and entropy, Entropy changes calculations, Free energy and equilibrium state, Thermo-chemistry, 2nd, 3rd laws and free energy, Applications.
Session 16 (Week 16)	8. Chemical kinetics: (6 hr) <ol style="list-style-type: none"> The rate of reactions The rate of laws Zero-order reaction First-order reaction Second-order reaction
Session 17 (Week 17)	<ol style="list-style-type: none"> Arrhenius equation Half-life of chemical reaction, Deviation of rate law from experiment, Effect of temperature on rate Excitation energy, Enzymatic reaction.
Session 18 (Week 18)	B. Introduction to Organic Chemistry: <ol style="list-style-type: none"> Introduction: <ol style="list-style-type: none"> Difference between organic and inorganic compounds Structural features of organic molecules, Isomerism Hybridized orbitals, Molecular shapes.
Session 19 (Week 19)	<ol style="list-style-type: none"> Classes of organic compound: <p>Saturated hydrocarbons: Aliphatic hydrocarbons (Alkanes and Cycloalkanes):</p> <ol style="list-style-type: none"> Physical properties, Nomenclature Chemical properties. Chemical reactions.
Session 20 (Week 20)	<ol style="list-style-type: none"> Unsaturated hydrocarbons: <ol style="list-style-type: none"> Nomenclature of alkenes, Isomerism among alkenes Geometry among ring compounds, Chemical reaction (Addition to double bonds), Polymerization.



Session 21 (Week 21)	4. Aromatic compounds: aromatic hydrocarbons: a) Characteristic reactions of benzene, b) Naming derivatives of benzene, c) The pi-electrons in benzene.
Session 22 (Week 22)	5. Alkyl and Aryl Halides: a) Nomenclature b) Physical properties c) Chemical reaction
Session 23 (Week 23)	6. Alcohols, Phenols and Ethers: a) Nomenclature b) Physical properties c) Chemical reaction d) Solubility e) Medical applications
Session 24 (Week 24)	7. Stereochemistry:
Session 25 (Week 25)	Stereochemistry (continue)
Session 26 (Week 26)	9. Ketones and aldehydes: a) Nomenclature b) Physical properties c) Chemical reaction d) Solubility e) Applications
Session 27 (Week 27)	10. Organic acids and esters (Carboxylic acids and derivatives: a) Nomenclature b) Physical properties c) Chemical reaction d) Hydrolysis
Session 28 (Week 28)	11. Amines and amides: a) Nomenclature b) Physical properties c) Chemical reaction d) Medical applications.
Practical Work	1. Identification of acidic and basic radicals. 2. Identification of unknown organic compounds. <ul style="list-style-type: none"> - Solubility - Melting point and boiling point - General scheme for identification of organic functional groups in organic compounds.
10-Practical Exam	



Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.

Physics

1	Course name	Physics
2	Course Code	GP 2
3	Course type: /general/specialty/optional	General
4	Accredited units	3 units (Theoretical 2 Lecture/Week 1Lab/Week)
5	Educational hours	4hrs/week
6	Pre-requisite requirements	Non
7	Program offered the course	Science college
8	Instruction Language	English Language
9	Date of course approval	12/2021
Brief Description:		This course involves the study of the Particle dynamics: work, energy and power, Properties of matter, Heat, Sound, Optics, and Modern Physics.
Textbooks required for this Course:		1. Jones and Childers. Contemporary physics, last edition. 2. Kane J. W and Sternheim M.M., Physics, last edition. 3. Hademenose G. W., Physics for pre-Med, Biology and allied health students Schaum' Outlines. Last edition. 5. Serway R.A. Physics for Scientists and Engineers 6 th edition, 2004
Course Duration		28 weeks
Delivery		Lectures (Tools: board, data show). The lectures were added on the internet site of the faculty to be available to the students all the time as an e-learning.



	Practical Session (Tools: labs., boards, instruments, chemicals, glassware, equipment). Assignments, seminars, research, and posters.	
Course Objectives:		
Course Assessments	Midyear Examination	20.0%
	Practical continuous Assessment	10.0%
	Final practical Examination	20.0%
	Final written Examination	50.0%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage	
Session 1 (Week 1)	Part I: Mechanics A. Mechanics: 1. Vectors a) Vectors, equilibrium, and moment of force (Biomechanics). b) Kinematics: one dimension, two dimensions, motion on a curve. c) 3- Circular motion, rolling, simple harmonic motion.	
Session 2 (Week 2)	2. Dynamics: a) Newton's Second law, Centripetal, Centrifugal acceleration. b) Newton's law applications.	
Session 3 (Week 3)	3. Particle dynamics: work, energy and power: a) Conservation of energy, b) conservation forces work in P-V system, c) applications, power, d) Units of power, e) Efficiency.	
Session 4 (Week 4)	4. Conservation of linear momentum: a) impulse, b) collision, c) moment of momentum, d) angular momentum, e) conservation law.	
Session 5 (Week 5)	5. Rotational dynamics: a) The moment of Inertia b) Application of moment of Inertia c) Rotational equilibrium and rotational dynamics.	
Session 6 (Week 6)	B- Properties of matter: 6)- Hydrostatics: a) Units of pressure, b) gauge pressure, c) absolute pressure,	
Session 7 (Week 7)	a) pressure inside fluid, b) Pascal principle, c) Buoyancy.	
Session 8 (Week 8)	7) Surface tension:	



	<ul style="list-style-type: none"> a) Coefficient of surface tension, b) Liquid drops, bubbles, c) membranes, d) cylindrical and spherical membranes.
Session 9 (Week 9)	8- Elasticity: <ul style="list-style-type: none"> a) Elastic and inelastic materials, b) biological material, stress, strain, c) Hook's law,
Session 10 (Week 10)	<ul style="list-style-type: none"> a) Shearing and twisting; Bulk modulus, compressibility, b) Stress and strain in biological systems, c) Energy in distortion,
Session 11 (Week 11)	Assessment
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	<ul style="list-style-type: none"> a) elastic constant, b) elastic membranes, c) Blood vessels, d) The heart and circulatory system.
Session 16(Week 16)	9. Hydrodynamics: <ul style="list-style-type: none"> a) laminar and turbulent flow, b) continuity equation, c) ideal fluid, Bernoulli equation d) applications,
Session 17 (Week 17)	<ul style="list-style-type: none"> a) abnormal blood vessels (stenosis, flutter), b) non ideal fluids, c) work done by heart in one beat,
Session 18 (Week 18)	<ul style="list-style-type: none"> a) viscosity, Poiseuill's law, b) flow resistance, c) vascular beds, d) sedimentation and centrifugation
Session 19 (Week 19)	Part II: Heat, Sound, Optics, and Modern Physics 10. Thermal Physics: <ul style="list-style-type: none"> a) Celsius and Fahrenheit scales. b) Heat: phase changes. c) Heat and first law of thermodynamics.
Session 20 (Week 20)	<ul style="list-style-type: none"> a) Heat conduction and its application b) Thermodynamics and its applications. c) Thermal properties of gases.
Session 21 (Week 21)	11. Waves and Sound: <ul style="list-style-type: none"> a) Sound wave, velocity of waves in elastic media. b) Acoustic impedence, intensity and intensity level. c) Damping, resonance, standing waves, Doppler effect, ultrasound.
Session 22 (Week 22)	<ul style="list-style-type: none"> a) The ear and hearing. b) Ultrasound (physical principles and application)



Session 23 (Week 23)	12. Optics: (wave and wave propagation): a) Wave theory of light, b) Properties of light, c) reflection and refraction at spherical surfaces. d) Total internal reflection and its application.
Session 24 (Week24)	13. Geometric Optics: a) Lenses the optical instrument. b) The human eye, c) color blindness, d) Optical defect of the eye vision: myopia, hyperopia, astigmatism, glaucoma.
Session 25 (Week 25)	14. Microscopes: a) Electron microscope, b) Laser and its applications in medicine. c) Spectrophotometry, d) Interference, e) Diffraction, f) Polarization.
Session 26 (Week 26)	15. Modern physics: (Nuclear Physics and Radioactivity): a) Atomic structure. b) Radioactivity c) Half-life d) X-ray production and absorption (photoelectric effect, Compton effect) e) Radioactive decay (γ , β , and α decay)
Session 27 (Week 27)	a) Nature radioactive emissions, b) Ionizing radiation c) Isotopes application, d) Radiation units
Session 28 (Week 28)	a) Radiation detectors, b) Exposure doses c) Biological effect of radiation, d) Harmful effects of radiation.
Practical Work	The applications on the theoretical outline of the course. 10-Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer,



	- understand the basic components of anatomy & physiology of plant	
Course Assessments	Midyear Examination	20.0%
	Practical continuous Assessment	10.0%
	Final practical Examination	20.0%
	Final written Examination	50.0%
	Total	100.0%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage	
Session 1 (Week 1)	Syllabus of General Botany: 1 - Introduction: <ul style="list-style-type: none"> - Historically and evolution of botany - Plant scientists. - Plant science relates to many fields. - Fields of botany and the importance of plants and their effects on life. - Botany today and in future. 	
Session 2 (Week 2)	<ul style="list-style-type: none"> - Classification of living Things. - Plant kingdom non-flowering plants. - Flowering plants. - Flowering plants Monocotyledons-Dicotyledons. 	
Session 3 (Week 3)	2- Summary on the kinds of plants in relation to kind of nutrition: <ul style="list-style-type: none"> a) Kind of organisms in relation to nutrition. b) Kind of nutrition of plant. c) Kind of organisms in relation to the cell structure. d) The major differences between animal and plant cells (table). e) Differences between animal and plant cell. f) The plant cell- The cell theory. 	
Session 4 (Week 4)	<ul style="list-style-type: none"> a) Cell parts and organelles. b) All plant cell parts from cell wall to the nucleoli (single nucleolus). c) From cytoplasm to lysosomes. 	
Session 5 (Week 5)	3- The plant cell: <ul style="list-style-type: none"> a) Discovery of the cell, prokaryotic and eukaryotic. b) The functional organization of plant cell. c) Cell wall; structure and functions. 	
Session 6 (Week 6)	4- The plant tissues: <ul style="list-style-type: none"> a) Cellular differentiation to give rise to dissimilar tissues within and individual functions of tissues. 	
Session 7 (Week 7)	5- The cell matter: <ul style="list-style-type: none"> b) Carbohydrates, c) lipids, d) proteins and nucleic acids; e) protein synthesis (structure of DNA and RAN, DNA replication, the genetic code, RNA synthesis and protein synthesis). 	
Session 8 (Week 8)	6- The cell metabolism: <ul style="list-style-type: none"> a) The cell energy (ATP), cellular respiration. 	



	b) The importance of energy on transportation of different substances; on growth and on the all of metabolic pathways .
Session 9 (Week 9)	7- Photosynthesis: a) Chloroplasts and the other photosynthetic pigments. b) Light-absorbing compounds (pigments), chlorophyll and absorption spectrum i e. adsorption of different wave lengths. Reduction of CO ₂ .
Session 10 (Week 10)	8- The plat structure and activity: a) The leafstructure and activity. b) Kind of modification of leaves; comparison of the adaptive differences of the kinds of plants. c) Transpiration: meaning, stomata or stomates and their controlling of transpiration. d) Water balance due to osmotic equilibration. CO ₂ uptake.
Session 11 (Week 11)	Assessment
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	a) The stem and Vascular system. Structure and function. Comparative anatomy of different main stems. Development of vegetation. b) The Root and the Plant Nutrients. General structure of the root and function. Kinds of roots. Comparative anatomy and modifications of roots. Growth of root. Absorption of water and salts.
Session 16(Week 16)	9. The flowering plants reproductions: a) The vegetative reproduction and its kinds. b) The flower and its male and female. c) Flowering plants reproduction. d) Pollination and fertilization. e) Embryo, Seed, and Fruit. f) Kinds of germination, seed's dormancy, and seedlings growth.
Session 17 (Week 17)	10. Hereditary or Inheritance: a) Introduction of genetics and its emergence. b) Chromosomal fundamental of inheritance. c) Genes, Chromosomal linkage and crossing-over. d) Complete and incomplete dominance (Dominant and Recessive characters). e) Mendelian laws and their effect on inheritance. f) Mutation, Genetic engineering (meaning only); its role on the improvement of the plant characters.
Session 18 (Week 18)	11. The plant Ecology: a) The importance of ecology. b) The strategies of adaptation.



	<ul style="list-style-type: none"> c) The resistance of ecological, tolerance, e.g. shortage of water or increase of salt in the soil. d) Resources for survival. e) Ecological organization and the role of plants in it. f) Ecological balance or equilibrium (just the meaning). Ecological infection and its kinds in brief.
Session 19 (Week 19)	<p>12. The plant Taxonomy:</p> <ul style="list-style-type: none"> a) Introduction on the emergence of the taxonomy. b) Bases of taxonomy and its rules. c) The system of binomial (for Carl Linnaeus 1707-1778): The international scientific system). d) The plant classification of the different basic aspects.
Session 20 (Week 20)	<p>13. Viruses: Characters, structures, classification, reproduction, and some diseases.</p>
Session 21 (Week 21)	<p>14. Bacteria:</p> <ul style="list-style-type: none"> a) Characters, properties, b) importance, c) reproduction and d) some diseases which it causes.
Session 22 (Week 22)	<p>15. Algae:</p> <ul style="list-style-type: none"> a) Characters and properties. b) Reproduction. c) Classification and bases. d) The most important species with their properties and importance (such as: The prokaryotic blue greens(cyanobacteria). Green algae, Nostoc, Spirogyra and Chlamydomonas. Golden algae, Brown algae and Diatoms.
Session 23 (Week 23)	<p>16. Fungi:</p> <ul style="list-style-type: none"> a) Characters and properties. b) Reproduction, c) classification and the bases. d) Examples of the most important species. e) Liches: characters and properties in general. Nutrient, structure. Species. Reproduction, f) importance. g) Pterydophyta: properties, Reproduction, Classification, and the importance.
Session 24 (Week24)	<p>17. Bryophytes (Nonvascular, Land Plants):</p> <ul style="list-style-type: none"> a) Properties and characters, b) reproduction and c) classification.
Session 25 (Week 25)	<p>18. The seed plants:</p> <ul style="list-style-type: none"> a) Gymnospermae: characters and properties, reproduction, life-cycle. Classification and the economic importance. b) Angiospermae: Characters, Properties, and Classification:



Session 26 (Week 26)	<ul style="list-style-type: none"> c) Monocotyledonae: properties, classification, and the economic importance d) Dicotyledonae: properties, classification and the economic importance
Session 27 (Week 27)	Review
Session 28 (Week 28)	Review
Practical Work	<p>Botany Practical: Usage of plant samples, slides, equipment of laboratory for practical study of different plant species and their varieties. The basis process of the plant life.</p> <p>1. The microscope:</p> <ul style="list-style-type: none"> a) structure, function and proper utilization of the compound microscope. b) different types of microscopes of common use in botanical investigations. <p>2. The plant cell: content (metabolites and reserved)</p> <ul style="list-style-type: none"> a) structure, nature of the cell wall, pits, stains for identification of the cell wall nature. b) Structure of the cell wall contents cytoplasm, nucleus, and inclusions. <p>3. The cell content (metabolites and reserved food materials):</p> <ul style="list-style-type: none"> a) starches: wheat, potato, Maize and Rice starches (composition, stains) b) Aileron grains: structure, composition, and stains. c) Oil and fats as found in cell: composition and stains. d) Calcium oxalate, identifications by microscope and chemical tests. d) Prisms (ficus), crystal sheath (Liquorice), Raphides (Squill), Clusters (Rhubarb) and crystal layer (Belladonna), or other examples of medicinal plants. <p>4. Different types of tissues:</p> <ul style="list-style-type: none"> a) Parenchyma, Collenchyma, sclerenchyma (Fibers and sclereids) shape, characters, contents. b) Xylem vessels, nature of cell wall, types of thickening. c) Tracheids, nature of cell wall, types of thickening. d) Epidermal systems (in leaves and stems). <ul style="list-style-type: none"> - type of cells: shape, structure, walls, cuticle, examples of medicinal plants. - Types of stomata: anomoeytic, diacytic etc. <p>5. Trichomes:</p> <ul style="list-style-type: none"> a) glandular (Clavate, Labiaceous, Composite hairs). b) Non glandular (different types: uni- bi- and multicellular, uni-, bi multiseriate. simple and branched types).



	<p>6. Histology of organs The leaf (Monocot and Dicot leaves). Example of isobilateral and dorsiventral leaves: structure and arrangement of different tissues.</p> <ol style="list-style-type: none"> Epidermises upper and lower. Mesophyll palisade and spongy tissue. Vascular bundles (different types). <p>The stem (Young and old monocot and dicot stem).</p> <ol style="list-style-type: none"> Structure, arrangement of tissues. Secondary thickening. Different types of vascular bundles: collateral, bicollateral, closed and centric...etc. <p>7. The secretory structures:</p> <ol style="list-style-type: none"> Oil cells, oil glands: schizogenous, lysigenous and schizolysigenous types. Oil ducts and resin ducts "vittae", laticiferous structures, cell tube and vessels. <p>8. Subterranean organs:</p> <ol style="list-style-type: none"> structure of monocot and dicot root and rhizome. differences between monocot and dicot roots and rhizomes Cork: structure of cork, Phellogen and phellogen. <p>9. Systematic botany: Examples of plants from the following families: Pinaceae (pinus sp.), Liliaceae (Aloe sp.), Leguminosae (any example), Solanaceae, Papaveraceae, Rosaceae, Compositae, Umbelliferae. The study includes morphological characters of the plant organs particularly the flower of available medicinal plants of Libyan flora.</p> <p>10-Practical Exam</p>
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure



	relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.
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Course Name

1	Course name		
2	Course Code		
3	Course type: /general/specialty/optional		
4	Accredited units		
5	Educational hours		
6	Pre-requisite requirements		
7	Program offered the course		
8	Instruction Language		
9	Date of course approval		
Brief Description:		Zoology part:	
Textbooks required for this Course:		Zoology for degree students Bcs. First year. Agarwal V.K.	
Course Duration		28 weeks	
Delivery		Lectures (Tools: board, data show). The lectures were added on the internet site of the faculty to be available to the students all the time as an e-learning. Practical Session (Tools: labs., boards, instruments, chemicals, glassware, equipment). Assignments, seminars, research and posters.	
Course Objectives:		Upon completion of the course, the student shall be able to understanding of: - The basic structure of living cells - The different functional activities of the cell. - The levels of body organization of cells, tissues, organs and systems. - know the classification and salient features of five kingdoms of life. - know understand the basic components of anatomy & physiology animal with special reference to human	
Course Assessments		Midyear Examination	20.0%
		Practical continuous Assessment	10.0%
		Final practical Examination	20.0%
		Final written Examination	50.0%
		Total	100.0%



Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1 (Week 1)	Biology syllabus Part (1): Cytology and Histology: <ol style="list-style-type: none"> Introduction to biological science: Manifestation of life. Cell structures and function: Ultra-structure of cell. Cell organelles (ultra-structure and function).
Session 2 (Week 2)	<ol style="list-style-type: none"> Prokaryotes and Eukaryotes. Tissue classification (Structure and function): Epithelial Connective tissue Muscular tissue Nervous tissue
Session 3 (Week 3)	Embryology: <ol style="list-style-type: none"> Male and female genital system Fertilization. Cleavage
Session 4 (Week 4)	<ol style="list-style-type: none"> Early embryogenesis; blastulation, gastrulation and neuulation Fetal period
Session 5 (Week 5)	Genetics: <ol style="list-style-type: none"> Information, coding, and transfer: <ol style="list-style-type: none"> DNA structure and replication Structure and chromosomes
Session 6 (Week 6)	<ol style="list-style-type: none"> Protein synthesis: <ol style="list-style-type: none"> RNA Transfer RNA Genetic code Ribosomal RNA Transcription of DNA to RNA Protein synthesis
Session 7 (Week 7)	<ol style="list-style-type: none"> Cell reproduction: <ol style="list-style-type: none"> Chromosome Cell cycle Cell division (Mitosis and Meiosis) Gametogenesis
Session 8 (Week 8)	<ol style="list-style-type: none"> Mendelian genetics: <ol style="list-style-type: none"> Mendelian methods Test cross Gene pairs
Session 9 (Week 9)	<ol style="list-style-type: none"> Mutation



	<ul style="list-style-type: none"> b) Mendelian laws (1 and 2) c) Lethal and multiple alleles d) Crossing over
Session 10 (Week 10)	Review
Session 11 (Week 11)	Assessment
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	Biology syllabus Part (2): Physiology: 1. Membrane permeability: <ul style="list-style-type: none"> a) Membrane permeability b) Simple diffusion and facilitated diffusion c) Active transport (primary and secondary) d) Exchange of large particles across plasma membrane e) Osmosis
Session 16(Week 16)	2. Nerve and muscle: <ul style="list-style-type: none"> a) Nerve cell, structure and function, brain and main functions of different parts, spinal cord and reflex action, autonomic nervous system. b) Muscle type and structure c) Neuromuscular junction and muscle contraction
Session 17 (Week 17)	3. Blood cells, Immunity, and blood clotting: <ul style="list-style-type: none"> a) Blood cell: definition, normal count, and function b) Immunity: definition, types of development of immune system and immune mechanism c) Blood clotting: clotting factors and mechanism of blood coagulation.
Session 18 (Week 18)	4. Endocrines: <ul style="list-style-type: none"> a) Hormone's type and mode of action. b) Sources and functions of important hormones.
Session 19 (Week 19)	5. Heart and Circulation: <ul style="list-style-type: none"> a) Organization of circulatory system, roles of arteries, capillaries, and veins b) Structure and function of heart, autorhythmicity, cardiac innervations and cardiac output c) Blood pressure and its regulation-regulation of local blood flow by metabolic and products
Session 20 (Week 20)	6. Respiration: <ul style="list-style-type: none"> a) Mechanism of breathing b) Transport of oxygen and carbon dioxide c) Control of breathing
Session 21 (Week 21)	7. Nutrition and Digestion: <ul style="list-style-type: none"> a) Essential components of food and their general functions, caloric requirement, and balance diet. b) Secretions of gastro-intestinal tract



	c) Digestion and absorption of nutrients
Session 22 (Week 22)	8. Food as fuel: a) Coenzymes b) Breakdown of glucose
Session 23 (Week 23)	Review
Practical Work	10-Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.

Statistics

1	Course name	Statistics
2	Course Code	GP 4
3	Course type: /general/specialty/optional	General
4	Accredited units	2 units (Theoretical 2 Lecture/Week)
5	Educational hours	2hrs/week
6	Pre-requisite requirements	Non
7	Program offered the course	Science college
8	Instruction Language	English Language
9	Date of course approval	12/2021
Brief Description:		
Textbooks required for this Course:		1. Bioastatistics (Wayne W. Daniel) 2. Biostatistics (Dr. Sadik Abonnaja). 3. Biostatistics analysis (Jerrold H. ZAR).



	4. الإحصاء والاحتمالات النظرية والتطبيق (د. علي العماري، د.د. علي العجيلي) 5. أسس الإحصاء الوصفي (د. فاروق البشتي، د. علي العجيلي، د. علي النقيب)	
Course Duration	28 weeks	
Delivery	Lectures (Tools: board, data show). The lectures were added on the internet site of the faculty to be available to the students all the time as an e-learning. Assignments, seminars, research and posters.	
Course Objectives:	The objective of this course is to provide medical science students with the knowledge and understanding of: -The methods of statistical analysis, applicable to medical and biological research. -The course emphasizes concepts and applications of statistical thinking. Basic probability theory, estimation, testing hypothesis, ANOVA, preparing for the methods of statistical data analysis, along with other quantitative methods and models will be introduced.	
Course Assessments	Midyear Examination	20.0%
	Continuous Assessment reports, quizzes	10.0%
	Final written Examination	70.0%
	Total	100.0%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage	
Session 1 (Week 1)	Introduction: -Basic concepts of statistics. -The bases of biostatistics.	
Session 2 (Week 2)	-Quantitative and qualitative data. -Variables. -Computers and biostatistical analysis.	
Session 3 (Week 3)	The nature of Data: -The scale of measurement.	
Session 4 (Week 4)	-Nominal, ordinal, interval and ratio scale data.	
Session 5 (Week 5)	Summarizing and Representing Data: -Listing numerical data, tabular presentation (frequency tables, frequency distributions, and categorical distributions).	
Session 6 (Week 6)	-Graphical presentation (bar charts, histogram, frequency polygon, Ogive, and pie chart).	
Session 7 (Week 7)	Measures of Central Tendency: -Arithmetic mean (A.M.): a) for ungrouped data, b) for grouped data, c) properties of A.M. d) weighted mean Median: a) for ungrouped data, b) for grouped data,	



	<p>c) properties of median</p> <p>Mode:</p> <p>a) for ungrouped data, b) for grouped data, c) properties of mode</p>
Session 8 (Week 8)	-Relation between mean, median and mode, quintiles, and percentiles.
Session 9 (Week 9)	Measures of Dispersion: -Range, mean deviation, quartile deviation, variance.
Session 10 (Week 10)	standard deviation standard error coefficient of variation. Coefficient of Skewness.
Session 11 (Week 11)	Assessment
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	Probability: -Rules of probability, objective and subjective. -Set theory and set notation.
Session 16(Week 16)	-Counting techniques (combination and permutation). -Calculating the probability of an event.
Session 17 (Week 17)	Probability distributions: - Discreet and continuous random variables,
Session 18 (Week 18)	- binomial, Poisson, and normal distributions.
Session 19 (Week 19)	Population and samples: -Concepts of sampling and census. -Methods of drawing sample.
Session 20 (Week 20)	-Simple random sampling (SRS). - Estimation of parameters and their standard errors in case of sampling.
Session 21 (Week 21)	Estimation: -Point estimation and interval estimation. -Confidence interval.
Session 22 (Week 22)	Test of Hypothesis: -Parameters of single and two populations. -Association of attributes, contingency tables.
Session 23 (Week 23)	-Test of independence. - Goodness test of fit.
Session 24 (Week24)	Analysis of Variance (ANOVA): - One way and two way classifications.
Session 25 (Week 25)	One way and two way classifications (continue).
Session 26 (Week 26)	



Session 27 (Week 27)	Regression and correlation: - Correlation coefficient: a) Pearson correlation coefficient. b) Spearman correlation coefficient.
Session 28 (Week 28)	- Regression: a) Simple linear regression. b) Method of least squares.
Practical Work	Tutorial 10-Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.

اللغة العربية

اللغة العربية	اسم المقرر الدراسي	1
GP 5	رمز المقرر	2
عام	طبيعة المقرر: عام/تخصص/اختياري	3
2	عدد الوحدات المعتمدة	4
2	عدد الساعات التعليمية	5
/	المتطلبات المطلوبة مسبقا	6



7	البرنامج التعليمي الذي يُقدم المقرر	كلية العلوم
8	لغة التدريس	اللغة العربية
9	تاريخ اعتماد المقرر	2021/12
وصف موجز للمقرر		مقرر اللغة العربية يتطرق إلى عدة محاور (النحو، والإملاء و قواعد كتابة التقرير والمقال والرسالة). يسلط الضوء على قواعد الإعراب إن وأخواتها وكان وأخواتها. كما يركز الضوء على قواعد الإملاء مثل الهمزة والتاء. كذلك يتطرق إلى أنواع التقارير وإجراء التمارين على كتابتها.
الكتب المقررة		أساسيات في علم النحو. قواعد الإملاء. كتابة التقارير والبحوث.
المدة الزمنية للمقرر		عدد الساعات المطلوب لتدريس المقرر 48 ساعة نظرية من المتوقع أن يتم تخصيص ساعات إضافية من الواجبات المنزلية يومياً خلال هذا المقرر
طريقة التدريس		المحاضرات، التفاعل والنقاش الجماعي، الأنشطة الموجهة ذاتياً، المشاركة النشطة،... إلخ
الأهداف والمستهدف من المقرر		بدراسة المقرر، سيكون الطالب قد أثبت بشكل موثوق القدرة على: • فهم قواعد النحو والإعراب. • فهم قواعد الإملاء • المقدرة على وضع علامات الترقيم في أماكنها الصحيحة. • تعلم أهمية التقارير العلمية والإدارية وفهم شروطها. • معرفة شروط كتابة المقالة وقواعدها. • فهم قواعد كتابة البحث والرسالة.
طريقة التقييم		الامتحان النصفي الامتحان النهائي الواجبات المنزلية
محتويات المقرر		محتوى المقرر الدراسي
الأسبوع الأول		أولاً: النحو 1- أقسام الكلمة وعلامته.
الأسبوع الثاني		2- علامات الإعراب.
الأسبوع الثالث		3- المعرب والمبني.
الأسبوع الرابع		4- المثني إعرابه وما يلحق به.
الأسبوع الخامس		5- كان وأخواتها.
الأسبوع السادس		6- إن وأخواتها.
الأسبوع السابع		7- العدد وأحكامه.
الأسبوع الثامن		ثانياً: قواعد الإملاء: 1- أنواع الإملاء وفانديتها.
الأسبوع التاسع		2- الهمزة وأحكامها.
الأسبوع العاشر		3- التاء المفتوحة والتاء المربوطة.
الأسابيع 11.12.13.14		
الأسبوع الخامس عشر		علامات الترقيم.



علامات التقييم والوقف.	الأسبوع السادس عشر
تمارين (الاستعانة بنصوص قرآنية أو أدبية والتطبيق عليها).	الأسبوع السابع عشر
تمارين (الاستعانة بنصوص قرآنية أو أدبية والتطبيق عليها).	الأسبوع الثامن عشر
تمارين (الاستعانة بنصوص قرآنية أو أدبية والتطبيق عليها).	الأسبوع التاسع عشر
ثالثاً: الكتابة وشروطها: 1- أنواع الكتابة: مع التركيز في الدراسة على شروط الكتابة ذات الطابع العلمي، كما هو الحال في التقرير العلمي والرسالة العلمية.	الأسبوع العشرون
أ- كتابة التقارير: - مفهوم التقرير وهيكله وأنواعه وخصائصه.	الأسبوع الحادي والعشرون
- شروط كتابة التقرير.	الأسبوع الثاني والعشرون
ب- كتابة المقال: - مفهوم المقال ، وأنواعه.	الأسبوع الثالث والعشرون
- شروط كتابة المقال.	الأسبوع الرابع والعشرون
ج- كتابة الرسالة: - مفهوم الرسالة، أنواعها.	الأسبوع الخامس والعشرون
- شروط كتابة الرسالة.	الأسبوع السادس والعشرون
تمارين: يمكن تكليف الطلبة بتطبيق أنواع الكتابة على أي موضوع يختارونه/، وتصحيح عينات من تلك الموضوعات داخل قاعة الدرس.	الأسبوع السابع والعشرون
تمارين: يمكن تكليف الطلبة بتطبيق أنواع الكتابة على أي موضوع يختارونه/، وتصحيح عينات من تلك الموضوعات داخل قاعة الدرس.	الأسبوع الثامن والعشرون
الامتحان النهائي	
تم إعداد المواضيع المقررة والمدة الزمنية المرتبطة بها . مع مراعاة الأسابيع المتعلقة بالامتحان الجزئي بعض الأسابيع التي ستجرى بها حلول تمارين واختبارات.	ملاحظة
يجب على الطلاب حضور كل المقرر الدراسي في الوقت المحدد ، ولا يسمح بالتغيب إلا لأسباب طبية ويجب دعمه بتقرير طبي.	الحضور والغياب
تلتزم الكلية بضمان حصول الطلاب على كامل المعرفة والمهارات اللازمة للمشاركة الكاملة في جميع جوانب حياتهم، بما في ذلك المهارات التي تمكنهم من أن يكونوا متعلمين مدى الحياة. لضمان حصول الخريجين على هذا الإعداد، سيتم تضمين مهارات عامة مثل الكمبيوتر والاتصالات الشخصية ومهارات التفكير .	مهارات عامة
المعلومات الواردة في مخطط المقرر الدراسي هذا صحيحة وقت النشر. وينقح محتوى المقررات الدراسية على أساس مستمر لضمان ملائمتها لتغير العملية التعليمية واحتياجات سوق العمل. ويسعى أستاذ المقرر إلى تقديم إشعار بالتغييرات للطلاب في الوقت المناسب. ويمكن أيضاً تنقيح الجدول الزمني.	التغيير والتعديل في المقرر الدراسي

English Language

1	Course name	English language
2	Course Code	GP 6
3	Course type: /general/specialty/optional	General
4	Accredited units	2 units (Theoretical 2 Lecture/Week)



5	Educational hours	2hrs/week
6	Pre-requisite requirements	Non
7	Program offered the course	Science college
8	Instruction Language	English Language
9	Date of course approval	12/2021
Brief Description:		
Textbooks required for this Course:		
Course Duration 28 weeks		
Delivery Lectures (Tools: board, data show). The lectures were added on the internet site of the faculty to be available to the students all the time as an e-learning. Practical Session (Tools: labs., boards, instruments, chemicals, glassware, equipment). Assignments, seminars, research and posters.		
Course Objectives: The course aims at: 1. Meeting the learners needs and fulfilling the national goals. 2. Training them how to adopt and use reading skills effectively. 3. Enabling them read and understand medical texts related to their areas of specialization. 4. Familiarizing them with medical jargon they may come across when reading and/ or consulting medical reference.		
Course Assessments		
	Midyear Examination	30.0%
	Final written Examination	70.0%
	Total	100.0%
Content Breakdown Topical Coverage Content Breakdown Topical Coverage		
Session 1 (Week 1) The admitted students are introduced to the following reading and / or writing skills and are instructed to rehearse them via relevant topics in a form of class and home assignments. 1. Reading and understanding a paragraph/paragraphs. 2. Practicing skim/scan reading. 3. Reading and understanding a text / texts. 4. Conducting intensive reading. 5. Reading and understanding medical authentic materials (topic/article/paper). 6. Reading and note-taking. 7. Summarizing a text. 8. Use of dictionaries. 9. Translating medical texts/terms.		
Session 2 (Week 2) Course topics: the course material includes the following: A- Language structures (Review)		
Session 3 (Week 3) Present simple tense.		



Session 4 (Week 4)	Past simple tense.
Session 5 (Week 5)	Present perfect tense.
Session 6 (Week 6)	Auxiliary verbs (verb to BE, verb to Have, Verb to Do, Modal verbs.
Session 7 (Week 7)	Auxiliary verbs (verb to BE, verb to Have, Verb to Do, Modal verbs. (continue).
Session 8 (Week 8)	Active and passive forms.
Session 9 (Week 9)	Active and passive forms. (continue)
Session 10 (Week 10)	Compound words (prefixes and suffixes).
Session 11 (Week 11)	Assessment
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	B/ Everyday dialogues: Talking about myself.
Session 16(Week 16)	Talking about my country.
Session 17 (Week 17)	Doctor / nurse/pharmacist-patient dialogue.
Session 18 (Week 18)	C/ Scientific/ medical topics Some Arab scientists
Session 19 (Week 19)	Malaria. Reference: Thornley Elementary scientific. English practice, Longman 1975
Session 20 (Week 20)	The work of Louis Pasteur
Session 21 (Week 21)	Anesthetics: Reference: Thornley, Easier scientific English Practice, Longman Group LTD, 1972.
Session 22 (Week 22)	Nitrogen fixation Lenses
Session 23 (Week 23)	Life history of the frog
Session 24 (Week24)	Digestion in humans. Reference: D.E Royds-Irmark, Beginning scientific English, Book Z, Nelson 1975.
Session 25 (Week 25)	Preservation of food Artificial organs and limbs (spare parts) for the human body.
Session 26 (Week 26)	Plants Reference: Bolitho and Sandler, study English for science, Longman 1994.
Session 27 (Week 27)	Human anatomy Disease: it's symptoms and treatments First-aid in medical emergencies
Session 28 (Week 28)	High-tech medicine and its consequences Reference: Tiersky, E and Tiersky , .., The language of medicine in English, prentice, prentice Hall 1992.



Practical Work	-
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.

التربية الوطنية

التربية الوطنية	اسم المقرر الدراسي	1
GP 7	رمز المقرر	2
عام	طبيعة المقرر : عام/ تخصص/ اختياري	3
2	عدد الوحدات المعتمدة	4
2	عدد الساعات التعليمية	5
/	المتطلبات المطلوبة مسبقا	6
كلية العلوم	البرنامج التعليمي الذي يُقدم المقرر	7
اللغة العربية	لغة التدريس	8



2021/12	تاريخ اعتماد المقرر	9
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	وصف موجز للمقرر
	الكتب المقررة
16 أسبوع	المدة الزمنية للمقرر
من المتوقع أن يتم تخصيص ساعات إضافية من الواجبات المنزلية يومياً خلال هذا المقرر	
المحاضرات، التفاعل والنقاش الجماعي، الأنشطة الموجهة ذاتياً، المشاركة النشطة، ...إلخ	طريقة التدريس
<ul style="list-style-type: none"> • تزويد الطلاب بالفهم الإيجابي والواقعي للنظام السياسي لدولة ليبيا. • تعليم الطلاب القيم، وضرورة المشاركة بالقرارات السياسية المؤثرة بمجرى حياتهم في بيئتهم المحلية. • تعليم الطلاب وإطلاعهم على حقوق وواجبات الأفراد. • تزويد الطلاب بمعلومات عن النظام التشريعي للدولة، وكيفية احترام القوانين التشريعية. • توعية الطلاب بالقضايا العامة الحالية التي يعاني منها مجتمعهم الذي يعيشون فيه. • فهم التعاون الدولي بين المجتمعات وتعليم الطلاب كيفية الاشتراك في النشاطات القومية والوطنية، محلياً وإقليمياً، وتشجيعهم على التفاعل معها. • توعية الطلاب بأهمية الخدمات الحكومية والاجتماعية والحاجة إليها، وكيفية استخدام هذه الخدمات وغرس حب العمل في نفوس الطلاب والأجيال الناشئة. • غرس مفاهيم التعاون والتفاهم بين المواطنين وتنشئة الطلاب على العادات الصحية، وقواعد السلامة العام 	الأهداف والمستهدف من المقرر
الامتحان النصفى الامتحان النهائي	طريقة التقييم
محتوى المقرر الدراسي	محتويات المقرر
مدخل مفهومي: (تعريف بالمادة وأهدافها، ومفاهيم: الثقافة- الهوية- الوطن- الوطنية / الانتماء).	الأسبوع الأول
والمواطنة والمدنية: (تعريف المواطنة، واجبات وحقوق المواطنة، المسؤولية المدنية ودورها في تنمية قيم المواطنة، المجتمع المدني وعلاقته بالدولة).	الأسبوع الثاني
ليبيا المجال: (الموقع، الحدود، المساحة، أهميتها الاستراتيجية، الخصائص الجغرافية: الطبيعية والبشرية، والتوزيع الجغرافي لمدينتها وقراها وواحاتها).	الأسبوع الثالث
ليبيا عبر التاريخ: (النشأة والتسمية، المراحل التاريخية التي مرت بها، وحدة ليبيا ومراحل تشكل فضائها الترابي).	الأسبوع الرابع
سكان ليبيا عبر العصور: (الجذور والامتداد) (أهم الشعوب التي استوطنت ليبيا قديماً وتأثيرها على التركيبة السكانية حالياً، تعداد 1954م شاملاً: التطور العددي، التوزيع الجغرافي، التركيب العمري، النوعي، التعليمي، وحتى الآن).	الأسبوع الخامس



الأسبوع السادس	النظام الاجتماعي: (التركيبة الاجتماعية للمجتمع الليبي، خصائصها. النظم الاجتماعية السائدة، تطورها. القيم الاجتماعية، دور المرأة ومكانتها، المشكلات الاجتماعية).
الأسبوع السابع	الموارد الاقتصادية: (الموارد الاقتصادية: النفط والغاز، المعادن، الثروة النباتية، الثروة الحيوانية، الثروة البحرية. آفاق التنمية المستدامة).
الأسبوع الثامن	الإرث المعنوي والتراث الحضاري: (أعراف وعادات وتقاليده، والحياة الأدبية، والفنون على تنوع ألوانها، الأمثال والحكم والقصص والأساطير الشعبية). اللباس والحلي، وتطور البيت الليبي، وأهمية التراث الثقافي والحضاري ودوره في تحديث المجتمع وإبراز صورة ليبيا.
الأسبوع التاسع	حلقة نقاش: ليبيا حوار مفتوح (1) يناقش فيها مجمل ما طرح في المحاضرات السابقة، مع امتحان تقويمي أول.
الأسبوع العاشر	مدن ليبية عبر التاريخ: (أهم المدن التاريخية في ليبيا، ملامحها ومعالمها وطرازها المعماري).
الأسبوع العاشر	مدن ليبية عبر التاريخ: (أهم المدن التاريخية في ليبيا، ملامحها ومعالمها وطرازها المعماري).
الأسبوع الحادي عشر	مدن ليبية عبر التاريخ: (أهم المدن التاريخية في ليبيا، ملامحها ومعالمها وطرازها المعماري).
الأسبوع الثاني عشر	مدن ليبية عبر التاريخ: (أهم المدن التاريخية في ليبيا، ملامحها ومعالمها وطرازها المعماري).
الأسبوع الثالث عشر	مدن ليبية عبر التاريخ: (أهم المدن التاريخية في ليبيا، ملامحها ومعالمها وطرازها المعماري).
الأسبوع الرابع عشر	مدن ليبية عبر التاريخ: (أهم المدن التاريخية في ليبيا، ملامحها ومعالمها وطرازها المعماري).
الأسبوع الخامس عشر	أنظمة الحكم: (أنواعها ومهامها، والسلطات واختصاصاتها، مفهوم الدستور، وأهميته، ومفهوم الحقوق السياسية والمدنية. أبرز المراحل السياسية التي مرت بها ليبيا، وتطور أنظمة حكمها، الرحلة الدستورية، التجربة البرلمانية).
الأسبوع السادس عشر	صفحات من تاريخ المقاومة الوطنية: (المقاومة المسلحة، شواهد الاعتزاز بالحركة الوطنية، أبرز معارك الوحدة الوطنية، أبرز شخصيات المقاومة الوطنية، مسيرة النضال الموازي "المقاومة السياسية والثقافية").
الأسبوع السابع عشر	أعلام من ليبيا في الداخل والخارج: (أبرز الأعلام الليبية في كل المجالات العلمية والأدبية والفنية والرياضية وأهم منجزاتهم).
الأسبوع الثامن عشر	الحضور الليبي في العالم: (الدور الليبي، دولة وأفراد، في الفضائين الإقليمي والدولي، قديما وحديثا).
الأسبوع التاسع عشر	حلقة نقاش ليبيا حوار مفتوح (2): يناقش فيها مجمل ما طرح في المحاضرات السابقة.
الأسبوع العشرون	امتحان تقويمي (ورقة علمية بحثية).
الامتحان النهائي	
ملاحظة	تم إعداد المواضيع المقررة والمدة الزمنية المرتبطة بها . مع مراعاة الأسابيع المتعلقة بالامتحان الجزئي بعض الأسابيع التي ستجرى بها حلول تمارين واختبارات.



الحضور والغياب	يجب على الطلاب حضور كل المقرر الدراسي في الوقت المحدد ، ولا يسمح بالتغيب إلا لأسباب طبية ويجب دعمه بتقرير طبي.
مهارات عامة	تلتزم الكلية بضمان حصول الطلاب على كامل المعرفة والمهارات اللازمة للمشاركة الكاملة في جميع جوانب حياتهم، بما في ذلك المهارات التي تمكنهم من أن يكونوا متعلمين مدى الحياة. لضمان حصول الخريجين على هذا الإعداد، سيتم تضمين مهارات عامة مثل الكمبيوتر والاتصالات الشخصية ومهارات التفكير .
التغيير والتعديل في المقرر الدراسي	المعلومات الواردة في مخطط المقرر الدراسي هذا صحيحة وقت النشر. وينقح محتوى المقررات الدراسية على أساس مستمر لضمان ملائمتها لتغير العملية التعليمية واحتياجات سوق العمل. وسيسعى أستاذ المقرر إلى تقديم إشعار بالتغييرات للطلاب في الوقت المناسب. ويمكن أيضا تنقيح الجدول الزمني.

مقررات السنة الأولى



First Year Courses



Organic chemistry 1

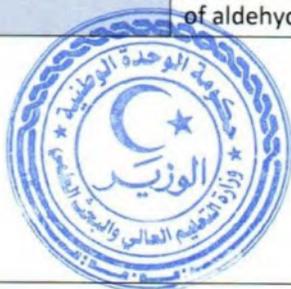
1	Course name	Organic chemistry 1
2	Course Code	BH101
3	Course type: /general/specialty/optional	General
4	Accredited units	4 units (Theoretical 3 hr./Week 2 hr. Lab/Week)
5	Educational hours	5hrs/week
6	Pre-requisite requirements	General chemistry
7	Program offered the course	Pharmaceutical Chemistry
8	Instruction Language	English Language
9	Date of course approval	12/2021
	Brief Description:	This course involves the study of the carbon compounds and chemical bonds, Stereochemistry. Also, the course deals with knowledge about nucleophilic substitution and Elimination reaction of alkyl halides, and Synthesis and reactions of alkenes and alkynes. the subject provides the students scientific information about alcohols, ethers, and aromatic compounds, aldehydes and ketones and Carboxylic acids and their derivatives and amines compounds. The practical component of the course helps the students to get a better insight into essential process in chemical reactions, functional group identification and safety rules in chemical laboratory.
	Textbooks required for this Course:	1- Solomons, Fundamentals of organic chemistry textbook, fourth edition. by T.W Graham Solomon. John Wiley and Sons INC. last edition. 2- FieserWilliamson, Organic experiments textbook sixth edition. By F.Louis ,Fieser and L. Kenneth Williamson. D.C. heath and company Lexington, Massachusetts. Last edition. 3- Experimental organic chemistry textbook, principles and practice. BlackWell Scientific publications. 4- Organic chemistry by Morrison and boyd
	Course Duration	28 weeks
	Delivery	Lectures (Tools: board, data show). The lectures were added on the internet site of the faculty to be available to the students all the time as an e-learning. Practical Session (Tools: labs., boards, instruments, chemicals, glassware, equipment). Assignments, seminars, research and posters.
	Course Objectives:	<ol style="list-style-type: none"> 1. To train students the fundamental theory and laboratory skills. 2. To familiarize students of organic chemical separation, purification, and resolution of optically active compounds.



	<p>3. To provide students with knowledge of nomenclature, synthesis, reactions, and the reaction mechanisms of organic compounds.</p> <p>4. To demonstrate to students how to use the laboratory methods of preparation, crystallization, purification, distillation, separation, extraction, determination of melting and boiling points ...etc.</p> <p>5. To learn about the common organometallic compounds and its applications for organic synthesis.</p> <p>6. To become familiar with many important organic products in the pharmaceutical industry.</p>
Course Assessments	Midyear Examination 20.0%
	Practical continuous Assessment 10.0%
	Quizzes, reports..., 10%
	Final practical Examination 20.0%
	Final written Examination 40.0%
	Total 100.0%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
	Unit 1- Introduction to carbon compounds and chemical bonds
Session 1 (Week 1)	<p>1.1 The Structure of methane, ethane, Ethylene, and the ethyne sp^3, sp^2, and sp- orbital hybridization.</p> <p>1.2 Restricted rotation and double bond, cis-trans E, Z -isomers, conformational analysis of ethane, butane, and cyclohexane, relative stabilities of cycloalkanes ; Ring strain</p>
Session 2 (Week 2)	<p>1.3 The structural and geometrical isomers.</p> <p>1.4 Nomenclature of alkanes, alkenes, alkynes, cycloalkanes and cycloalkenes, bicyclic and Spiro compounds.</p>
Session 3 (Week 3)	<p>1.5 Substituted and disubstituted cycloalkanes, Bicyclic and polycyclic alkanes.</p> <p>1.6 Physical properties of alkanes and cycloalkanes</p>
Session 4 (Week 4)	<p>Unit 2- Stereochemistry; Chiral molecules</p> <p>2.1 Isomerism.</p> <p>2.2 Enantiomers and chiral molecules, nomenclature of Enantiomers, properties of enantiomers; optical activity</p>
Session 5 (Week 5)	<p>2.3 Molecules with more than one stereocenter, stereoisomerism of cyclic compounds, resolution of enantiomers, and Fischer projection.</p>
Session 6 (Week 6)	<p>Unit 3-. Nucleophilic substitution and Elimination reaction of alkyl halides.</p> <p>3.1 Introduction, physical properties of organic halides, reaction mechanisms S_N1 and S_N2 reactions and the stereochemistry of S_N1 reactions .</p>



Session 7 (Week 7)	3.2 Elimination reaction of alkyl halides; The E ₂ and E ₁ reactions, Substitution versus Elimination.
Session 8 (Week 8)	Unit 4- Synthesis of alkenes and alkynes. 4.1 Dehydrohalogenation of alkyl halides, Dehydration of alcohol and its mechanism, and Dehalogenation of <i>vic</i> -dibromides, Hydrogenation of alkynes, .
Session 9 (Week 9)	4.2 Carbocation stability and the occurrence of molecular rearrangements
Session 10 (Week 10)	Unit 5-Reactions of alkenes and alkynes 5.1 Additions reaction: Hydrogenation, Halogenation. 5.2 Addition of HX and oxidation
Session 11 (Week 11)	
Session 12 (Week 12)	Midterm Assessment
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	Unit 6- Alcohols and Ethers: 6.1 Structure and nomenclature, physical properties of alcohols and ethers. 6.2 Synthesis of alcohols from alkenes, hydration of alkenes, through oxymercuration-demercuration, through hydroboration –oxidation.
Session 16 (Week 16)	6.3 Alcohols as acids, conversion of alcohols into mesylates and tosylates, conversion of alcohols into alkyl halides. 6.4 Reaction of alcohols: with HX, PBr ₃ , SOCl ₂ . 6.4 Reaction of alcohols: with HX, PBr ₃ , SOCl ₂ .
Session 17 (Week 17)	6.6 Reaction of ethers: Reaction of epoxides. 6.7 Alcohols from carbonyl compounds: Oxidation- Reduction and organometallic compounds, oxidation of alcohols, preparation of organolithium and organomagnesium. 6.8 Reaction of organolithium and organomagnesium compounds
Session 18 (Week 18)	Unit 7-Aromatic compounds: 7.1 Nomenclature of benzene derivatives, the Kekule structure for benzene, the stability of benzene, aromatic, antiaromatic, nonaromatic, the annulenes aromatic ions, and benzeneoid aromatic compounds.
Session 19 (Week 19)	7.2 Electrophilic aromatic substitution, halogenation nitration, sulfonation, Friedel-Crafts alkylation, Friedel-Crafts acylation. 7.3 Theory of substituent effects on orientation and reactivity in electrophilic aromatic substitution, synthetic applications
Session 20 (Week 20)	Unit 8- Aldehydes and ketones: Nucleophilic addition to carbonyl group: 8.1 Nomenclature of aldehydes and ketones, physical properties, synthesis of aldehydes, synthesis of ketones.



	<p>8.2 Nucleophilic addition to the carbon-oxygen double bond, the addition of water and alcohols, acetals and ketals , hemiacetals and hemi ketal and cyclic ketals .</p>
Session 21 (Week 21)	<p>8.3 the addition of hydrogen cyanide and sodium bisulfite, the addition of Ylides: The Wittig reaction, the addition of organo- metallic reagents: The Reformatsky reaction.</p> <p>8.4 Oxidation of aldehydes and ketones, TheBaeyr-Villger oxidation.</p>
Session 22 (Week 22)	<p>8.5 Reaction of aldehydes and ketones: Aldol reactions, reaction via enols and enolate ions, halogenation of ketones ,haloform reaction ,The Aldol reaction ,crossed Aldol reaction ,Claisen – Schmidtreactions,and cyclization via Aldol condensations</p>
Session 23 (Week 23)	<p>Unit9- Carboxylic acids and their derivatives: Nucleophilic substitution at the acyl carbon:</p> <p>9.1 Nomenclature and physical properties, acidity of carboxylic acids, dicarboxylicacids, esters, carboxylicanhydrides, acyl chlorides amides and nitriles.</p>
Session 24 (Week 24)	<p>9.2 Preparation of carboxylic acids, by oxidation of alkenes, by oxidation of aldehydes and primary alcohols, by oxidation of alkylbenzene, by hydrolysis of cyanohydrins, and by carbonation of Grignard reagents.</p>
Session 25 (Week 25)	<p>9.3 Synthesis and reaction of acid derivatives: acyl chloride acid anhydrides, esters, lactones, amides, lactams, and nitriles.</p>
Session 26 (Week26)	<p>Unit 10- Amines:</p> <p>10.1 Nomenclature, physical properties and structure of amines, basicity of amines, amines as resolving agents,</p>
Session 27 (Week 27)	<p>10.2 preparation of amines, through nucleophilic substitution reactions, through reduction of nitro compounds, through reductive amination and through reduction of amides, oximes, and nitriles.</p>
Session 28 (Week 28)	<p>10.3 Reaction of amines: Oxidation of amines, reaction with nitrous acids, reaction of primary arylamines with nitrouaacids, reaction of secondary amines with nitrouaacids, reaction of tertiary amines with nitrous acids.</p> <p>10.4 Replacement reaction of arendiazonium salts, synthesis using diazonium salts.</p>
	Final Exam



Practical Work	<p>1-Safety rules: Laboratory safety: Eye safety, fires, the hazardous of organic solvents, waste, solvents disposal, dispensing reagents, food in the laboratory, and first aid.</p> <p>2- Determination of melting points</p> <p>3- Determination of boiling points</p> <p>4- Crystallization</p> <p>5- Sublimation</p> <p>6- Simple and fractional distillation</p> <p>7- Vacuum and steam distillation.</p> <p>8-Extraction with solvents.</p> <p>9- Functional group identification, alcohols, aldehydes and ketones, esters , carboxylic acids , and phenols</p>
	<p>10-Practical Exam</p>
Attendance Expectations	<p>Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.</p>
Generic Skills	<p>The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.</p>

Physical Pharmacy

1	Course name	Physical pharmacy
2	Course Code	PH103
3	Course type: /general/specialty/optional	General
4	Accredited units	3 units (Theoretical 2 Lecture/Week + Practical 1 lab/Week)
5	Educational hours	4hrs/week
6	Pre-requisite requirements	passed examination in physics
7	Program offered the course	Department of Pharmaceutics and Industrial pharmacy
8	Instruction Language	English Language
9	Date of course approval	12/2021

Brief Description:	This course involves the study of the mathematical preparation, states of matter. This includes study of phase rule, interfacial phenomena, solutions and solubility, determination of partition coefficient, and study of solutions properties. Also covers the study of buffered and isotonic solution, rheology and colloids. Theory and practical components of the subject help the student to get a better insight into various areas of formulation research and development, and stability studies of pharmaceutical dosage forms.
Textbooks required for this Course:	Recommended Books: (Latest Editions) 1. Physical Pharmacy by Alfred Martin, Sixth edition 2. Experimental pharmaceutics by Eugene, Parott. 3. Tutorial pharmacy by Cooper and Gunn. 4. Stocklosam J. Pharmaceutical calculations, Lea &Febiger, Philadelphia. 5. Liberman H.A, Lachman C., Pharmaceutical Dosage forms, Tablets, Volume-1 to 3, Marcel Dekkar Inc. Remington: the science and practice of pharmacy, 20th edition, A. Gennaro, Lippincott, last edition.
Course Duration	50 hours
Delivery	Lectures (Tools: board, data show). The lectures were added on the internet site of the faculty to be available to the students all the time as an e-learning. Practical Session (Tools: labs., boards, instruments, chemicals, glassware, equipment). Assignments, seminars, research and posters.



Course Objectives:	Upon the completion of the course student shall be able to 1. Understand various physicochemical properties of States of matter. 2. Know the principles of phase equilibrium and phase rule, solutions of non-electrolytes, adsorption, solubility, buffers and isotonic solutions and rheology. 3. Differentiate surface and interfacial tension; describe methods of determination of surface/interfacial laws; describe the solubilization phenomenon. 4- Understanding the characteristic, types of solutions, colloids and Incompatibility.
Course Assessments	- Midyear exam 20% - Quizzes, reports, presentation 10% - Practical continuous assessment, exam 10% - Final Practical exam 20% - Final theoretical exam 40% - Total 100%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1 (Week 1)	Unit I: Mathematical preparation (1 hr.) • Units • Dimensions and statistical analysis of errors Unit II: States of matter (3hr.) • Liquid state, vapor pressure, boiling point, surface tension
Session 2 (Week 2)	• Solid state. • Crystalline and amorphous state, crystal systems habits and imperfections. • Polymorphism, hydrates, other solvates, clathrates and hygroscopicity. • Melting point and x-ray diffraction.
Session 3 (Week 3)	Unit III: Micrometrics 4 hrs. • Definition & significance of particle size, particle size distribution • Particle size analysis and separation • Determining particle size shape and surface area
Session 4 (Week 4)	• Calculation of particle porosity and density • Flow property of powder (Hausner ratio, Carr's index, Angle of repose).
Session 5 (Week 5)	Unit IV: The phase rule: (2 hr.) • One, two and three component systems. • One, two and three component systems. Eutectic mixtures, solid solutions and glass solutions.
Session 6 (Week 6)	Unit V: Interfacial phenomena (8 hr.)



	<ul style="list-style-type: none"> • Classification of interfaces. • Intermolecular forces. • Surface tension and surface free energy. • Interfacial tension. • Measurement of surface and interfacial tension. <ul style="list-style-type: none"> a. Capillary rise method. b. Du nouy tensiometer.
Session 7 (Week 7)	<ul style="list-style-type: none"> • Adsorption as liquid interfaces. <ul style="list-style-type: none"> a. Surface active agents. b. HLB system.
Session 8 (Week 8)	<ul style="list-style-type: none"> • Types of monolayers at liquid surfaces. • Liquid/vapor system, Liquid/liquid system. • Adsorption at solid interfaces: Solid / liquid interfaces. • Factor affection the extent of adsorption. • Logmuir adsorption isotherm, Freundlich adsorption isotherm, Brunauere, Emmett, and taller.
Session 9 (Week 9)	<ul style="list-style-type: none"> • Electric properties of interfaces. • The electric double layer. • Nernst zeta potentials.
Session 10 (Week 10)	Unit VI: Solution and solubility: (6 hr.): <ul style="list-style-type: none"> • Definition. • Solubility expressions. • Solubility of liquids. • Complete miscibility. • Partial miscibility.
Session 11 (Week 11)	Midterm Assessment
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	<ul style="list-style-type: none"> • Extended Hildebrand solubility approach. • Solubility parameters. • Solubility of salts in water. • Solubility of slightly water-soluble electrolytes. • Solubility of weak electrolytes.
Session 16 (Week 16)	<ul style="list-style-type: none"> • Calculating of the solubility of weak electrolytes influenced by pH. • Influence of solvents on solubility of drug. • Combined effect of pH and solvents. • Influence of complexation and particle size
Session 17 (Week 17)	Unit VII: Distribution of solutes between immiscible solvent: (4 hr.) <ul style="list-style-type: none"> • Determination of partition coefficient. • Effect of ionic dissociation and molecular association on partition coefficient.
Session 18 (Week 18)	<ul style="list-style-type: none"> • Solubility and partition coefficient.



	<ul style="list-style-type: none"> • Extraction. • Preservative action of weak acids in oil-water system. Drug action and partition coefficient.
Session 19 (Week 19)	Unit VIII: Colligative properties of solutions: (3 hr): <ul style="list-style-type: none"> • Vapor pressure. • Boiling point. • Freezing point. • Osmotic pressure. • Diffusion. • Osmosis. • M. Wt. Determination. • Choice of colligative properties.
Session 20 (Week 20)	Unit IX: Buffered and isotonic solution: (4 hr.) <ul style="list-style-type: none"> • Definition, buffer equation (for weak acid and base). • Drugs as buffers, buffer capacity, pharmaceutical buffers, tissue irritation.
Session 21 (Week 21)	<ul style="list-style-type: none"> • Buffered isotonic solutions, measurement of tonicity, methods of adjusting tonicity and pH.
Session 22 (Week 22)	Unit X: Rheology (2 hr.) <ul style="list-style-type: none"> • Newtonian systems. • Non-Newtonian systems. • Thixotropy • Determination of rheological properties. • Applications to pharmacy.
Session 23 (Week 23)	Unit XI: Polymers: (4 hr) <ul style="list-style-type: none"> • Definition and classification of polymers. • Properties of polymers. • Pharmaceutical applications of polymers. • Behavior of polymers in solution (effect on viscosity, gel formation, heterogels, syneresis, estimation of molecular weight).
Session 24 (Week 24)	<ul style="list-style-type: none"> • Plasticization of polymers, glass transition temperature, the behavior of polymers during dissolution testing, aging of polymers.
Session 25 (Week 25)	Unit XII: Colloids: (5 hr): <ul style="list-style-type: none"> • Definition of colloid. • Types of colloidal system. • Preparation of colloids, • Pharmaceutical applications of colloids.
Session 26 (Week 26)	<ul style="list-style-type: none"> • Kinetic properties of colloids. <ul style="list-style-type: none"> a) Brownian motion. b) Diffusion. c) Sedimentation.



	<p>d) Viscosity.</p> <ul style="list-style-type: none"> • Properties of colloids, (electrical, optical, osmotic properties, and particle size).
Session 27 (Week 27)	<ul style="list-style-type: none"> • Electrokinetic phenomena. • Donnan membrane equilibrium. • Stability of colloidal systems. <p>Unit XIII: Incompatibility (3 hrs.)</p> <ul style="list-style-type: none"> • Definition. • Types of physical incompatibilities.
Session 28 (Week 28)	<ul style="list-style-type: none"> • Types of chemical incompatibilities. • Factors affecting incompatibility. • Prevention of incompatibility.
Final Exam	
Practical Work	<p>The purpose of the laboratory in this course is to provide students with:</p> <ol style="list-style-type: none"> 1- Identification of laboratory apparatus and specific techniques which are essential in understanding this course and how to Improve report writing skills. 2- Analysis of Errors. 3- Ternary phase diagram. 4- Intermolecular binding forces. 5- Determination of surface tension of given liquids. 6- Determination the solubility of drug at room temperature. 7- Solubility of benzoic acid in water. 8- The effect of Tween 80 on the solubility of benzoic acid in water. 9- Determination of viscosity using Stoke's equation. 10- Determination of partition coefficient of benzoic acid in benzene and water. 11-Evaluation of the particle size of solids and measure their flowability. 12- Methods of improving the flowability of solids. 13. Estimation of the molecular weight of polymers. 14. Prediction of the shelf life of dosage forms. 15.Determination of % composition of NaCl in a solution using phenol-water system by CST method 16. Determination of pKa value by Half Neutralization/ Henderson Hasselbalch equation.
13-Practical Exam	
Attendance Expectations	<p>Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.</p>
Generic Skills	<p>The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives,</p>



	including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.

Pharmaceutics I

1	Course name	Pharmaceutics I
2	Course Code	BH 103
3	Course type: /general/specialty/optional	Specialty
4	Accredited units	4 units (3 hours theory+2 hours practical)
5	Educational hours	5 hours/week
6	Pre-requisite requirements	Non
7	Program offered the course	Department of pharmaceutical and industrial pharmacy
8	Instruction Language	English
9	Date of course approval	12/2021

Brief Description:	This course is designed to impart fundamental knowledge on the preparatory pharmacy with the arts and science of preparing the different conventional dosage forms. The students will study in this subject the history of pharmacy and Orientation to Pharmacy, technique of weighing, concept of pre-formulations, and formulation, pharmaceutical systems, and techniques of measurements. Also, the course covers other topics as pharmaceutical calculations, introduction to dosage forms, pharmaceutical solutions and suspension, and Clinical preparations
Textbooks required for this Course:	<ol style="list-style-type: none"> 1. H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, LippincottWilliams and Walkins, New Delhi. 2. Carter S.J., Cooper and Gunn's-Dispensing for Pharmaceutical Students, CBS publishers, New Delhi. 3. M.E. Aulton, Pharmaceutics, The Science& Dosage Form Design, Churchill Livingstone, Edinburgh.



	4. British pharmacopoeia.	
Course Duration	28 weeks	
Delivery	<ul style="list-style-type: none"> • Lecture-based, Group interaction and discussion, Use of video technique, practical classes. 	
Course Objectives:	<p>Upon completion of this course the student should be able to:</p> <ul style="list-style-type: none"> • Know the history of profession of pharmacy • Understand the basics of different dosage forms, pharmaceutical calculations and technique of weighing. • To understanding the concept of pre-formulations and formulation • Understand the pharmaceutical solutions and suspensions. • Preparation of various conventional dosage forms 	
Course Assessments	<p>20% Assessment Exam 10% in lab activities 10% in class activities e.g.: quizzes 40% Final theoretical exam 20 % Final Practical Exam Total 100%</p>	
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage	
Session 1 (Week 1)	<p>Unit I: History of pharmacy: 3 hr.</p> <ul style="list-style-type: none"> • Introduction to drug and pharmacy • The influence of Arabic civilization in the development of Pharmacy • The role of Arabic scientists in the development of pharmacy 	
Session 2 (Week 2)	<p>Unit II: Orientation to Pharmacy (3 hrs)</p> <ul style="list-style-type: none"> • Introduction to the subject of pharmaceuticals • Pharmacy as profession (Hospital, Retail, Industry) • The role of the pharmacist in the health care system • The relationship between pharmacist and other health care professionals • Reviewing and dispensing prescriptions and medication order • Labeling of dispensed medications • Computer labeling • Scope of pharmaceuticals 	
Session 3 (Week 3)	<p>Unit III: Technique of weighing (2 hrs)</p> <ul style="list-style-type: none"> • Description of prescription balance • Care and use of prescription balance • Weighing of small doses (Aliquot method of weighing) 	
Session 4 (Week 4)	<p>Unit IV: Concept of pre-formulations and formulation (6 hr)</p> <ul style="list-style-type: none"> • Biopharmaceutical and therapeutic considerations in dosage form design. • Drug incompatibility: (Physical, Chemical, Pharmacokinetics, and Pharmacodynamic). 	
Session 5 (Week 5)	<ul style="list-style-type: none"> • Introductory aspects of physicochemical properties with their 	



	application.	
Session 6 (Week 6)	<ul style="list-style-type: none"> Pharmaceutical recipients: solvents, colorants, flavors, diluents, binders, disintegrants, lubricants, thickening agents, emulsifying agents, etc. 	
Session 7 (Week 7)	Unit V: Pharmaceutical systems and techniques of measurements (2 hrs) <ul style="list-style-type: none"> Common systems, Weights, and measures – Imperial & Metric system, (S.I. units and terminology, CGS, FFs, units of mass, units of amount of substance, units of length, units of radiation, dose equivalent) <p>The relationship and unit conversions of systems</p>	
Session 8 (Week 8)	Unit VI: Pharmaceutical calculations (10hrs) <ul style="list-style-type: none"> General dilutions: using stock solutions, allegation method, least weighable amounts/percentage error 	
Session 9 (Week 9)	<ul style="list-style-type: none"> The calculation of dose: Miscellaneous dosage problem, calculation of doses of children. Calculation of body surface area. 	
Session 10 (Week 10)	<ul style="list-style-type: none"> Reducing and enlarging formulas 	
Session 11 (Week 11)	Assessment	
Session 12 (Week 12)		
Session 13 (Week 13)		
Session 14 (Week 14)		
Session 15 (Week 15)	<ul style="list-style-type: none"> Density and specific gravity: sp. Gravity of liquids and solids, calculation of volume and weight from sp. Gravity 	
Session 16 (Week 16)	<ul style="list-style-type: none"> Ratio strength and stock solutions 	
Session 17 (Week 17)	(6hrs) Unit VII: Introduction to dosage forms <ul style="list-style-type: none"> Short description and properties of different dosage forms 	
Session 18 (Week 18)	<ul style="list-style-type: none"> The need for dosage forms Therapeutic consideration in dosage form design 	
Session 19 (Week 19)	<ul style="list-style-type: none"> Routes of drug administration: Oral, parenteral, rectal, nasal, etc. 	
Session 20 (Week 20)	Unit VIII: Pharmaceutical solutions (7 hrs) <ul style="list-style-type: none"> Introduction Advantages and disadvantages 	
Session 21 (Week 21)	<ul style="list-style-type: none"> Aqueous solutions: Standards for water, aromatic waters, aqueous acids, solutions douches, enemas, gargles, mouth washes, juices, sprays, syrups, honey, otic solutions, irrigations, toothache drops 	
Session 22 (Week 22)	<ul style="list-style-type: none"> Aromatic waters: Types and method of preparation Non-aqueous solutions : Elixirs, spirits, collodious, liniments, tinctures, mucilages proof spirit and isotonic solutions Pharmaceutical solvents: glycol, alcohol, etc. 	
Session 23 (Week 23)	Unit IX: Pharmaceutical Suspension (6 hr)	



	<ul style="list-style-type: none"> • -Definition. • -Advantages of oral suspensions. • Classification based on type of preparation and route of administration 	
Session 24 (Week 24)	<ul style="list-style-type: none"> • Types of suspensions. • Manufacturing 	
Session 25 (Week 25)	<ul style="list-style-type: none"> • Sedimentation rate and factors affecting it. • Evaluation of stability of suspension 	
Session 26 (Week 26)	Unit X: Clinical preparations (6 hr) <ul style="list-style-type: none"> • Principle and methods of preparation: infusion, decoction, maceration, percolation. 	
Session 27 (Week 27)	<ul style="list-style-type: none"> • Principle and methods of preparation: infusion, decoction, maceration, percolation. 	
Session 28 (Week 28)	<ul style="list-style-type: none"> • Principle and methods of preparation: infusion, decoction, maceration, percolation. 	
	Final theoretical Exam.	
Practical work (one/week)	Practical Part: <ol style="list-style-type: none"> 1. identification of laboratory apparatus 2. pharmaceutical calculations 3. chloroform water 4. peppermint water 5. aqueous iodine solution 6. weak iodine solution 7. orange tincture 8. simple syrup 9. orange syrup 10. camphor liniment 11. Ferrous sulphate mixture 	
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.	
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of them lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.	



Pharmacognosy

1	Course name	Pharmacognosy
2	Course Code	PH 104
3	Course type: /general/specialty/optional	General
4	Accredited units	4 Units (Theoretical 3 Lecture/Week Practical 2 hours/Week)
5	Educational hours	5hrs/week
6	Pre-requisite requirements	passed examination in Botany
7	Program offered the course	Department of Pharmacognosy
8	Instruction Language	English Language
9	Date of course approval	12/2021

Brief Description:	Pharmacognosy is a branch of pharmaceutical sciences which focuses on drugs of herbal and natural origin. Although Pharmacognosy mostly deals with medicinal herbs, some animal products and bacterial products are also discussed in it Pharmacognosy is the oldest branch of pharmacy since humans have been producing medicines using plants and microbes for ages.
Textbooks required for this Course:	Treas and Evans' Pharmacognosy by William Charles Evans ISBN: 9780702029332 Publication Date 2009 Additional Resources: Lectures Notes
Course Duration	28 weeks
Delivery	Lectures (Tools: board, data show). The lectures were added on the internet site of the faculty to be available to the students all the time as an e-learning. Practical Session (Tools: labs., boards, instruments, chemicals, glassware, equipment). Assignments, seminars, research and posters.
Course Objectives:	Upon successful completion of this course, the students should be able to <ul style="list-style-type: none"> - Illustrate the morphological and histological structures of different organs of medicinal plants such as leaves, Flowers, Herbs, Barks and woods, seeds, fruits, roots and rhizomes. - Discuss role of these medicinal plants in the treatment of different disease conditions. - Identify many medicinal plants microscopically in both their entire and powdered forms.



Course Assessments	Midyear Examination	20.0%
	Practical continuous Assessment, Exam	10.0%
	Quiz, reports, presentation	10.0%
	Final practical Examination	20.0%
	Final written Examination	40.0%
	Total	100%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage	
Session 1 (Week 1)	- General Introduction to Pharmacognosy - Selection & breeding of medicinal plants. - Cultivation of medicinal plants. - Factors affecting plant growth	
Session 2 (Week 2)	- Pharmacognosical study of crude drugs - Preparation of drugs from plants to pharmaceuticals. - Adulteration. - Secondary plant metabolites. - Dusting powder.	
Session 3 (Week 3)	- Drugs composed of Leaves Introduction to Leaves. Senna Digitalis (In detail) • Morphology. T.S, Characteristic elements in powder, active constituents, Chemical test, Uses.	
Session 4 (Week 4)	Buchu, Uvaursi, Belladonna, Stramonium, Egyptian henbane, Coca, Boldo Jaborandi, Eucalyptus, Gambier, Henna and Tea leaf. (Characteristic elements in powder, active constituents, Chemical test, Uses).	
Session 5 (Week 5)	- Introduction to flower. - Roman & German chamomile. Clove, (In detail) Morphology. T.S, Characteristic elements in powder, active constituents, Chemical test, Uses.	
Session 6 (Week 6)	Pyrethrum, Santonica, Saffron, Safflower, Karkadeh, Lavander. (Characteristic elements in powder, active constituents, Chemical test, Uses).	
Session 7 (Week 7)	- Introduction to barks - Cinchona, Cinnamon, Cassia and Galls. (In detail) Morphology. T.S, Characteristic elements in powder, active constituents, Chemical test, Uses.	
Session 8 (Week 8)	Cascara, FrangulaQuillaia, pomegranate bark, Characteristic elements in powder, active constituents, Chemical test, Uses.	
Session 9 (Week 9)	- Introduction to wood. - Quassia wood. (In detail) Morphology. T.S, Characteristic elements in powder, active constituents, Chemical test, Uses.	



	Sandal and Guaiacum woods. (Characteristic elements in powder, active constituents, Chemical test, Uses.
Session 10 (Week 10)	-Introduction to seeds. - Cardamom, Strophanthus, Nux vomica,(In detail),Stramonium, Colchicum, Nutmeg, Black mustard White mustard, Linseed, Fenugreek, Castor seed.
Session 11 (Week 11)	Midterm Assessment
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	-Introduction to fruits - Umbelliferous fruit Fennel, Anise, Coriander, (in detail) Ammivisnaga, Ammimajus, Caraway, Dill. Cumin, Hemlock,
Session 16 (Week 16)	Black pepper, Colocynth. Bitter orange peels, Hop Vanilla, Capsicum, Poppy
Session 17 (Week 17)	Introduction to subterranean organs Rhizomes: Ginger, Rhubarb, In detail
Session 18 (Week 18)	Filix mass, Valerian. Podophyllum, Hydrastis, Turmeric, Colchicum.
Session 19 (Week 19)	Roots: Liquorice, Ipecacuanha, Rauwolfia. In detail
Session 20 (Week 20)	Senega, Marshmallow, Gentian, Jalap, Aconite. Sasaparilla
Session 21 (Week 21)	Introduction to herbs Hyoscyamus, Lobelia, In detail
Session 22 (Week 22)	Vinca, Mentha, Thyme, Ephedra Ergot & Cannabis
Session 23 (Week 23)	Introduction to unorganized drugs Colophony, Aloes, Myrrh, Asafetida
Session 24 (Week 24)	Mastic Olibanum Benzoin Balsam Peru Balsam Tolu
Session 25 (Week 25)	Storax Gum acacia Gum tragacanth, Agar, Gelatin Opium
Session 26 (Week 26)	Introduction to animal drugs Cochineal, Cod liver oil, Cantharides, Insulin, Collagen Heparin, Beeswax, Musk, Umber.
Session 27 (Week 27)	Review
Session 28 (Week 28)	Review
	Final Exam
Practical Work	1- safety rules
	2- Introduction to the Microscope, microscopical identification for starch & dusting powders.
	3- Drugs composed of Leaves a- T. S of Drug. powder. Active constituents, Chemical test, medicinal uses. Senna leaf b- Characteristic elements in Powder, Active constituents, Chemical test, medicinal uses. Digitalis, Belladonna leaf.



	c. Origin, Active constituents, Chemical test, medicinal uses. Eucalyptus, Boldo, Henna, Uvi-ursi,
	4-Drugs composed of Flower a. T. S of Drug. powder. Active constituents, Chemical test, medicinal uses. Clove b- Characteristic elements in Powder, Active constituents, Chemical test, medicinal uses. Chamomile. c. Origin, Active constituents, Chemical test, medicinal uses. Karkadeh, Santonica
	5-Drugs composed of Seeds a. Linseed, b. Cardemom, Nux vomica and c. Nutmeg, Fenugreek
	6-Drugs composed of Fruits a. Fennel, b. Anise, Capsicum, and c. Ammivisnage, Black pepper, Colocynth, Coriander.
	7-Drugs composed of Fruits a. Fennel, b. Anise, Capsicum, and c. Ammivisnage, Black pepper, Colocynth, Coriander.
	8-Drugs composed of Barks a. Cinchona, Galls, b. Cinnamon, Cassia, and c. Pomeograntha, Cascara. Drugs composed of Wods a. Quassia wood
	9-Drugs composed of Roots a. Liquorice, b. Squill, and c. Ipecachuana
	10-Drugs composed of Rhizomes a. Ginger, b. Rhubarb, Curcuma, and c. Curcuma
	11- Drugs composed of Unorganized Drugs Morphology Active constituents and Medicinal use Colophony, Myrrh, Acacia Arabic, Benzoin, Aloes
	12- Final practical exam.
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.



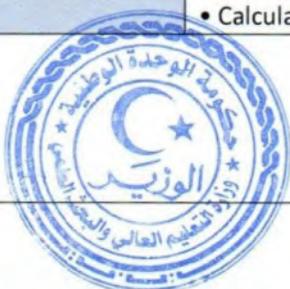
Analytical chemistry

1	Course name	Analytical chemistry
2	Course Code	PH105
3	Course type: /general/specialty/optional	General
4	Accredited units	4 Units (Theoretical 3Hours/Week Practical 2 hours/Week)
5	Educational hours	5 hours/week
6	Pre-requisite requirements	General chemistry
7	Program offered the course	Department of Pharmaceutical chemistry
8	Instruction Language	English Language
9	Date of course approval	12/2021

Brief Description:	Analytical chemistry is the science of obtaining, processing, and communicating information about the composition and structure of matter. In other words, it is the art and science of determining what matter is and how much of it exists. Analytical chemistry can be a challenging profession that makes significant contributions to many fields of science. It is one of the most popular fields of work for ACS chemists. The subject covers methods of analysis, neutralization in analytical chemistry, oxidation – reduction reactions, precipitometry, gravimetric analysis, and complexometry topics.
Textbooks required for this Course:	Modern Analytical Chemistry. David Harvey.
Course Duration	28 weeks
Delivery	Lectures (Tools: board, data show and discussion). The lectures were added on the internet site of the faculty to be available to the students all the time as learning. Practical Session (Tools: labs., boards, instruments, chemicals, glassware, equipment). Assignments, seminars, research, and posters.
Course Objectives:	On successful completion of this course, students will be able: 1. to develop an understanding of the range and uses of analytical methods in chemistry.



	<p>2. to establish an appreciation of the role of chemistry in quantitative analysis</p> <p>3. to develop an understanding of the broad role of the chemist in measurement and problem solving for analytical tasks.</p> <p>4. to provide an understanding of chemical methods employed for elemental and compound analysis.</p> <p>5. to provide experience in some scientific methods employed in analytical chemistry.</p> <p>6. to develop some understanding of the professional and safety responsibilities residing in working on chemical analysis.</p>
Course Assessments	<ul style="list-style-type: none"> - Assessment exam 20% - Quizzes, reports, discussion 10% - lab classes 10% - Final practical exam 20% - Final exam 40% - Total = 100%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1 (Week 1)	<p>I. Introduction</p> <ul style="list-style-type: none"> • What is Analytical Chemistry? • Qualitative and Quantitative analysis. • The function of Analytical Chemistry.
Session 2 (Week 2)	<p>Methods of Analysis.</p> <p>Stereochemistry</p> <ul style="list-style-type: none"> • Percentage concentration (Weight per weight- volume per volume)
Session 3 (Week 3)	<ul style="list-style-type: none"> • Molar and formal concentration (Molarity and formality). • Normal concentration (Normality).
Session 4 (Week 4)	<ul style="list-style-type: none"> • Conversion from one concentration to another. • Problems and calculations.
Session 5 (Week 5)	<p>Volumetric quantitative methods of analysis</p> <ul style="list-style-type: none"> • General principles (Titrimetric analysis, Titrant & Titrant). • Types of titrimetric analysis (direct and back titration).
Session 6 (Week 6)	<p>Standards (primary & secondary substances).</p> <p>Preparation of standard solutions by direct & indirect methods</p>
	<p>Specific chemical reactions in analytical chemistry.</p> <ul style="list-style-type: none"> • Equilibrium concept.
Session 8 (Week 8)	<p>II. Neutralization in analytical chemistry</p> <ul style="list-style-type: none"> • Introduction. • Acid – base theories. • Acid – base strength. • Leveling effect.
Session 9 (Week 9)	<p>Acidity of solutions pH.</p> <ul style="list-style-type: none"> • Calculation the pH of solution of strong acid and strong base.



	<ul style="list-style-type: none"> • The ionic product of water. • Calculation the pH of solutions of weak acid and weak base. • Calculation the pH during titration.
Session 10 (Week 10)	<ul style="list-style-type: none"> • Ionization of polyprotic acids. • Hydrolysis of salt. • Buffer solutions. • Calculation of pH of Buffer (Henderson equation). • Problems and calculation.
Session 11 (Week 11)	Midterm Assessment
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	<ul style="list-style-type: none"> • Acid – Base Titration, • Titration curves, • Acid – base Indicators. • Preparation of standard solutions of acid & base. • End point detection.
Session 16 (Week 16)	<ul style="list-style-type: none"> • Acid-base Applications. • Determination of carbonate in a mixture of carbonate and bicarbonate. • Determination of carbonate in a mixture of carbonate and hydroxide. • Determination of carbon dioxide in the atmosphere. • Determination of nitrogen. • Determination the original boric acid in a mixture of Boric and Borax.
Session 17 (Week 17)	Acid-base titration in non-aqueous solvents: <ul style="list-style-type: none"> • Introduction. • Solvents. • Choosing a solvent. • End point detection.
Session 18 (Week 18)	III. Oxidation – Reduction <ul style="list-style-type: none"> • Oxidation – Reduction reactions. • Electro chemical cells. • Cell calculation. • Electrode potentials. Factors affecting oxidation potentials
Session 19 (Week 19)	Titration curves. <ul style="list-style-type: none"> • Oxidation – Reduction indicators, Oxidation – Reduction titration, Oxidation and Reduction Agents. • The gram equivalent weight of an oxidizing Agent. • Potassium permanganate titration. • Preparation of standard solution. • Determination of ferrous sulphate using potassium permanganate. • Potassium dichromate titration. • Ceric titrations.



Session 20 (Week 20)	Methods of titration involving Iodine (Iodimetry and Iodometry reactions). • Iodine and sodium thiosulphate exercises.
Session 21 (Week 21)	IV. Precipitometry • Introduction, • Solubility product. • Formation of a precipitate, Types of precipitates, Types of precipitating reagents. • Calculation of the solubility product from solubility. • Calculation of the solubility from the solubility product. • Factors affecting on the formation of a precipitate
Session 22 (Week 22)	Argentometric titration • Preparation of standard solution of silver nitrate and sodium chloride. • End point detection. • Mohrs method for halides. • Fajan's method for halides by using adsorption indicators. • Volhard method for halides (indirect method). •
Session 23 (Week 23)	Applications • Estimation of chloride anion. • Estimation of chloride in presence of iodide and bromide. • Estimation of chloride in presence of CN. • Estimation of Bromide and iodide.
Session 24 (Week 24)	V. Gravimetry • Gravimetric analysis, • Precipitation, • Post precipitation. • Co-precipitation, • Homogeneous , • Calculation of gravimetric analysis
Session 25 (Week 25)	Applications: • Determination of Chloride, • Determination of Aluminum. • Determination of Sulphate, • Determination of Magnesium.
Session 26 (Week 26)	VI. Complexometry • Formation of complexes. • Chelating agents. • Stability of metal complexes. • Effect of pH on complex formations. • Solubility of complexes. Complex formation titrations
Session 27 (Week 27)	• Ethylene – diamine – tetra – acetic acid (EDTA). • Titration of metal ions using EDTA.



	<ul style="list-style-type: none"> • End point detection by using metallo-chromic indicators. • Types of EDTA titrations: <ul style="list-style-type: none"> - Direct titration.
Session 28 (Week 28)	<p>Indirect titration.</p> <ul style="list-style-type: none"> - Replacement titration. - Alkalimetric methods. - Titration of mixtures of metal ions. - Determination of hardness in water. - Masking and demasking agents.
Practical Work	<p>1- general laboratory techniques: laboratory notebook (laboratory), Mass measurement, how precision works in determining mass, and Size measurement</p> <p>2. Adjustment in volume determination, pipette, calibration, burette calibration, quantitative transfer - sediment intake, moisture control, reagents, sampling, evaporative</p> <p>3- Methods of weighing: Determination of chloride in a dissolved sample, Determination of nickel in steel, Determination of tin in zero (lead),</p> <p>4. Determination of sulfur in a dissolved sample, Determination of iron (homogeneous precipitation), Determination of copper and nickel in Monbel (electrical weight)</p> <p>5. - Volumetric Methods</p> <p>Preparation & Standardization From solid and liquid</p> <p>6. Titration of Sodium Carbonate with Hydrochloric acid (Acid – Base Titration)</p> <p>7. Titration of Sodium Hydroxide with Hydrochloric acid (Acid – Base Titration)</p> <p>8. Standardization of potassium permanganate using oxalic acid (Reduction-Oxidation Titration)</p> <p>9. Silver nitrate titrations by Mohr method (Precipitation titration)</p> <p>10. Complex-formation titration (Water hardness)</p> <p>11. Determination of iodine (Iodimetry titration).</p> <p>11- Practical Exam</p>
Attendance Expectations	<p>Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.</p>
Generic Skills	<p>The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure</p>



	graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.

Physiology

1	Course name	Physiology
2	Course Code	PH 106
3	Course type: /general/specialty/optional	Specialty
4	Accredited units	3 credits (2 hours/week/THEORY 2 hours/ week/ lab)
5	Educational hours	4 hours /week
6	Pre-requisite requirements	Biology
7	Program offered the course	Department Pharmacology and Toxicology
8	Instruction Language	English
9	Date of course approval	12/2021
Brief Description:		Physiology is the study of how the human body works. It describes the chemistry and physics behind basic body functions, from how molecules behave in cells to how systems of organs work together. It helps us understand what happens in a healthy body in everyday life and what goes wrong when someone gets sick.
Textbooks required for this Course:		1. Guyton and Hall Textbook of Medical Physiology (12 th Edition) for John E. Hall. 2. Costanzo Physiology (7 th edition) for Linda S. Costanzo. 3. Textbook of Medical Physiology, D.Venkatesh &H.H.Sudhakar, Wolters Kluwer.
Course Duration		28 weeks



Delivery	<ul style="list-style-type: none"> - Lectures (Tools: board, data show). -Tutorials and group discussions. -Assignments (if applicable). -Videos. - Practical classes (Lab experiments+ computerized experiments simulation).
Course Objectives:	<ol style="list-style-type: none"> 1. Define homeostasis and explain how homeostatic mechanisms normally maintain a constant interior milieu. 2. State the functions of each organ system of the body, explain the mechanisms by which each function, and relate the functions and the anatomy and histology of each organ system. 3. Understand and demonstrate the interrelations of the organ systems to each other. 4. Predict and explain the integrated responses of the organ systems of the body to physiological and pathological stresses. 5. Explain the pathophysiology of common diseases related to the organ systems of the body.
Course Assessments	<ul style="list-style-type: none"> - Midyear exam 20% - Quizzes, reports, presentation 10% - Continuous lab assessment, Exam 10% - Final Practical exam 20% - Final theoretical exam 40% - Total marks 100%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1 (Week 1)	General Physiology: Structure and function of the cell
Session 2 (Week 2)	General Physiology: Structure and function of the cell
Session 3 (Week 3)	Nervous System
Session 4 (Week 4)	Nervous System
Session 5 (Week 5)	Nervous System
Session 6 (Week 6)	Blood and body fluids
Session 7 (Week 7)	Blood and body fluids
Session 8 (Week 8)	Cardiovascular system
Session 9 (Week 9)	Cardiovascular system
Session 10 (Week 10)	Body defense
Session 11 (Week 11)	Body temperature homeostasis
Session 12 (Week 12)	Assessment exam
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	
Session 16 (Week 16)	Endocrine system
Session 17 (Week 17)	Endocrine system



Session 18 (Week 18)	Urinary system
Session 19 (Week 19)	Acid-base balance
Session 20 (Week 20)	Fluid-electrolyte balance
Session 21 (Week 21)	Respiratory system
Session 22 (Week 22)	Respiratory system
Session 23 (Week 23)	Digestive system and metabolism
Session 24 (Week 24)	Digestive system and metabolism
Session 25 (Week 25)	Special senses
Session 26 (Week 26)	Special senses
Session 27 (Week 27)	Reproductive system
Session 28 (Week 28)	Reproductive system
FINAL EXAM	
Practical work	1. Osmotic behavior of red cell membrane and osmotic fragility of cells
	2. Hematological lab.: Hematological methods (Hemoglobin, PCV, ABO system, ESR, , Element count (RBCs count), Bleeding and Coagulation time, Red cell indices, total and differential leukocyte count)
	3. (Hemoglobin, PCV, ABO system, ESR, Element count (RBCs count), Bleeding and Coagulation time, red cell indices, total and differential leukocyte count)
	4. (Hemoglobin, PCV, ABO system, ESR, , Element count (RBCs count), Bleeding and Coagulation time, Red cell indices, differential leukocyte count)
	5. (Hemoglobin, PCV, ABO system, ESR, Element count (RBCs count), Bleeding and Coagulation time, Red cell indices, differential leukocyte count)
	6. (Hemoglobin, PCV, ABO system, ESR, Element count (RBCs count), Bleeding and Coagulation time, red cell indices, differential leukocyte count)
	7. (Hemoglobin, PCV, ABO system, ESR, Element count (RBCs count), Bleeding and Coagulation time, red cell indices, differential leukocyte count)
	8. (Hemoglobin, PCV, ABO system, ESR, , Element count (RBCs count), Bleeding and Coagulation time, Red cell indices, differential leukocyte count)
	9. Electrocardiography
	10. Arterial blood pressure in man
	11. Examination of sensory system
	12. Study of reflexes in man
	13. a) To demonstrate the function of olfactory nerve b) To examine the different types of taste.
	14. a) To demonstrate the visual acuity b) To demonstrate the reflex activity



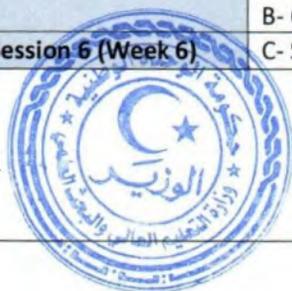
	15. Measure of basal mass index (BMI)
	16. Study of family planning devices and pregnancy diagnosis test.
	11. Final Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.

Histology

1	Course name	Histology
2	Course Code	PH107
3	Course type: /general/specialty/optional	General
4	Accredited units	2 credits (1 lecture + 1 lab / week)
5	Educational hours	1 hour/week/Theory, 2 hours/ week/ lab
6	Pre-requisite requirements	Biology
7	Program offered the course	Biomedical science department
8	Instruction Language	English
9	Date of course approval	12/2021



Brief Description:	Histology: In this course the student will study the technique of microscopic use, the basic and general introduction to histology of the following systems: - Cell, types of tissues, CVS, GIT, genitourinary systems, respiratory system, immune system, endocrine and male and female systems.
Textbooks for the Course:	1) Junqueira, L. C. and J. Carneiro, Basic Histology, tenth edition. Norwalk: Appleton & Lang; Last edition. 2) Eroschenko, V. P., di Fiore's Atlas of Histology with Functional Correlations, ninth edition. Philadelphia: Lippincott Williams & Wilkins; Last edition. 3) Text Basic Histology by Luiz Carlos 11th ed. (2005)
Course Duration	28 weeks
Delivery	- Lectures (Tools: board, data show). -Tutorials and group discussions. -Assignments (if applicable). -Videos. - Practical classes (Lab experiments+ computerized experiments simulation).
Course Objectives:	1. To understanding the technique in use of microscope. 2. Classify the types of tissues. 3. To study and differentiate between blood cells and bone marrow cells. 4- Understand and demonstrate the interrelations of the organ systems to each other. 5- State the functions of the exocrine and endocrine glands.
Course Assessments	- Midyear exam 20% - Quizzes, reports 10% - lab classes 10% - Final Practical exam 20% - Final theory exam 40% - Total 100%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1 (Week 1)	Unit I: Introduction and methods of study: - Microscopes and micro technique
Session 2 (Week 2)	Unit II: Cytology: I- Cell structure: a) Cytoplasm. b) Organoids
Session 3 (Week 3)	c) Cytoskeleton. d) Cell inclusions:
Session 4 (Week 4)	II- Cell division and cell death.
Session 5 (Week 5)	Unit III: Epithelial tissues: A- General characteristics. B- Classification of epithelia:
Session 6 (Week 6)	C- Surface modifications and cell junctions.



	D- Functions of epithelial tissues.
Session 7 (Week 7)	Unit IV: Connective tissues: A- General characteristics and classification. B- Cells, ground substance and fibers.
Session 8 (Week 8)	Unit V: Cartilages: General characteristics and classification.
Session 9 (Week 9)	Unit VI: Bones: A- General characteristics and classification
Session 10 (Week 10)	B- Cell and matrix C- Structure of compact and spongy bones.
Session 11 (Week 11)	Midyear exam
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	Unit VII: Blood: A- General structure (cells, plasma, and stains)
Session 16 (Week 16)	B- Erythrocytes, leukocytes, and blood platelets
Session 17 (Week 17)	C- Bone marrow
Session 18 (Week 18)	Unit VIII: Muscular tissues: A- General characteristics and classification
Session 19 (Week 19)	B- Skeletal, smooth, and cardiac muscles
Session 20 (Week 20)	Unit IX: Nervous tissue: A- General structure. B- Neurons. C- Neuroglia. D- Nerve trunk and ganglia
Session 21 (Week 21)	Unit X: Cardiovascular system: Cardiovascular system: A- General structure of the blood vessels. B- structure of the arteries, veins, and capillaries.
Session 22 (Week 22)	Unit XI: Lymphatic system: A- Immune system. B- Lymph node, spleen, thymus gland, and tonsil
Session 23 (Week 23)	Unit XII: Integumentary system (skin and its appendages): A- General structure B- Appendages and glands C- Functions of skin
Session 24 (Week 24)	Unit XIII: Respiratory system



	A- Conducting portion (Nose, Nasopharynx, Trachea Bronchus & Bronchioles) A- General structure of lung
Session 25 (Week 25)	Unit XIV: Digestive system A- General structure of esophagus, stomach, small and large intestine, rectum, anus, liver, and pancreas. B- Glands associated with the digestive tract (Salivary glands, Pancreas, Liver & Gall bladder.
Session 26 (Week 26)	Unit XV: Urinary system A- Structure & Function of the (kidney & nephron) B -Histology of the nephron (filtration, absorption & excretion). C - Structure of the (Ureter, Bladder & Urethra).
Session 27 (Week 27)	Unit XVI: Endocrine system A -General structure of the Pituitary gland, Adrenal, Thyroid, Parathyroid, Islet of Langerhans & Pineal glands.
Session 28 (Week 28)	Unit XVI: Male reproductive system: A -Excretory genital ducts-Excretory genital glands (Seminal vesicles, Prostate & Cowper's glands)
Session 29 (Week 29)	Female reproductive system: A-General structure of ovary, Oviduct, Uterus & Vagina. B -Stages of follicle development. Ovulation
FINAL EXAM	
Practical work	PART II: PRACTICAL Histology (One lab / week) 1. Light Microscope 2. EM of cell organelles 3. Epithelium 4. Connective tissues 5. Cartilage 6. Bone 7. Blood 8. Muscles 9. Neural tissue 10. Blood vessels 11. Lymphatic tissue 12. Spleen 13. Digestive system 14. Skin
	Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.



Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.

Anatomy

1	Course name	Anatomy
2	Course Code	PH 108
3	Course type: /general/specialty/optional	General
4	Accredited units	1 credit
5	Educational hours	1 hours/week/THEORY
6	Pre-requisite requirements	Biology
7	Program offered the course	Department of Biomedical Science
8	Instruction Language	English
9	Date of course approval	12/2021

Brief Description:	This subject is designed to impart fundamental knowledge on the structure and functions of the various systems of the human body, such as nervous, cardiovascular, endocrine systems. Also, the subject provides the basic knowledge on the structure and functions of the respiratory, digestive, urinary and reproductive systems. It deals with structure and functions of and lymphatic, skeletal and muscular systems. The subject provides the basic knowledge required to understand the various disciplines of pharmacy.
Textbooks required for this Course:	1- Principles of Anatomy and Physiology by Tortora Grabowski. Palmetto, GA, U.S.A.
Course Duration	28 weeks



Delivery	Lecture-based, Group interaction and discussion, Self-directed activities, Active participation. Lectures (Tools: board, data show, models and discussion). The lectures were added on the internet site of the faculty to be available to the students all the time as learning.
Course Objectives:	Upon completion of this course the student should be able to 1. Explain the gross morphology, structure and functions of various organs of the human body. 2. Describe the various homeostatic mechanisms and their imbalances. 3. Identify the various tissues and organs of different systems of human body. 5. Appreciate coordinated working pattern of different organs of each system
Course Assessments	- Assessment exam 20% - Quizzes, reports, discussion 20% - Final exam 60% - Total = 100%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1 (Week 1)	Unit I: Nervous system: <ul style="list-style-type: none"> • Sections of the nervous system, the most important structural and functional differences of the sympathetic and parasympathetic nerves • -Spinal-cerebral nerves
Session 2 (Week 2)	<ul style="list-style-type: none"> • Physiology of nerve impulses and reflex arc • Cerebrospinal fluid, its composition, characteristics, cycle, functions, medical importance • Some neurological diseases (cerebral and vascular accidents, Parkinson's disease)
Session 3 (Week 3)	Unit II: Cardiovascular system: <ul style="list-style-type: none"> • Its components and most important functions • Hemoglobin in terms of its composition, types, characteristics, and importance • Blood clot and its formation steps • Blood groups and their medical importance • Anemia and its types.
Session 4 (Week 4)	<ul style="list-style-type: none"> • The most important anatomical features of the heart and its function • Heart cycle, heart capacity and factors affecting it • Circulation and the most important changes that occur to the circulatory system before and after birth.
Session 5 (Week 5)	Unit III: Endocrine system: <ul style="list-style-type: none"> • Definition of hormones and their types • The mechanism of the effect of hormones on tissues and the relationship of primary and secondary messengers to receptors • How to control the secretion of hormones?



Session 6 (Week 6)	<ul style="list-style-type: none"> • Study of the following glands from an anatomical point of view, their secretions, the functions of these hormonal secretions, and how to control the secretions: • The pituitary gland, pineal gland, thyroid and parathyroid glands, thymus gland, parathyroid glands, pancreas, testes and ovaries are studied within the reproductive system.
Session 7 (Week 7)	Unit IV: Urinary system: <ul style="list-style-type: none"> • Its parts and functions • How urine is formed in the renal tubules and the urea cycle
Session 8 (Week 8)	Unit V: Reproductive system: <ul style="list-style-type: none"> • Its parts (male and female and its general functions) • Steps in the formation of sperm and eggs • Menstrual cycle, fertilization, pregnancy and how to regulate it • Fetal development
Session 9 (Week 9)	Unit VI: Respiratory system: <ul style="list-style-type: none"> • Its parts, most important characteristics and functions • Respiratory volumes and lung capacity • Inhale and exhale steps • Steps for the transfer of gases (O₂, CO₂) between tissues and lungs and the factors affecting the saturation of blood with gases and then poisoning by CO.
Session 10 (Week 10)	<ul style="list-style-type: none"> • Regulating breathing (control centers of the nervous system) • Adaptation of the body to the change in altitude (diving and climbing to high areas)
Session 11 (Week 11)	Assessment exam
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	Unit VII: Digestive system: <ul style="list-style-type: none"> • Its parts and general functions • The most important changes that occur to carbohydrates, fats and protein as a result of digestion in the alimentary canal
Session 16 (Week 16)	<ul style="list-style-type: none"> • The role of the appendices of the alimentary canal (liver and pancreas) in the digestive process
Session 17 (Week 17)	<ul style="list-style-type: none"> • Absorption of indigestible substances • Metabolism and energy release (anaerobic and aerobic respiration)
Session 18 (Week 18)	Unit VIII: Lymphatic system: <ul style="list-style-type: none"> • Its parts, its role, and its importance • Specialized and non-specialized immune systems, cellular and humoral immunity
Session 19 (Week 19)	Unit IX: Integumentary system <ul style="list-style-type: none"> • Structure and function



Session 20 (Week 20)	Unit X: the skeletal system: <ul style="list-style-type: none"> • The most important features of bones, their general functions, and their medical importance • Distinctive superficial signs of bone. • Bone shapes (types).
Session 21 (Week 21)	<ul style="list-style-type: none"> • Study of the spine in terms of the intervertebral discs (their structure and function), as well as the most important superficial anatomical differences for the vertebrae of the five regions of the spine. • The most important differences between the male and female structure.
Session 22 (Week 22)	<ul style="list-style-type: none"> • Studying the development of the middle ear Ossicles in humans and comparing them with other vertebrates • joints • Factors affecting bone growth • Brief indication of some diseases of the skeletal system (disc herniation, kyphosis and lordosis)
Session 23 (Week 23)	Unit XI: the muscular system: <ul style="list-style-type: none"> • The most important differences between smooth, skeletal, and cardiac muscles • General muscle functions • Physiology of muscle contraction, sliding filament theory and its comparison with smooth muscle contraction
Session 24 (Week 24)	<ul style="list-style-type: none"> • Cardiac muscle as a conduction organ • Muscular fatigue and muscle energy sources • Muscle cramps • Some muscle diseases (myalgia and myasthenia gravis)
Session 25 (Week 25)	Review
Session 26 (Week 26)	Review
Session 27 (Week 27)	Review
Session 28 (Week 28)	Review
FINAL EXAM	
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure



relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.



مقررات السنة الثانية



Organic chemistry II

1	Course name	Organic chemistry II
2	Course Code	BP 201
3	Course type: /general/specialty/optional	General
4	Accredited units	3 units (2 theoretical+ 1 Lab /week)
5	Educational hours	5 hours
6	Pre-requisite requirements	Organic I
7	Program offered the course	Bachelor's degree in Pharmaceutical Sciences
8	Instruction Language	English Language
9	Date of course approval	12/2021
Brief Description:		Scope: This subject imparts knowledge on stereo-chemical aspects of organic compounds and organic reactions, important named reactions, chemistry of important hetero cyclic compounds.
Textbooks required for this Course:		<ol style="list-style-type: none"> Organic chemistry by I. Finar, Volume-I & II. A textbook of organic chemistry – ArunBahl, B.S. Bahl. Heterocyclic Chemistry by Raj K. Bansal Organic Chemistry by Morrison and Boyd Heterocyclic Chemistry by T.L. Gilchrist
Course Duration		28 weeks
Delivery		<p>Lectures (Tools: board, data show, video), Group interaction and discussion, self-directed activities.</p> <p>Practical classes (Lab experiments+ preparation of a chemical compounds.</p> <p>Lecture-based, Group interaction and discussion, self-directed activities, active participation, computer lab, lab experimentsetc.</p>
Course Objectives:		<p>Upon completion of the course the student shall be able to</p> <ol style="list-style-type: none"> write the structure, name, and the type of isomerism of the organic compound write the reaction, name the reaction and orientation of reactions account for reactivity/stability of compounds, prepare organic compounds.



	5. understand the methods of preparation and properties of organic compounds 6. explain the stereochemical aspects of organic compounds and stereochemical reactions
Course Assessments	Midyear Examination 20.0%
	Quizzes, reports, presentation... 10%
	Practical activities, Exam 10%
	Final Practical Exam 20%
	Final theoretical Exam 40%
	Total 100%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1 (Week 1)	Unit one: Chemistry of Heterocyclic Compounds: Nomenclature including IUPAC and trivial names still used by the chemical abstracts.
Session 2 (Week 2)	Nomenclature including IUPAC and trivial names still used by the chemical abstracts.
Session 3 (Week 3)	Chemistry: Including a) The aromatic properties in terms of MO and resonance, the resonance theories, chemical reaction, and the properties such as behavior towards electrophilic and nucleophilic reagents, basic and acidic properties, oxidation, reduction.
Session 4 (Week 4)	Chemistry: Including a) The aromatic properties in terms of MO and resonance, the resonance theories, chemical reaction, and the properties such as behavior towards electrophilic and nucleophilic reagents, basic and acidic properties, oxidation, reduction.
Session 5 (Week 5)	b) Methods of synthesis of following: - Heterocyclic five membered rings with one heteroatom (pyrrole, thiophene and furan).
Session 6 (Week 6)	- Heterocyclic six membered with one heteroatom (pyridine).
Session 7 (Week 7)	- Fused heterocycles contain indole and isoquinoline five membered ring (indole, benzothiophene and benzofuran).



Session 8 (Week 8)	- Fused heterocycles containing six membered rings (quinoline and isoquinoline).
Session 9 (Week 9)	- Five membered rings with two heteroatoms (pyrazole, imidazole, oxazole and thiazole).
Session 10 (Week 10)	- Six membered rings with two nitrogen atoms (pyrimidine, pyridazine and pyridazine and pyrazine).
Session 11 (Week 11)	
Session 12 (Week 12)	Midterm Assessment
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	Unit two: Chemistry of Carbohydrates: - Classifications, synthesis (descending, ascending and interconversion) structure and physical properties (optical activity and mutarotation) chemical reaction.
Session 16 (Week 16)	- Classifications, synthesis (descending, ascending and interconversion) structure and physical properties (optical activity and mutarotation) chemical reaction.
Session 17 (Week 17)	- Classifications, synthesis (descending, ascending and interconversion) structure and physical properties (optical activity and mutarotation) chemical reaction.
Session 18 (Week 18)	- Classifications, synthesis (descending, ascending and interconversion) structure and physical properties (optical activity and mutarotation) chemical reaction.
Session 19 (Week 19)	- Vitamin C synthesis with special reference to biological significance of deoxy and amino sugars.
Session 20 (Week 20)	- Vitamin C synthesis with special reference to biological significance of deoxy and amino sugars.
Session 21 (Week 21)	Unit three: Polynuclear Compounds: - Fused ring aromatic compounds, naphthalene. - Nomenclature of naphthalene. - Reactions of naphthalene.
Session 22 (Week 22)	- Oxidation of naphthalene. - Reduction of naphthalene. - Dehydrogenation of hydrotaromatic compounds, aromatization.
Session 23 (Week 23)	- Nitration and halogenations of naphthalene.



	<ul style="list-style-type: none"> - Orientation of electrophilic substitution in naphthalene. - Friedel-Crafts acylation of naphthalene.
Session 24 (Week 24)	<ul style="list-style-type: none"> - Sulfonation of naphthalene. - Naphthols. - Orientation of electrophilic substitution in naphthalene derivatives.
Session 25 (Week 25)	<ul style="list-style-type: none"> - Synthesis of naphthalene derivatives by ring closure. The Haworth synthesis. - Anthracene and phenanthrene, nomenclature. - Structure of anthracene and phenanthrene.
Session 26 (Week 26)	<ul style="list-style-type: none"> - Reactions of anthracene derivatives by ring closer, anthraquinone. - Preparation of phenanthrene derivatives by ring closer. - Carcinogenic hydrocarbons, arene oxides.
Session 27 (Week 27)	Review
Session 28 (Week 28)	Review
Final Exam	
Practical Work	<ul style="list-style-type: none"> • Practical of Organic Chemistry II • Single step synthesis and preparations-(with reaction mechanism, determination of physical constants and calculation of percentage yield of the following: <ul style="list-style-type: none"> - Synthesis of Aspirin. - Acetylation. - Preparation of Acetanilide. - Nitration. - Preparation of Para nitro acetanilide. - hydrolysis. - Preparation of para nitro aniline - Benzoylation. - preparation of 2-Naphthyl benzoate. - Esterification. - preparation of Methyl salicylate - Condensation reactions. - preparation of Dibenzal acetone. - preparation of Barbituric acid. - Separation of binary and tertiary organic mixtures of compounds: <ul style="list-style-type: none"> • (Reactions and principle, procedures, and pilot separations). • Separation of organic mixtures of (carboxylic acid, Hydrocarbons, Phenols, Amines, and Neutral organic compounds).
Practical Exam	
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.



Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.

Biochemistry

1	Course name	Biochemistry
2	Course Code	PH 202
3	Course type: /general/specialty/optional	General
4	Accredited units	3 units (2 hrs./week theoretical 2 hrs./week practical)
5	Educational hours	4 hours / week
6	Pre-requisite requirements	Biology and organic chemistry
7	Program offered the course	Department of Pharmaceutical chemistry
8	Instruction Language	English
9	Date of course approval	12/2021



Brief Description:	The course is designed to give students the important foundations of biochemistry. This course focuses on processes occurring at a molecular level. It focuses on what's happening inside human cells, studying components such as carbohydrates, lipids, proteins, and organelles. Also, the course covers enzymes, haem metabolism, vitamins, and nucleotides and nucleic acids. In addition, it includes practical part (preparation of buffers, quantitative and qualitative test of the above topics)
Textbooks required for this Course:	1. Marks' Essentials of Medical Biochemistry A Clinical Approach. By Michael Lieberman and Alisa Peet. Michael Tully. 2. Practical Textbook of biochemistry for medical students. By DMVasudevan and Subir Kumar Das. jaypeebrother's medical publishers. 3. Oraby's illustrated reviews of Biochemistry. 4. Biochemistry Research International. www.hindawi.com/journals/bri
Course Duration	28 weeks
Delivery	- Lectures (Tools: board, data show). -Tutorials and group discussions. -Assignments (if applicable), seminars, research and posters. -Videos. - Practical classes (Lab experiments+ computerized experiments simulation). • The lectures are added on the internet site of the faculty to be available to the students all the time as an e-learning.
Course Objectives:	By the end of the course, students should be able to:
Course Assessments	20% Assessment Exam 10% in lab activities 10% in class activities e.g.: quizzes 40% Final theoretical exam 20 % Final Practical Exam Total 100%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1 (Week 1)	Properties of water and buffers: Water and acid base balance. Buffer, acidosis, and alkalosis
Session 2 (Week 2)	Chemistry of carbohydrates: Definition and classification of carbohydrates. Different types of complex carbohydrates.
Session 3 (Week 3)	Carbohydrate metabolism: - Pentose phosphate pathway, its importance, deficiency of G6PDs -Preparatory step, and rate limiting step
Session 4 (Week 4)	- Gluconeogenesis: gluconeogenic substances, gluconeogenesis pathway and its regulation
Session 5 (Week 5)	- Tricarboxylic acid cycle: It's reactions, functions, role in metabolism and ATP production by respiratory chain and regulation



Session 6 (Week 6)	Chemistry of lipids: -Lipid classification -Physical properties - Reactions of fatty acid
Session 7 (Week 7)	-Types of lipid: i- phospholipids, ii- glycolipids iii- lipoproteins iv- triacylglycerol v- cholesterol -Lipoproteins
Session 8 (Week 8)	Lipid metabolism: Biosynthesis of fatty acids and Ketone bodies
Session 9 (Week 9)	Biosynthesis and catabolism of triglycerides, phospholipids
Session 10 (Week 10)	Oxidation of fatty acids, α -, β - oxidation,
Session 11 (Week 11)	Assessment
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	Protein chemistry: - Protein digestion - Absorption of amino acids Amino Acids definition - Structure of proteins - Globular Proteins Fibrous Proteins
Session 16 (Week 16)	- Urea Cycle - Reactions of the urea cycle - Origin of ornithine - Regulation of the urea cycle - Function of the urea cycle during fasting
Session 17 (Week 17)	Protein metabolism: - Nitrogen Metabolism - Catabolism of Amino Group Nitrogen
Session 18 (Week 18)	- Catabolism of Carbon Skeleton of Amino Acids - Biosynthesis of Amino Acids
Session 19 (Week 19)	-Amino Acids: Conversion to Specialized Products - Disorders of Amino Acid Metabolism
Session 20 (Week 20)	Enzymes: -Properties of enzymes - Mechanism of Enzyme Catalysis -Michaelis–Menten kinetic theory of enzyme action
Session 21 (Week 21)	- Regulation of enzyme activity Isoenzymes Enzymes in Clinical Diagnosis



Session 22 (Week 22)	Haem metabolism: - General Characteristics of Porphyrins - Biological Significance of Porphyrins - Synthesis of Haem
Session 23 (Week 23)	-Disorders of Porphyrin Metabolism: Porphyria - Haem Breakdown - Jaundice
Session 24 (Week 24)	Vitamins: - Classification and nomenclature - Sources, daily requirements - Deficiency of Vitamins - Water-soluble vitamins - Fat-soluble vitamins
Session 25 (Week 25)	Xenobiotic: - Definition of xenobiotic - Metabolism of xenobiotic
Session 26 (Week 26)	Nucleotides and nucleic acids: Nucleotides: Chemistry and Biological Significance -Purine Metabolism -Pyrimidine Metabolism
Session 27 (Week 27)	-Structure of DNA -Physical Properties of DNA -DNA as Genetic Material -Replication, translation, transcription, and repair
Session 28 (Week 28)	-RNA Structure, Synthesis, and Processing -General features of RNA -Types of RNAs
	Final theoretical Exam.
Practical work (one/week)	Practical Part: 1. Preparation of Buffers, different types of buffers in the human body. 2. Qualitative test of carbohydrates. 3. Quantitative test of carbohydrates. 4. Clinical cases. 5. Review and practical reports. 6. Qualitative tests of Lipids. 7. Quantitative tests of Lipids. 8. Clinical cases. 9. Qualitative tests of proteins. 10. Quantitative tests of proteins
	Final practical exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed.



	Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.

Phytochemistry

1	Course name	Phytochemistry
2	Course Code	PH 203
3	Course type: /general/specialty/optional	General
4	Accredited units	4 units (Theoretical 3 Lecture/Week Practical 2 hours/Week)
5	Educational hours	5hrs/week
6	Pre-requisite requirements	passed examination in Pharmacognosy
7	Program offered the course	Department of Pharmacognosy
8	Instruction Language	English Language
9	Date of course approval	12/2021



Brief Description:	Phytochemistry is a branch of pharmaceutical sciences which study the <u>phytochemicals</u> , derived from <u>plants</u> . Phytochemists strive to describe the structures of the large number of <u>secondary metabolites</u> found in plants, the functions of these compounds in human and plant biology, and the biosynthesis of these compounds. The compounds found in plants are of many kinds, but most can be grouped into four major biosynthetic classes: <u>alkaloids</u> , <u>phenylpropanoids</u> , <u>polyketides</u> , and <u>terpenoids</u> .	
Textbooks required for this Course:	Treas and Evans' Pharmacognosy by William Charles Evans ISBN: 9780702029332 Publication Date 2009 Additional Resources: Lectures Notes	
Course Duration	72 hours	
Delivery	- Lectures (Tools: board, data show). -Tutorials and group discussions. -Assignments (if applicable), seminars, research and posters. -Videos. - Practical classes (Lab experiments+ computerized experiments simulation). The lectures are added on the internet site of the faculty to be available to the students all the time as an e-learning.	
Course Objectives:	Upon successful completion of this course, the students should illustrate the 2ry plant metabolites. The student should be able to: <ul style="list-style-type: none"> • Give an account on the chemistry, biological activity of volatile oils, carbohydrates, alkaloids, glycosides, bitter principles, tannins and resins. • Describe the mechanism of action of these biologically active components and their structureactivity relationship. • Recognize or draw the chemical structure of such biologically active compounds. • Enumerate the physical and chemical properties of active and inactive chemicals. • Define the role of these medicinal plants in the treatment of different diseased conditions • Illustrate the concepts of chemistry of biologically active natural products e.g., volatile oil, carbohydrates, alkaloids, glycosides, bitter principles, tannins and resins. 	
Course Assessments	Midyear Examination	20.0%
	Quizzes, reports, presentation	10.0%
	Practical continuous Assessment, Exam	10.0%
	Final practical Examination	20.0%
	Final written Examination	40.0%
	Total	100.0%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage	



Session 1 (Week 1)	- General Introduction to Phytochemistry - Techniques commonly used in the field of Phytochemistry: study of general biosynthetic pathways, <u>extraction</u> and isolation of <u>natural products</u>
Session 2 (Week 2)	<ul style="list-style-type: none"> - Introduction to the volatile oil. - Methods of extraction - Biosynthesis - Physical and chemical properties - Classification
Session 3 (Week 3)	<ul style="list-style-type: none"> - Terpene volatile oil - Non-cyclic mono and sesquiterpenes. - Cyclic mono and sesquiterpenes.
Session 4 (Week 4)	<ul style="list-style-type: none"> - Oxygenated terpene volatile oil - Non-cyclic mono and sesquiterpenes. - Cyclic mono and sesquiterpenes.
Session 5 (Week 5)	<ul style="list-style-type: none"> - Phenolic volatile oil - General Properties of Terpene Phenols - Classification The terpene phenols
Session 6 (Week 6)	<ul style="list-style-type: none"> - Introduction to the Alkaloids. - Naming and History. - Classifications - Physical and chemical Properties - Distribution in nature - Extraction - Biosynthesis
Session 7 (Week 7)	<ul style="list-style-type: none"> - Protoalkaloids", which contain <u>nitrogen</u> (but not the nitrogen heterocycle). - Phenylalkyl amine alkaloids
Session 8 (Week 8)	<ul style="list-style-type: none"> - True alkaloids" contain <u>nitrogen</u> in the <u>heterocyclic</u> and originate from <u>amino acids</u>. - Pyridine alkaloids - Pyrrolizidine alkaloids - Piperine alkaloids
Session 9 (Week 9)	<ul style="list-style-type: none"> - Quinoline alkaloids - Isoquinoline alkaloids - Quinolizidine alkaloids
Session 10 (Week 10)	-Tropane alkaloids <ul style="list-style-type: none"> - Atropine group. - Cocaine group.
Session 11 (Week 11)	



Session 12 (Week 12)	Midterm Assessment
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	<ul style="list-style-type: none"> - Pseudoalkaloids – alkaloid-like compounds that do not originate from amino acids. - Purine-like alkaloids such as caffeine, theobromine and theophylline
Session 16 (Week 16)	<ul style="list-style-type: none"> - Terpen-like and <u>steroid</u>-like alkaloids
Session 17 (Week 17)	<ul style="list-style-type: none"> - Introduction of carbohydrate - Classification - Biosynthesis - Reactions and uses
Session 18 (Week 18)	<ul style="list-style-type: none"> - Introduction of glycosides. - Naming and History. - Classifications - Physical and chemical Properties - Distribution in nature - Extraction - Biosynthesis
Session 19 (Week 19)	<ul style="list-style-type: none"> - <u>Alcoholic glycosides</u> - Cyanogenic glycosides - Phenolic glycosides
Session 20 (Week 20)	<ul style="list-style-type: none"> - <u>Anthraquinone glycosides</u> - <u>Coumarin glycosides</u>
Session 21 (Week 21)	Flavonoid glycosides <ul style="list-style-type: none"> - Classification - Physical and chemical properties - Pharmacological activities.
Session 22 (Week 22)	Saponin glycosides <ul style="list-style-type: none"> - Classification - Physical and chemical properties - Pharmacological activities.
Session 23 (Week 23)	Tannins
Session 24 (Week 24)	Bitter principles
Session 25 (Week 25)	Resin and resin combination
	Final Exam
Practical Work	1-Safety rules 2-Identification of some selected alkaloids by General tests and specific tests: Ephedrine, Atropine, Caffeine, Papaverine, Strychnine, Brucine, Quinine



	3-Distillation of volatile oil (Mentha herb)
	4-Determination of Phenol content in clove oil (Cassia Flask)
	5-Determination of Thymol content in Thymus oil
	6-Determination of Cineol content in Eucalyptus oil
	7-Identification different glycosides by qualitative tests
	8-Chemical test for Tannins and Saponins
	9-Identification different Carbohydrates by qualitative tests
	10-Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.

Pharmaceutics II

1	Course name	Pharmaceutics II
2	Course Code	PH 204
3	Course type: /general/specialty/optional	Specialty
4	Accredited units	3 units (2 hours theory + 2 hours lab)
5	Educational hours	4 hours
6	Pre-requisite requirements	Pharmaceutics I
7	Program offered the course	Department of pharmaceutics and industrial pharmacy



8	Instruction Language	English
9	Date of course approval	12/2021

Brief Description:	This course is designed to impart a fundamental knowledge on the preparatory pharmacy with arts and science of preparing the different conventional dosage forms.
Textbooks required for this Course:	<ol style="list-style-type: none"> 1. Alfonso R. Gennaro Remington. The Science and Practice of Pharmacy, Lippincott Williams, New Delhi. 2. Carter S.J., Cooper and Gunn's. Tutorial Pharmacy, CBS Publications, New Delhi. 3. E.A. Rawlins, Bentley's Textbook of Pharmaceutics, English Language Book Society, Elsevier Health Sciences, USA. 4. Isaac GhebreSellassie: Pharmaceutical Pelletization Technology, Marcel Dekker, INC, New York. 5. Dilip M. Parikh: Handbook of Pharmaceutical Granulation Technology, Marcel Dekker, INC, New York. 6. Francoise Nieloud and Gilberte Marti-Mestres: Pharmaceutical Emulsions and Suspensions, Marcel Dekker, INC, New York.
Course Duration	28 weeks
Delivery	<ul style="list-style-type: none"> • Lecture-based, Group interaction and discussion, Use of video technique, practical classes.
Course Objectives:	<p>Upon completion of this course the student should be able to:</p> <ul style="list-style-type: none"> ☑ Know the history of profession of pharmacy ☑ Understand the basics of different dosage forms, pharmaceutical incompatibilities and pharmaceutical calculations ☑ Understand the professional way of handling the prescription ☑ Preparation of various conventional dosage forms
Course Assessments	<p>20% Assessment Exam 10% in lab activities 10% in class activities e.g.: quizzes, reports, discussion... 40% Final theoretical exam 20 % Final Practical Exam Total 100%</p>
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1 (Week 1)	<p>Unit I. Emulsions (6 hr)</p> <ul style="list-style-type: none"> • Definition. • Purposes of emulsification. • Theories of emulsification.
Session 2 (Week 2)	<ul style="list-style-type: none"> • Types of emulsifying agents. • Tests for determination of emulsion type.



Session 3 (Week 3)	<ul style="list-style-type: none"> • Preservation of emulsions. • Manufacturing.
Session 4 (Week 4)	Unit II: Semi - solid dosage forms (18 hr) a) Ointments. (6 hr) <ul style="list-style-type: none"> • Definition. • Function of ointments and ointments bases Excipients used in semi solid dosage forms. Evaluation of semi solid dosage forms. • Release rate of semi-solid dosage form.
Session 5 (Week 5)	<ul style="list-style-type: none"> • Classification of ointments bases.
Session 6 (Week 6)	<ul style="list-style-type: none"> • Considerations in compounding and dispensing, e.g., quality, suitability
Session 7 (Week 7)	b) Creams and gels. (6 hr) <ul style="list-style-type: none"> • Types of creams and gels. • Formulation. • Filling and Packaging. • Type of base & Functions.
Session 8 (Week 8)	<ul style="list-style-type: none"> • Packaging.
Session 9 (Week 9)	<ul style="list-style-type: none"> • Type of base & Functions.
Session 10 (Week 10)	c) Suppositories (6 hr) <ul style="list-style-type: none"> • History • Types and therapeutic uses, advantages and disadvantages, types of bases, methods of preparations. Displacement value & its calculations, evaluation of suppositories.
Session 11 (Week 11)	Assessment
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	<ul style="list-style-type: none"> • Anatomy of rectum & factors affecting drug absorption
Session 16 (Week 16)	<ul style="list-style-type: none"> • Classification of suppository bases • General consideration of compounding & dispensing • Manufacturing, packaging, evaluation and stability of semisolid dosage forms.
Session 17 (Week 17)	Unit III: Modified-release Pharmaceutical Dosage forms (MRPD) (5 hrs) <ul style="list-style-type: none"> • Pharmaceutical Concepts. • Formulation of (MRPD).
Session 18 (Week 18)	<ul style="list-style-type: none"> • Mechanisms of drug release from MRPD.
Session 19 (Week 19)	Unit IV: Complexation and protein binding. (10 hr) <ul style="list-style-type: none"> • Definitions and Introduction.



	<ul style="list-style-type: none"> • Types of complexes.
Session 20 (Week 20)	<ul style="list-style-type: none"> • Types of complex reactions. • Methods of complex analysis.
Session 21 (Week 21)	<ul style="list-style-type: none"> • Protein binding. • Equilibrium dialysis.
Session 22 (Week 22)	<ul style="list-style-type: none"> • Dynamic dialysis.
Session 23 (Week 23)	<ul style="list-style-type: none"> • Complexation and drug action.
Session 24 (Week 24)	Unit V: Kinetics. (4 hrs) <ul style="list-style-type: none"> • Rate and order of reactions. • Determination of order of reactions. • Factors influencing the reaction rate.
Session 25 (Week 25)	Unit VI: Product stability (8-hrs) <ul style="list-style-type: none"> • Factors affecting drug stability. • Reactions causing drug decompositions.
Session 26 (Week 26)	<ul style="list-style-type: none"> • Types of stability tests. • Prediction of shelf life and expiry dates.
Session 27 (Week 27)	<ul style="list-style-type: none"> • Stability tests of pharmaceutical dosage forms.
Session 28 (Week 28)	<ul style="list-style-type: none"> • Stabilization of pharmaceutical products
	Final theoretical Exam.
Practical work (one/week)	Practical Part: <ol style="list-style-type: none"> 1. Preparation of arachis oil emulsion 2. Preparation of liquid paraffin emulsion 3. Preparation of calamine lotion 4. Preparation of salicylic acid lotion 5. Preparation of aminobenzoic acid lotion 6. Preparation of lubricating jelly 7. Preparation of zinc oxide paste 8. Preparation of vanishing cream 9. Preparation of cold cream 10. Preparation of suppositories using theobroma oil and displacement value (calculation (theoretical)) 11. Preparation of suppositories using glycerol-gelatin base and displacement value (calculation (theoretical)) 12. Determination of rate, rate constant and half-life of zero order reaction (theoretical) 13. Determination of rate, rate constant and half-life of first order reaction (theoretical)
	Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.



Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
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Pharmacology I

1	Course name	Pharmacology I
2	Course Code	PH 205
3	Course type: /general/specialty/optional	specialty
4	Accredited units	4 Units (Theoretical 3 Lecture/Week Practical 2 hours/Week)
5	Educational hours	5 hours /week
6	Pre-requisite requirements	Pass the first year of pharmaceutical science program or equivalent
7	Program offered the course	Department of Pharmacology and Toxicology
8	Instruction Language	English Language
9	Date of course approval	12/2021



Brief Description:	This course is designed to serve as an introduction to the pharmacology of drugs which affect the various functions of the autonomic nervous system and drugs that modulate the actions of the local hormonal systems, grossly named as "autacoids" as well as covers the pharmacology of drugs acting on cardiovascular system, respiratory system, renal system and haematopoietic system.
Textbooks required for this Course:	-Lippincott Illustrated Reviews: Pharmacology, 7th Edition -Goodman & Gilman's: The Pharmacological Basis of Therapeutics - Rang and Dale's Pharmacology. -Additional Resources: Lectures Notes and Practical Notes.
Course Duration	28 weeks
Delivery	- Lectures (Tools: board, data show). -Tutorials and group discussions. -Assignments (if applicable). -Videos. - Practical classes (Lab experiments+ computerized experiments simulation).
Course Objectives:	<ol style="list-style-type: none"> 1. Upon successful completion of this course, the students should be able to: Identify route of drug administration, advantages and disadvantages of each. 2. Explain the principles of pharmacodynamics and pharmacokinetics and classify different types and locations of receptors and the responses mediated by neurotransmitters, agonist and antagonist drugs. 3. Explain the mechanism of pharmacological actions, therapeutic uses and adverse effects of cholinergic, anticholinergic, adrenergic, antiadrenergic drugs. 4. Describe different mechanism of skeletal muscle and neuromuscular blockers. 5. Define autacoids, list their classes, explain their pathophysiological role and explain the mechanism of pharmacological actions, therapeutic uses and adverse effects of drugs modulating the functions of autacoids. 6. Illustrate the mechanisms of actions, therapeutic uses, adverse drug reactions, contraindications, and interactions of drugs used in cardiovascular, Haemopoietic , urinary and respiratory systems.
Course Assessments	- Midyear exam 20% - Quizzes, reports 10% - lab classes 10% - Final Practical exam 20% - Final theory exam 40% - Total 100%.
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1 (Week 1)	General pharmacology: a. Introduction & definitions b. Dose and factors modifying dose



	c. Routes of administration
Session 2 (Week 2)	General pharmacology: d. Pharmacokinetics: i. General principles and relevant terms. ii. Absorption of drugs, bioavailability, passage of drugs across cell membrane iii. Drug distribution in body
Session 3 (Week 3)	General pharmacology: d. Pharmacokinetics: iv. Drug biotransformation, Enzyme induction & inhibition v. Elimination of drugs
Session 4 (Week 4)	General pharmacology E. Pharmacodynamics: i. Types and mechanisms of drug action (including receptors, ion channels, enzymes and signaling mechanisms) ii. Drug interactions (including potentiation, antagonism & mechanisms) iii. pharmacogenetics. iv. Adverse drug reactions-side effects, toxicity drug allergy, tachyphylaxis tolerance and addiction
Session 5 (Week 5)	Autonomic Nervous System (A.N.S) a . Introduction: Anatomical & physiological considerations
Session 6 (Week 6)	Autonomic Nervous System (A.N.S) b. Parasympathomimetics: Directly acting on receptors, Anticholinesterases (Reversible & Irreversible), Organophosphate poisoning and treatment – cholinesterase reactivators
Session 7 (Week 7)	Autonomic Nervous System (A.N.S) c. Parasympathetic blocking drugs (Muscarinic receptor blockers)
Session 8 (Week 8)	Autonomic Nervous System (A.N.S) d. Neuromuscular blocking agents (Nm blockers and persistent depolarizers)
Session 9 (Week 9)	Autonomic Nervous System (A.N.S): E. Sympathomimetics (Direct and Indirectly acting)
Session 10 (Week 10)	Autonomic Nervous System (A.N.S): F. sympathetic blocking drugs: i. Adrenoceptor blockers
Session 11 (Week 11)	
Session 12 (Week 12)	
Session 13 (Week 13)	Assessment exam
Session 14 (Week 14)	
Session 15 (Week 15)	Autonomic Nervous System (A.N.S): F. Sympathetic blocking drugs: ii. Adrenergic neuron b block centrally acting drugs, Reserpine G. Autonomic ganglion stimulants and blockers
Session 16 (Week 16)	Autacoids: i. Histamine and antagonists- Origin, synthesis, metabolism, physiological and pathological considerations, release and depletors;



	Receptors of histamine; Antihistaminics - H1 receptor blockers, H2 receptor blockers.
Session 17 (Week 17)	Autacoids: ii .5 hydroxytryptamine and antagonists - 5HT and its receptors in CNS and periphery; receptor blockers and their pharmacology
Session 18 (Week 18)	Autacoids: iii. Angiotensin - synthesis, actions, renin-angiotensin system - Blockers of renin-angiotensin system iv. bradykinin, kallekrein system. v. Eicosanoids vi. Prostaglandins, Thromboxane A2, Prostacyclin, Leukotrienes- their synthesis and physiopathological considerations. -Pharmacology of eicosanoids and relation with therapeutics. - overview of synthesis and receptor block.
Session 19 (Week 19)	CVS A. Drugs used in treatment of hypertension including -hypertensive emergencies
Session 20 (Week 20)	CVS B. Angina pectoris –Pathophysiology Drugs in treatment and prevention
Session 21 (Week 21)	CVS C. Drugs in congestive heart failure: i. Pathophysiology of congestive heart failure ii. Cardiotonics, vasodilators and other drugs in CHF
Session 22 (Week 22)	CVS D. Antiarrhythmic drugs: i. Electrophysiology of cardiac rhythm ii. Mechanism and types of cardiac arrhythmic iii. classifications and pharmacology of anti-arrhythmic
Session 23 (Week 23)	CVS E. Drugs in hyperlipoproteinemias i. Overview of cholesterol and triglycerides and lipoproteins metabolism ii. Types and pharmacology of hypolipidemic drugs
Session 24 (Week 24)	Haematopoietic system: i. Drugs in anemia: -Iron: Absorption, preparations and use, Acute and chronic toxicity and treatment Folic acid: physiology, metabolism. Relation vitamin B12, use -Vitamin B12: Absorption, deficiency, uses. Inter relationship with folic acid metabolism



	-Erythropoietin and colony stimulating factors
Session 25 (Week 25)	Hematopoietic system: ii. Drugs and blood coagulation: A. Cascade of blood coagulation B. Anticoagulants: Heparin & oral anticoagulants , their mechanism of , indications ,Contraindications, toxicity and antagonists
Session 26 (Week 26)	Hematopoietic system: C. Fibrinolytic and antithrombotic &antagonist D. Coagulants and hemostatic in bleeding disease.
Session 27 (Week 27)	Urinary system i. Physiology of urine formation and possible sites of diuretic actions ii. Control of acid-base balance iii. Diuretics and antidiuretics
Session 28 (Week 28)	Respiratory system i. Drugs in bronchial asthma treatment ii. Drug treatment of cough – central peripheralAntitussives and expectorants. iii. Oxygen therapy.
Practical work	1. Introduction: a) general terminology b) Animals used in experimental pharmacology. c) Handling of laboratory animals and techniques of drug administration 2. Effect of route of administration of drug on the pharmacological response 3. Isolated rabbit intestine: a) Effects of spasmogens. b) Dose-Response curve in absence and presence of antagonists. c) Identification of unknown drug solution. 4. Effect of drugs on rabbit eye. 5. Blood pressure. 6. Effect of drugs on rabbit heart.
	13- Final Practical Exam.
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.



Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.
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Pathology

1	Course name	Pathology
2	Course Code	PH 206
3	Course type: /general/specialty/optional	General
4	Accredited units	3 units (2 hours theory and 1 lab /week)
5	Educational hours	4 hours/week
6	Pre-requisite requirements	Physiology
7	Program offered the course	Department of pharmaceutical care
8	Instruction Language	English
9	Date of course approval	12/2021



Brief Description:	The Pathology module is divided into two parts- general pathology and systemic pathology. It is designed to cover the following topics: cellular injury and adaptation, acute and chronic inflammation, regeneration and repair, circular disturbance, disturbances of cell growth. The students also study in this subject the Pathology of the immune reaction, bacterial and protozoal diseases, tumor pathology and endocrine CVS, GIT, respiratory and urinary system diseases.
Textbooks required for this Course:	1. Textbook: Pathology and therapeutics for Pharmacists: Green & Harris, Pharmaceutical Press. 2. Rubin's Pathology, Clinicopathologic Foundations of Medicine, 6th edition 2011 edited by Rubin, Strayer, and Rubin (Lippincott Williams and Wilkins).
Course Duration	28 weeks
Delivery	<ul style="list-style-type: none"> Lecture-based, Group interaction and discussion, Use of video technique, practical classes.
Course Objectives:	The broad objectives of the module were for the students to understand the etiology, pathogenesis and key morphological and clinical features of major disease conditions, as well as to correlate these with the fundamental principles of therapy.
Course Assessments	20% Assessment Exam 10% in lab activities 10% in class activities. e.g.: quizzes, reports 40% Final theoretical exam 20 % Final Practical Exam Total 100%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1(Week 1)	General Pathology: Unit I: Cellular response to injury: <ul style="list-style-type: none"> Causes of cell injury. Mechanism of cell injury. Morphological alteration in cell injury. Necrosis (pathological cell's death): Coagulative, Gaseous necrosis, liquifactive, fat, Zenker's necrosis. Apoptosis. Gangrene
Session 2 (Week 2)	Unit II: Intracellular accumulation and Extracellular depositions: Intracellular accumulation: <ul style="list-style-type: none"> Steatosis (fatty change) Cholesterol and cholesterol esters Extracellular depositions: <ul style="list-style-type: none"> Pathological calcification Amyloidois
Session 3 (Week 3)	Unit III: Cellular adaptations/ growth disturbances.
Session 4 (Week 4)	Unit IV: inflammation



	Acute inflammation: <ul style="list-style-type: none"> • Definition • local signs and symptoms, systemic effects • outcomes of acute inflammation • types of acute inflammation • abscess, furuncle, carbuncle, • serous inflammation, fibrinous inflammation • chemical mediators and regulators of inflammation
Session 5 (Week 5)	Chronic inflammation, repair and cell injury: <ul style="list-style-type: none"> • Definition • Cells of chronic inflammation, • Types of chronic inflammation, granuloma, • Healing and repair
Session 6 (Week 6)	Unit V: Regeneration and repair: <ul style="list-style-type: none"> • Healing of wounds: <ul style="list-style-type: none"> a) Primary and secondary types, b) Factors affecting wound healing.
Session 7 (Week 7)	Unit V: circulatory disturbances: <ul style="list-style-type: none"> • Edema: definition, types, pathogenesis. • Embolism: definition, types. • Infarction: definition, types. • Hemorrhage and shock: mechanism and types. • Congestion: active and passive.
Session 8 (Week 8)	Unit VI: Disturbances of cell growth: Aplasia -Hypoplasia. - Hyperplasia. - Atrophy. - Hypertrophy. Hematoma. - Metaplasia.- Anaplasia.
Session 9 (Week 9)	Unit VII: General tumor pathology: a) Neoplasia (tumors) Definition, classification, differences between benign and malignant tumors, types of benign and malignant tumors, malignancies of hematopoietic cells (Leukemia) and lymphomas.
Session 10 (Week 10)	b) Carcinogenesis: Clinical aspects of tumors, diagnosis of cancer, cancer arraigning and staging.
Session 11 (Week 11)	Assessment
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 16 (Week 15)	Unit VIII: Pathology of the immune reaction: Introduction to the immune system. Cells and other elements involved in the immune response (T,B ...cells) Hypersensitivity reactions; types (I, II,III, IV).
Session 17 (Week 16)	HLA system. Transplant pathology.



	Auto-immune diseases: Types, etiology, pathogenesis, clinical features, pathology and prognosis of selected major illness (SLE, Scleroderma). Acquired immune deficiency syndromes.
Session 18 (Week 17)	Unit IX: Infections: a) Tuberculosis: incidence, pathogenesis, primary complex secondary TB and features of pulmonary TB.
Session 19 (Week 18)	b) Syphilis: Mode of transmission, stages, signs and symptoms, organs involved and effects. Congenital syphilis. c) Gonorrhea: Unit X: Protozoal and Helminthic diseases: Amoebiasis, Leishmaniasis, Hydatid disease.
Session 20 (Week 20)	Malaria. Bilharziosis: Geographical distribution, types, and complications.
Session 21 (Week 21)	Systemic pathology: Unit XI: Cardiovascular system: Atherosclerosis- pathogenesis, risk factors, complications. Hypertension. Ischemic heart disease (IHD)- types of angina pectoris, rheumatic heart disease. Infective endocarditis.
Session 22 (Week 22)	Unit XII: Respiratory system: Tonsillitis, bronchitis, bronchial asthma, pneumonia- bronchiectasis- Bronchogenic carcinoma.
Session 23 (Week 23)	Unit XIII: Gastro-intestinal system: Gastritis-Peptic Ulcer, Ulcerative colitis, Crohn's disease, Zollinger- Ellison syndrome, Pancreatitis
Session 24 (Week 24)	Unit XIV: Biliary system and liver: Cholecystitis- Hepatitis- Cirrhosis- complications.
Session 25 (Week 25)	Unit XV: Urinary system: Glomerulonephritis: definition, types. Drug-nephritic syndrome-induced tubule- cystitis – interstitial nephritis- pyelonephritis.
Session 26 (Week 26)	Unit XVI: Endocrine system: Thyroid: hypothyroidism, hypothyroidism goiter, pyelonephritis-diabetes mellitus, types, complications Adrenal glands.
Session 27 (Week 27)	Unit XVII: Hematopoietic system: Classification of anaemias- Iron deficiency anemia – Vitamin B12 and folate deficiency anaemia- aplastic anaemia- thrombocytopenia- leucopenia.
Session 28 (Week 28)	Unit XVIII: Genetic mechanism of diseases: Structure of the genom and its disorders, selected definitions, mutation of genes, mendelian disorders, normal karyo type, cytogenetic disorders, role of molecular diagnostics.



	Final theoretical Exam.
Practical work (one/week)	Practical Part: List of Museum specimens: <ol style="list-style-type: none"> 1. Fibrinous pericarditis, Diphtheria of larynx, Brain abscess, acute appendicitis 2. Infarction of spleen, CVC liver, Cerebral hemorrhage. 3. Adenoma thyroid, Fibroadenoma Breast (Carcinoma stomach, Carcinoma Ureter). 4. Lipoma (Leiomyoma Uterus, Metastasis Lung, Malignant Melanoma skin). 5. Miliary Tuberculosis, lung (Tuberculosis lymphadenitis, Gumma liver- Bilharzial Hepatic fibrosis- Tuberculosis small intestine- Hydatid cyst liver, Amebic liver abscess). 6. Acute bacterial endocarditis (recent infection heat, Atherosclerosis , Lobar pneumonia, Bronchogenic carcinoma. 7. Crohn's disease, Ulcerative colitis-Micro-nodular cirrhosis- Macro-nodular cirrhosis- Chronic cholecystitis- Chronic gastric ulcer. 8. Acute pyelonephritis, Acute cystitis, Goiter.
	Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.

Pharmaceutical Microbiology I

1	Course name	Pharmaceutical Microbiology I
2	Course Code	PH207
3	Course type: /general/specialty/optional	Specialty
4	Accredited units	3 units
5	Educational hours	(2 theory + 2 Practical)
6	Pre-requisite requirements	Biology



7	Program offered the course	Department of Biomedical Science
8	Instruction Language	English language
9	Date of course approval	12/2021
Brief Description:		The course will provide detailed insights into basic concepts and the differences between different classifications of microbiology. structure and function of microbes (cellular structures, metabolism, microbial growth, and its requirements and how to control it), microbial genetics, prokaryotes versus eukaryotes. This course also provides a comprehensive explanation of the microbial diversity (bacteria, viruses, fungi, and parasites) that are medically important and shows how they are defined, named, classified and reproduced, as well as of the different types of virulence factors used by pathogens to cause the diseases.
Textbooks required for this Course:		Microbiology an Introduction, 9 th edition; (2004). Tortora GJ, Funke BR & Case CL. (Pearson International edition) Medical Microbiology, 23 rd edition; (2004). Jawetz E., Melnick JL & Adelberg's E. Lange Middle East edition Additional Resources: Lectures Notes
Course Duration		28 weeks
Delivery		1. Lectures (Tools: board, data show). 2. Practical classes (Lab experiments+ computerized experiments simulation) 3. Assignments, reports and power point presentation thesis. 4. Construction of illustrated posters.
Course Objectives:		<ol style="list-style-type: none"> 1- Introduction to the nature of general microbiology and be familiar with the different branches and classification of microbiology. 2- Focus on the major differences between Prokaryotes and Eukaryotes 3- Know the differential identification pigments of microorganisms, understand the mechanism of action of those pigments, and identify bacteria through biochemical reactions. Plus, how to name and classify microorganisms 4- Understanding the structure and morphology of bacteria and their reproduction types, growth requirements and the growth curve and metabolism 5- Understanding the principles of microbial genetics and genetic study techniques 6- Be familiar with the medically important Gram-negative and Gram-positive pathogenic bacteria and related disease 7- Focus on the medically important human pathogenic viruses and related diseases and understand their types, replication, and different classification



	<p>8- Focus on the medically important human pathogenic fungi and parasites and related diseases</p> <p>In general: At the end of course, the student will be able to</p> <ol style="list-style-type: none"> 1- Illustrate the concept of Microbiology, different microorganisms, and their relationship with the human diseases 2- Identify the isolated microorganisms and give the medical information about. 3- The student will have acquired knowledge and critical understanding of basic facts, principles and theories related to bacterial genetics. 4- The student will be able to analyze unexpected results while dealing with microbes in terms of changing their characteristics and explain the abnormality at the level of microbial genetics. 5- The student will have acquired the skill of using the microscope. 6- The student will be able to interpret the results and find and assess the information of different microbial diseases quickly and reliably 7- The student will be able to use the internet to search and prepare reports and do a presentation
Course Assessments	<ul style="list-style-type: none"> - Midyear exam 20% - Quizzes, reports, presentation 10% - Practical continuous assessment, exam 10% - Final Practical exam 20% - Final theoretical exam 40% - Total 100%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1 (Week 1)	<p>Introduction to General Microbiology</p> <ul style="list-style-type: none"> • Different branches of Microbiology • History of Microbiology • Classification and nomenclature of microorganisms
Session 2 (Week 2)	<p>Study of Prokaryotes.</p> <p>Classification(taxonomy) of the Prokaryotes</p> <ul style="list-style-type: none"> - Morphology, arrangement, and structure of the bacterial cell - The bacterial spore, The process of spore formation, Spore germination and outgrowth <p>Classification of bacteria, bacterial morphology, and structure of bacterial cells.</p> <p>Prokaryotic cells versus Eukaryotic Cells (structure & organelles functions)</p>
Session 3 (Week 3)	<p>Bacterial nutrition and metabolism and growth requirements</p> <p>Physical Requirements • Chemical Requirements, Growth factors, Nutritional classification of microorganisms</p>



Session 4 (Week 4)	Bacterial growth: Bacterial growth curve, generation time, measurement of bacterial growth.
Session 5 (Week 5)	Bacterial growth control: Antiseptic versus disinfectants (types & mechanisms) Sterilization methods: - Heat sterilization (dry, moist) - Cold sterilization (radiation, gas, filtration).
Session 6 (Week 6)	Different bacterial stains: <ul style="list-style-type: none"> • (Gram stain, Acid-fast stain.... etc) • Principles and reactions • Microbial biochemical reactions
Session 7 (Week 7)	Different types of culture media (constituents and characteristics) (Enrichment growth media, differential media and selective media) - Bacterial biochemical reaction
Session 8 (Week 8)	All medical important human pathogenic Gram-positive Staphylococci bacteria and related disease with virulence factor
Session 9 (Week 9)	All medical important human pathogenic Gram-positive Streptococci bacteria and related disease with virulence factor
Session 10 (Week 10)	Clostridium, Corynebacterium, Bacillus, Enterococcus, and Pneumococcus
Session 11 (Week 11)	Assessment exam
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	Medical important human pathogenic Gram-negative Enterobacteriaceae bacteria and related disease with virulence factor
Session 16 (Week 16)	Continue to Medical important human pathogenic Gram-negative bacteria and related disease with virulence factor (Pseudomonas, Vibrio, Campylobacter and Helicobacter, Brucella, Yersinia, Acinetobacterbaumannii, etc)
Session 17 (Week 17)	Acid fast bacteria: Mycobacteria species with related diseases and virulence factor
Session 18 (Week 18)	Unusual bacteria and related diseases with virulence factor <ul style="list-style-type: none"> • -Spirochetes (Treponema, Borrelia.) • -Moraxella • -Mycoplasma, Rickettsiae. • -Chlamydia
Session 19 (Week 19)	Workshop (Assignment, discussion and presentation)
Session 20 (Week 20)	Microbial Genetics:



	<ul style="list-style-type: none"> a. Nucleic acid types, Structure and Function (DNA & RNA) b. Differences between DNA & RNA c. Protein synthesis (Replication, transcription & translation)
Session 21 (Week 21)	<p>Continue to Microbial Genetics.</p> <ul style="list-style-type: none"> a. Changes in Genetic Material (Mutation • Types of Mutations • Mutagens)
Session 22 (Week 22)	<p>Continue to Microbial Genetics.</p> <ul style="list-style-type: none"> a. Genetic Transfer and Recombination (Plasmids and Transposons • Transformation in Bacteria • Conjugation in Bacteria • Transduction in Bacteria, Genetic Mechanisms of Drug Resistance in Bacteria) b. Blotting Techniques • Polymerase Chain Reaction (PCR) • Gene Therapy
Session 23 (Week 23)	<p>Study of Virology: Types, classification, structures characteristics & replication of viruses</p>
Session 24 (Week 24)	<p>Continue to virology: Medically important human pathogenic viruses and related diseases</p>
Session 25 (Week 25)	<p>Study of Mycology: Types, classification, structures characteristics & replication of fungi</p>
Session 26 (Week 26)	<p>Continue to Mycology: Medically important human pathogenic fungi and related diseases</p>
Session 27 (Week 27)	<p>Study of parasites: common classification, and characteristics of parasites</p>
Session 28 (Week 28)	<p>Continue to parasites: Medically important human pathogenic fungi and related diseases.</p>
Practical work (one/week)	<ol style="list-style-type: none"> 1-Laboratory regulations: -Equipment and aids in microbiology labse.g. incubator, laminar flow, aseptic hood, autoclave, hot air sterilizer, deep freezer, refrigerator, 2-Use of microscope: -Examination of stained smears. Examination of wet preparations. 3. Sterilization of glassware, preparation and sterilization of media. 4-Culture media: -Basic, enriched, selective and differential media. Agars and broth. Aerobic and anaerobic cultures 5-Bacteriological subculture techniques: purification of culture. 6-Microbiological stains I: Preparation of smears. Simple stain. Negative stain. 7-Microbiological stains II: -Gram stain. Acid fast, capsule and spore stain. 8-Systematic bacteriology: -Morphology and staining of microorganisms of medical importance. -Culture characteristics. -Biochemical tests. 9. Microbiological assay of antibiotics by cup plate method and other methods 10. Motility determination by Hanging drop method. 11. Sterility testing of pharmaceuticals.



	Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	By the end of the course the students will have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in this course
Course Change	Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students if happen. Timetables also will be revised continuously.

Pharmaceutical Technology

1	Course name	Pharmaceutical technology
2	Course Code	PH 208
3	Course type: /general/specialty/optional	Specialty
4	Accredited units	4 Units (Theoretical 3 Lecture/Week Practical 2 hours/Week)
5	Educational hours	6 hr/week
6	Pre-requisite requirements	Pharmaceutics I, II
7	The program offered the course	Department of Pharmaceutics and Industrial pharmacy
8	Instruction Language	English
9	Date of course approval	12/2021

Brief Description:	This course focuses on the study of the interrelationships between formulation and physiological factors and pharmacokinetic aspects of drug absorption, distribution, metabolism, and excretion.
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Textbooks required for this Course:	1. Remington's pharmaceutical sciences 2. Aulton's pharmaceuticals 3. Sciences direct web
Course Duration	72 hours for theory
Delivery	Lecture-based, Group interaction and discussion, self-directed activities, active participation, computer lab , lab experimentsetc.
Course Objectives:	1. To have the expertise and knowledge needed to be involved in different pharmaceutical care settings in community pharmacies, industrial sector, pharmaceutical sales and marketing. 2. Supplying information about pharmaceutical packaging, GMP, validation, contamination, sterilization and pharmaceutical plant. 3. Supplying information about aerosol.
Course Assessments	20% Assessment Exam 10% Quizzes, reports, 10% Lab classes and activities 20% Final Lab exam 40% Final theoretical exam Total = 100
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1 (Week 1)	Unit I: size reduction and size separation: (powder, granulation technology) <ul style="list-style-type: none"> • Definitions, factors affecting size reduction • Principles, laws and factors affecting energy requirements
Session 2 (Week 2)	<ul style="list-style-type: none"> • Methods of size reduction • Hammer mill, fluid energy mill and disintegrator.
Session 3 (Week 3)	<ul style="list-style-type: none"> • Size separation: various methods and equipments employed for size separation: e.g., sieving, sedimentation, centrifugal elutriation microscopic methods... etc. • Pelletization.
Session 4 (Week 4)	<ul style="list-style-type: none"> • Dust control
Session 5 (Week 5)	<ul style="list-style-type: none"> • Safety measuring and industrial hazards
Session 6 (Week 6)	<ul style="list-style-type: none"> • Introduction to production management
Session 7 (week 7)	<ul style="list-style-type: none"> • Heat transfer
Session 8 (Week 8)	<ul style="list-style-type: none"> • Evaporation
Session 9 (Week 9)	<ul style="list-style-type: none"> • Drying
Session 10 (Week 10)	<ul style="list-style-type: none"> • Drying continue.
Week (11.12.13.14)	Assessment Exam
Session 15 (Week 15)	Mass transfer and fluid mechanics



Session 16 (Week 16)	Filtration Centrifugation
Session 17 (Week 17)	Crystallization Mixing
Session 18 (Week 18)	Mixing continues.
Session 19 (Week 19)	Pharmaceutical Packaging Technology
Session 20 (Week 20)	Pharmaceutical Packaging Technology continue.
Session 21 (Week 21)	Topical and transdermal drug delivery techniques
Session 22 (Week 22)	Pulmonary drug delivery techniques (Aerosols)
Session 23 (Week 23)	Pharmaceutical nanotechnology and nanomedicines
Session 24 (Week 24)	Sterile products
Session 25 (Week 25)	Pilot plane and scale up
Session 26 (Week 26)	Structure of pharmaceutical plan
Session 27 (Week 27)	Surgical ligature
Session 28 (Week 28)	Current good manufacturing practice
Session 29 (Week 29)	Current good manufacturing practice continue.
	Manufacturing authorization and product registration
Final Exam	
Practical work	<ol style="list-style-type: none"> 1. preparation of simple ointment and Sulphur ointment. 2. preparation of emulsifying ointment and Whitfield ointment. 3. preparation of non-staining iodine ointment 4. preparation of vanishing cream 5. preparation of cold cream 6. preparation of salicylic acid and sulphuric cream 7. preparation of cetrimide cream 8. preparation of tragacanth jelly 9. preparation of boric acid suppositories 10. preparation of zinc oxide suppositories 11. preparation of toothpaste 12. solubility curves 13. calculation of filter media resistance and cake resistance 14. rate of sedimentation 15. particle size analysis.
	Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer,



	interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.

Instrumental Analysis

1	Course name	Instrumental Analysis
2	Course Code	PH209
3	Course type: /general/specialty/optional	Specialty
4	Accredited units	3 units (Theoretical 2 hours/week Practical 2 hours /week)
5	Educational hours	4 hours /week
6	Pre-requisite requirements	Analytical Chemistry
7	Program offered the course	Department of Pharmaceutical chemistry
8	Instruction Language	English
9	Date of course approval	12/2021
	Brief Description:	This course will provide students with a fundamental understanding of: Principle of working different pharmaceutical instruments that used for analysis, qualify and quantify the medicine. Principle of different methods of separating, purifying, identifying, and titrating pharmaceutical substances using different standard methods.
	Textbooks required for this Course:	book title & ISBN: 1. Pharmaceutical analysis David Watson 5 edition 2. British pharmacopeia 2016 3. Instrumental methods of analysis 4. Instrumental analysis 5. lecture notes
	Course Duration	24 weeks
	Delivery	- Lectures (Tools: board, data show). -Tutorials and group discussions.



	<p>-Assignments (if applicable), seminars, research and posters.</p> <p>-Videos.</p> <p>- Practical classes (Lab experiments+ computerized experiments simulation).</p> <p>The lectures are added on the internet site of the faculty to be available to the students all the time as an e-learning.</p>
Course Objectives:	<p>Upon completion of this course, the student will have reliably demonstrated the ability to:</p> <ol style="list-style-type: none"> 1. Identify the difference between qualification and quantification of drug and any other samples. 2. Identify the different types of instruments that used to qualify and quantify the medicine. 3. Learn students how we can prepare different types of samples for analysis. 4. Discover the mechanism of all types of spectral and electrochemical analysis instruments. 5. Familiarity with the methods of electrical analysis, spectroscopy, and various chromatographic methods of analysis. 6. To understand the foundations of the techniques used by devices and their applications.
Course Assessments	- Midyear exam 20%
	- Quizzes, reports, presentation 10%
	- Practical continuous assessment, exam 10%
	- Final Practical exam 20%
	- Final theoretical exam 40%
	- Total 100%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1 (Week 1)	<p>1- Pharmaceutical analysis</p> <p>Definition</p> <p>Identify the difference between qualification and quantification</p> <p>Classification of pharmaceutical analysis</p> <p>Different mechanisms used in pharmaceutical analysis</p> <p>Aim of pharmaceutical analysis</p>
Session 2 (Week 2)	<p>2- Spectroscopy:(Spectral analysis)</p> <p>Definition</p> <p>Different instruments used in spectral analysis</p> <p>Ultra-violet spectroscopy</p> <p>Definition</p> <p>Principle of UV spectra</p>
Session 3 (Week 3)	<p>Ultra-violet spectrophotometer</p> <p>Application of UV spectroscopy</p>
Session 4 (Week 4)	<p>Infrared spectroscopy</p> <p>Definition</p>



	Theory of IR
Session 5 (Week 5)	IR - spectrophotometer (device) Application of IR spectra
Session 6 (Week 6)	Atomic spectroscopy Atomic absorption and fluorescence
Session 7 (Week 7)	Theory of atomic absorption spectroscopy (AAS) Atomic absorption (instrument)
Session 8 (Week 8)	Atomic spectroscopy (flame spectroscopy) Atomic emission and fluorescence Theory of atomic emission spectroscopy (AES) Atomic Emission (instrument)
Session 9 (Week 9)	Molecular Spectroscopy – Nuclear transitions NMR, introduction, theory, instrumentation, applications.
Session 10 (Week 10)	Mass spectrophotometry: Introduction, theory, instrumentation, limitation, applications. Fourier Transform Mass Spectrometry.
Session 11 (Week 11)	Midterm Assessment
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	Non-spectroscopic analysis Turbidometry
Session 16 (Week 16)	Separation techniques: Chromatographic Analysis General chromatographic techniques HPLC Theory of HPLC
Session 17 (Week 17)	Basic information for the different mechanism of HPLC HPLC instrument Application of HPLC
Session 18 (Week 18)	GAS chromatography Theory of GAS chromatography GAS chromatography instrument Application of GAS chromatography
Session 19 (Week 19)	Ion chromatography
Session 20 (Week 20)	Electrophoresis
Session 21 (Week 21)	Electrochemical analysis: Introduction.
Session 22 (Week 22)	Potentiometry Theory of potentiometry Potentiometer (device) Application of Potentiometry
Session 23 (Week 23)	Polarography Theory of polarography



	Polarography (device) Application of polarography
Session 24 (Week 24)	Conductometry Theory of conductometry Conductometric titrations Application of conductometry
Session 25 (Week 25)	Amperometry Theory of amperometry Amperometry (device) Application of amperometric titration
Session 26 (Week 26)	Electrogravimetry Columetry Fluorometry
Session 27 (Week 27)	Coulometry: Introduction, types of coulometry, parameters in coulometric analysis, applications.
Session 28 (Week 28)	Thermal analysis: Introduction, thermogravimetry (TG), differential thermal analysis (DTA), differential scanning calorimetry (DSC), factors affecting DTA and DSC results, instruments for thermal analysis, applications.
Final Exam	
Practical Work	Identify Ultra -violet instrument components
	Effect of solvent in λ_{max} using phenol
	Identify Infrared instrument components
	Determination of Lasix
	Identify AAS instruments components
	Assay some metals by AAS instrument
	Identify HPLC instrument
	Identify GAS chromatographic instruments
	Assay quality of some medicines by using different pharmaceutical techniques according to BP
	Calibration curve using of UV of unknown concentration.
11- Exam	
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.



Course Change

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مقررات السنة الثالثة



Biopharmaceutics and Pharmacokinetics

1	Course name	Biopharmaceutics and Pharmacokinetics
2	Course Code	PH301
3	Course type: /general/specialty/optional	Specialty
4	Accredited units	4 units (3 hrs / week Theory 2 hrs / week lab)
5	Educational hours	5 hr/week
6	Pre-requisite requirements	Pharmaceutics 1, 2 , Physical Pharmacy
7	Program offered the course	Pharmaceutics
8	Instruction Language	English
9	Date of course approval	1/2022

Brief Description:	This course focuses on the study of the interrelationships between formulation and physiological factors and pharmacokinetic aspects of drug absorption, distribution, metabolism, and excretion.
Textbooks required for this Course:	<p>1. Leon Shargel, Andrew B.C. Yu, eds. Applied Biopharmaceutics and Pharmacokinetics, 7th edition. New York: McGraw Hill, 2016. ISBN: 978-0-07-183093-5.</p> <p>2. Derendorf, Hartmut; Schmidt, Stephan. Rowland and Tozer's Clinical Pharmacokinetics and Pharmacodynamics – Concepts and Applications, 5th Ed, Walters-Kluwer: 2020, ISBN: 978-1-49-638504-8.</p> <p>3. Principles and Applications of Biopharmaceutics and Pharmacokinetics: for Pharmacy. Late Dr. H.P Tipnis and Dr. Amrita Bajaj ISBN: 8188739146, 9788188739141</p> <p>Additional Resources: Lecture slides Microsoft Office Excel software with PK Solver tool Winnonlin or Phoenix Software Small ruler and scientific calculator or laptop calculator/calculation tool (in class) Rectilinear and semi logarithmic graph papers</p>
Course Duration	28 weeks
Delivery	Lecture-based, Group interaction and discussion, self-directed activities, active participation, computer lab , lab experimentsetc.



Course Objectives:	<p>Upon completion of the course student should be able to:</p> <ol style="list-style-type: none"> 1. Understand the basic concepts in biopharmaceutics and pharmacokinetics and their significance. 2. Use of plasma drug concentration-time data to calculate the pharmacokinetic parameters to describe the kinetics of drug absorption, distribution, metabolism, excretion, elimination. 3. To understand the concepts of bioavailability and bioequivalence of drug products and their significance. 4. Understand various pharmacokinetic parameters, their significance & applications.
Course Assessments	<p>20% Assessment Exam 10% Quizzes, reports, 10% Lab classes and activities 20% Final Lab exam 40% Final theoretical exam Total = 100</p>
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1 (Week 1)	<p>I. BIOPHARMACEUTICS (21-Hrs)</p> <p>1. Introduction 3-hrs</p> <ol style="list-style-type: none"> 1.1 Definition and concepts. 1.2 Fundamental principles of biopharmaceutics. 1.3 Biopharmaceutical Classification System 1.4 Concept of bioavailability.
Session 2 (Week 2)	<p>2. Drug adsorption from gastrointestinal tract (G.I.T) 9-hrs</p> <ol style="list-style-type: none"> 2.1 Anatomic and physiologic considerations. 2.2 Physicochemical factors influencing drug absorption from the G.I.T. <ul style="list-style-type: none"> - Drug dissolution constant (pka) and lipid solubility. - Dissolution rate of drugs (Particle size and Surface area, Crystal form, Polymorphism, Solvation, Salt forms, Complexation, Solid solutions, Adsorption, Eutectics, Surfactants). - Chemical stability of drugs in the G.I.T.
Session 3 (Week 3)	<p>2.3 Physiological factors influencing drug absorption from the G.I.T</p> <ul style="list-style-type: none"> - Surface area of the G.I. absorption sites. - pH of the G.I. fluids. - Gastric emptying. - Intestinal motility. <p>Dosage form factors influencing drug absorption from the G.I.T.</p> <ul style="list-style-type: none"> - General consideration (design of the appropriate dosage form, bioavailability, rate-limiting steps). - Influence of the type of dosage form (solution, suspension, capsules compressed tablets, modified-release dosage forms).



	- Influence of excipients (diluents, surfactants, viscosity-enhancing agents).
Session 4 (Week 4)	4. Mechanisms of drug transport the G.I / blood barrier <ul style="list-style-type: none"> - Passive diffusion. - Carrier-mediated transport (Active & Facilitated diffusion). - Other mechanisms (Ion-pair transport, Pore transport, Pinocytosis).
Session 5 (Week 5)	5. Drug absorption via different routes of administration 3-hrs <p>5.1 Drug absorption via buccal, sublingual, pharyngeal and nasogastric mucosa.</p> <p>5.2 Rectal drug absorption.</p> <p>5.3 Ophthalmic drug absorption.</p> <p>5.4 Parenteral drug absorption.</p> <p>5.5 Inhalation drug delivery systems.</p> <p>5.6 Percutaneous drug absorption.</p> <p>5.7 Absorption through other routes.</p>
Session 6 (Week 6)	6. Disposition factors influencing drug activity 6-hrs <p>6.1 Drug distribution.</p> <ul style="list-style-type: none"> - Binding to blood components. - Tissue distribution. - Membrane transport (PH partition, uptake into CSF). <p>6.2 Drug metabolism</p> <ul style="list-style-type: none"> - Principles and pathways of biotransformation. - Factors affecting drug biotransformation.
Session 7 (week 7)	6.3 Drug excretion <ul style="list-style-type: none"> - Renal excretion (Glomerular filtration, Active tubular secretion, Passive tubular reabsorption). - Non-renal excretion (Biliary, Salivary, Mummy, Pulmonary. Skin, Genital). - Relative contribution of renal excretion in bioavailability
Session 8 (Week 8)	II. PHARMACOKINETICS (51-hrs) <p>1. Introduction 3-hrs</p> <p>1.1 Definition and aims (Pharmacokinetic, Pharmacodynamics, Therapeutic window etc.).</p> <p>1.2 Kinetic concepts of drug absorption, distribution & elimination.</p> <ul style="list-style-type: none"> - Compartments and models. - Rates and order of kinetics. - Volume of distribution.
Session 9 (Week 9)	2. Basic Pharmacokinetics 21-hrs <p>2.1 Pharmacokinetics of IV bolus single dose.</p>



	<ul style="list-style-type: none"> - Compartmental Approach - non- compartmental approach
Session 10 (Week 10)	2.2 Drug clearance. <ul style="list-style-type: none"> - Renal clearance. - Hepatic clearance. - Biliary and salivary clearance
Week (11.12.13.14)	Assessment Exam (Biopharmaceutics)
Session 15 (Week 15)	2.3 Pharmacokinetics of IV bolus dose using urine data
Session 16 (Week 16)	2.4 Pharmacokinetics of oral-single dose.
Session 17 (Week 17)	2.5 Pharmacokinetics of Intravenous Infusion
Session 18 (Week 18)	2.6 Pharmacokinetics of Multiple dosing
Session 19 (Week 19)	2.7 Non-linear pharmacokinetics. <ul style="list-style-type: none"> - Causes and characteristics. - Determination (Michaelis–Menten kinetics)
Session 20 (Week 20)	3. Bioavailability and Bioequivalence Studies 6-hrs <ul style="list-style-type: none"> 3.1 Definition and concept. 3.2 Relative and Absolute bioavailability 3.3 Bioequivalence requirements and design.
Session 21 (Week 21)	<ul style="list-style-type: none"> 3.4 Bioequivalence studies. 3.5 Methods of documenting bioequivalency and therapeutic equivalence.
Session 22 (Week 22)	4. In Vitro- In Vivo correlation 6-hrs <ul style="list-style-type: none"> 4.1 Introduction 4.2 Correlation levels
Session 23 (Week 23)	<ul style="list-style-type: none"> 4.3 Development and assessment of <i>IVIVC</i> 4.4 Application of <i>IVIVC</i>
Session 24 (Week 24)	5. Therapeutic Drug Monitoring monitoring 12-hrs <ul style="list-style-type: none"> 5.1. Clinical Pharmacokinetic concepts and equations
Session 25 (Week 25)	5.2. Dosage Regimen adjustment and equations in renal impairment.
Session 26 (Week 26)	5.3. Dosage Regimen adjustment and equations in hepatic impairment.
Session 27 (Week 27)	5.4 Selected Problems in Clinical Pharmacokinetics <ul style="list-style-type: none"> • Antibiotics. • Cardiovascular drugs. • Anticonvulsants. • Immunosuppressants. • Anticoagulants. • Other drugs.



Session 28 (Week 28)	6. Plasma Drug Concentration and Therapeutic Response: 3-hrs An Introduction to Pharmacodynamics
Final Exam	
Practical work	<p>1. Using Winnonlin, Phoenix or Excel-Pk-solver Software to:</p> <ol style="list-style-type: none"> 1.1. Determination of AUC using Trapezoidal rule 1.2. Determination of absolute and relative bioavailability 1.3. Determine Pharmacokinetics parameters from plasma concentration profile after IV bolus drug administration 1.4. Determine Pharmacokinetics parameters from plasma concentration profile oral drug administration 1.5. Determine Pharmacokinetics parameters from plasma concentration profile after IV infusion drug administration. 1.6. Determine Pharmacokinetics parameters from plasma concentration profile after Multiple dosing 1.7. Determine Pharmacokinetics parameters using non-compartmental approach. 1.8. Determine Pharmacokinetics parameters of Aspirin and Riboflavin using urine excretion data 1.9. Applications of IV/VC <p>2. Lab experiments:</p> <ol style="list-style-type: none"> 2.1. Study the effect of pH of site on In Vitro absorption of weakly acidic drugs. 2.2. Effect of permeation enhancers on the Percutaneous absorption of drugs. 2.3. Study the dissolution profile of marketed paracetamol tablets 2.4. Study the effect of urine pH on urinary excretion of Aspirin 2.5. Effect of surface area and particle size of drug on the dissolution and absorption of drug. 2.6. Bioavailability of acetaminophen in saliva. 2.7. Effect of drug concentration, pH and polysorbate 80 on drug absorption in Goldfish.
	Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure



relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.

Industrial Pharmacy

1	Course name	Industrial Pharmacy
2	Course Code	PH 302
3	Course type: /general/specialty/optional	Specialty
4	Accredited units	4 units (Theoretical 3 Lecture/Week Practical 1 lab/Week)
5	Educational hours	5hrs/week
6	Pre-requisite requirements	passed examination in Pharmaceutics
7	Program offered the course	Department of Pharmaceutics and Industrial Pharmacy
8	Instruction Language	English Language
9	Date of course approval	12/2021



Brief Description:	The course deals with the basic pharmaceutical operations that take place in the pharmaceutical industry, as well as how to establish a pharmaceutical factory. The course also focuses in the devices industry. Course enables the student to understand and appreciate the influence of pharmaceutical additives and various pharmaceutical dosage forms on the performance of the drug product.												
Textbooks required for this Course:	1- Modern Pharmaceutics by Gilbert S. Banker & C.T. Rhodes, 3rd Edition 2-. Remington: The Science and Practice of Pharmacy, 20th edition Pharmaceutical Science (RPS) 3- . Theory and Practice of Industrial Pharmacy by Liberman& Lachman 4- . Pharmaceutics- The science of dosage form design by M.E. Aulton, Churchill Livingstone, Latest edition 5- Additional Resources: Lectures Notes												
Course Duration	28 weeks												
Delivery	Lectures (Tools: board, data show). The lectures were added on the internet site of the faculty to be available to the students all the time as an e-learning. Practical Session (Tools: labs., boards, instruments, chemicals, glassware, equipment). Assignments, seminars, research and posters.												
Course Objectives:	Upon successful completion of this course, the students should be able to 1. Know the various pharmaceutical dosage forms and their manufacturing techniques. 2. Understand the process of technology transfer from lab scale to commercial batch 3. Know various considerations in development of pharmaceutical dosage forms 4. Formulate solid, liquid and semisolid dosage forms and evaluate them for their quality.												
Course Assessments	<table border="1"> <tr> <td>Midyear Examination</td> <td>20.0%</td> </tr> <tr> <td>Practical continuous Assessment, Exam</td> <td>10.0%</td> </tr> <tr> <td>Quiz, reports , presentation</td> <td>10.0%</td> </tr> <tr> <td>Final practical Examination</td> <td>20.0%</td> </tr> <tr> <td>Final written Examination</td> <td>40.0%</td> </tr> <tr> <td>Total</td> <td>100%</td> </tr> </table>	Midyear Examination	20.0%	Practical continuous Assessment, Exam	10.0%	Quiz, reports , presentation	10.0%	Final practical Examination	20.0%	Final written Examination	40.0%	Total	100%
Midyear Examination	20.0%												
Practical continuous Assessment, Exam	10.0%												
Quiz, reports , presentation	10.0%												
Final practical Examination	20.0%												
Final written Examination	40.0%												
Total	100%												
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage												
Session 1 (Week 1)	I. Solid dosage forms (6 hr) a) Free powder dosage forms (3 hrs) b) Granules												
Session 3 (Week 3)	c) Tablets (9 hrs) <ul style="list-style-type: none"> • History, advantages and classification • Single compressed tablets • Recipients (diluents, binders, disintegrants, lubricants, colorants and flavoring agents) 												



Session 4 (Week 4)	<p>Manufacture</p> <p>i) Dry methods</p> <ul style="list-style-type: none"> • Direct compression • Granulation by compression – slugging <p>ii) Wet methods</p> <ul style="list-style-type: none"> • Wet granulation • Special procedures: Spray drying granulation, fluidized-bed granulation- Tablet machines (single punch, intermediate type and rotary tablet machines)
Session 5 (Week 5)	<ul style="list-style-type: none"> • Processing problems - capping, picking, weight variation, non-disintegrating tablet, etc. • Classification: Chewable, buccal, sublingual and effervescent tablets. • Evaluation -Hardness, friability, disintegration, dissolution rate, weight and content uniformity, etc.
Session 6 (Week 6)	<p>d) Capsules and microencapsulation</p> <p>Hard gelatin capsules (6 hr)</p> <ul style="list-style-type: none"> • Extemporaneous filling methods <ul style="list-style-type: none"> - Machine filling methods
Session 7 (Week 7)	<ul style="list-style-type: none"> - Quality control: Weight variation, content uniformity, capsule disintegration, dissolution test.
Session 8 (Week 8)	<ul style="list-style-type: none"> • Soft gelatin capsules (3 hrs) <ul style="list-style-type: none"> - Plate process, rotary die process, Norton capsule machine, Accogel capsule machine
Session 9 (Week 9)	<ul style="list-style-type: none"> • Microencapsulation(5 hrs) <ul style="list-style-type: none"> - Definition, materials used, equipment, methods of applications
Session 10 (Week 10)	<ul style="list-style-type: none"> • Microencapsulation (continue) <ul style="list-style-type: none"> - Definition, materials used, equipment, methods of applications
Session 11 (Week 11)	Midterm Assessment
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	<ul style="list-style-type: none"> • Coating of solids (5 hrs) <ul style="list-style-type: none"> ○ Reasons, equipment, core tablet characteristics, types ○ Sugar coating, film coating (non enteric and enteric)
Session 16 (Week 16)	<ul style="list-style-type: none"> • Equipment: Pan coating, air suspension coating, compression coating, multiple compressed tablets, long-acting tablets.
Session 17 (Week 17)	<p>II. Prolonged acting pharmaceuticals (6 hr) - (7 hrs)</p> <ul style="list-style-type: none"> • Terminology, sustained release, prolonged action, repeat action, coated slow-release beads, Tablets and slow-release granules, Tablet mixed release granules, Porous inert carrier, Ion exchange resins,



Session 18 (Week 18)	<ul style="list-style-type: none"> Multiple layer tablets/Repeat action tablets, slightly soluble salts or complex, Evaluation of prolonged released dosage forms, <i>In vitro</i> and <i>In vivo</i> evaluation
	<p>III. Cosmetology (12hr) Classification of cosmetic and cosmeceutical products Definition of cosmetics as per Indian and EU regulations, Evolution of cosmeceuticals from cosmetics, cosmetics as quasi and OTC drugs Cosmetic excipients: Surfactants, rheology modifiers, humectants, emollients, preservatives. Classification and application Skin: Basic structure and function of skin. Hair: Basic structure of hair. Hair growth cycle. Oral Cavity: Common problem associated with teeth and gums.</p>
Session 19 (Week 19)	<ul style="list-style-type: none"> Lather shaving creams and brushless shaving cream,
Session 20 (Week 20)	<ul style="list-style-type: none"> Shampoos, Lipsticks, Face powders (loose and compact), Different types of creams,
Session 21 (Week 21)	<ul style="list-style-type: none"> Toothpaste (Formulation, manufacture and evaluation) Principles of Cosmetic Evaluation: Principles of sebometer, corneometer. Measurement of TEWL, Skin Color, Hair tensile strength, Hair combing properties Soaps, and syndet bars. Evolution and skin benefits.
Session 22 (Week 22)	<p>IV. Fermentation technology (6 hr)</p> <ul style="list-style-type: none"> Production of penicillin and streptomycin
Session 23 (Week 23)	<p>Fermentation technology Production of penicillin and streptomycin (continue)</p>
Session 24 (Week 24)	<p>V. Blood products and preparations (5 hrs.)</p>
Session 25 (Week 25)	<p>Blood products and preparations (continue)</p>
Session 26 (Week 26)	<p>V. Structure of pharmaceutical factory (3 hr)</p> <ul style="list-style-type: none"> Structure of pharmaceutical factory, structure of each division, duties and responsibilities of each department.
Session 27 (Week 27)	<p>VI. Pilot-plant scale-up (3 hr)</p> <ul style="list-style-type: none"> Lay out of pharmaceutical factory. Materials used in construction.
Session 28 (Week 28)	<p>VII. Industrial safety and industrial hazards. (3 hr)</p>
	<p>Final Exam</p>
Practical Work	<p>1- preparation of effervescent granules by dry method and wet method. 2- preparation of tablet containing different types of drug substances by wet granulation, dry granulation and direct compression methods. 3- evaluation of prepared tablets/ commercial tablets, capsules. Weight evaluation test, disintegration test, hardness, friability.</p>



	4- formulation and filling of capsules.
	5- preparation of cosmetics such as cold cream, vanishing cream, shaving cream, toothpaste, shampoo, face-powders etc. Evaluation of the quality of these products.
	6- preparation of non-staining iodine ointment.
	7- preparation of prolonged release formulations such as microspheres.
	8- determination of bulk properties of granules such as bulk, density, true density, compressibility, flow properties (angle of repose) etc.
	9- Final Practical Examination
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.

Applied Pharmacognosy

1	Course name	Applied Pharmacognosy
2	Course Code	PH 303
3	Course type: /general/specialty/optional	General
4	Accredited units	3 Units (Theoretical 2 Lecture/Week Practical 2 hours/Week)
5	Educational hours	4hrs/week
6	Pre-requisite requirements	Pharmacognosy and Phytochemistry



7	Program offered the course	Department of Pharmacognosy
8	Instruction Language	English Language
9	Date of course approval	12/2021
Brief Description:		Upon successful completion of this course, the student should have information about formulation of herbal drug mixtures and their interaction, qualitative and quantitative evaluation of herbal medicines in addition to chromatographic techniques and its application in the isolating of active principles.
Textbooks required for this Course:		<ol style="list-style-type: none"> 1. Trease, G.E. and Evans, W.C.; "Pharmacognosy", W.B. Saunders Publishers, Ltd, 17th ed., 2012. 2. 2D NMR spectroscopy, Silverstein. 3. Course notes 4. Lecture and practical notes prepared by instructors 5. Essential & Recommended books 6. Periodicals, Web sites, ... etc 7. http://www.pubmed.com
Course Duration		28 weeks
Delivery		Lectures (Tools: board, data show). The lectures were added on the internet site of the faculty to be available to the students all the time as an e-learning. Practical Session (Tools: labs., boards, instruments, chemicals, glassware, equipment). Assignments, seminars, research and posters.
Course Objectives:		<p>Upon completion of this course, the student will have reliably demonstrated the ability to:</p> <ol style="list-style-type: none"> 1. Give an account on the general principles of quality control, chromatographic analysis of herbal products, storage and preservation of herbal drugs, marker determination, validation and applications of analysis of herbal tea bags. 2. Describe the application of GC and HPLC in the analysis of herbal constituents. 3. Recognize the structure of pure active natural products applying different methods of spectral analysis e.g. UV., IR, Ms and NMR. 4. Implement/Perform standard industrial and/or pharmaceutical instrumentation and laboratory procedures and applying such skill in aromatherapy. 5. Define Complementary therapies, including herbal therapies. 6. Enumerate the concepts of chemistry of biologically active natural products viz, carbohydrates, glycosides, tannins, bitter principles, alkaloids, volatile oil and unorganized drugs in addition to principle of chromatography that covers theories and applications in natural product analysis. 7. Enumerate the principle of Plant cell and tissue culture that covers theories and applications in natural product production.



	<p>8. Identify different classes of marine natural products illustrate the most important biologically active constituents from marine</p> <p>9. Identify different classes of tumor inhibitors from natural products clinically use.</p> <p>10. Identify different classes of hallucinogenics & drug abuse and methods of detection.</p> <p>11. Identify the different methods Biosynthesis of secondary metabolites.</p> <p>12. Identification of the most important Toxic plants of Libya</p>
Course Assessments	Midyear Examination 20.0%
	Practical continuous Assessment 10.0%
	Quizzes, reports, presentation 10.0%
	Final practical Examination 20.0%
	Final written Examination 40.0%
Total 100.0%	
Content Breakdown	Topical Coverage
Session 1 (Week 1)	Extraction and Isolation of Active Constituents: Maceration and hot continuous extraction. Solvent extraction
Session 2 (Week 2)	Phytochemical Screening
Session 3 (Week 3)	Advanced Chromatographic Techniques Definitions, Classification, Theoretical Partition chromatography: Paper Chromatography
Session 4 (Week 4)	Adsorption Chromatography Thin Layer Chromatography (TLC) Column Chromatography
Session 5 (Week 5)	Separation Based on electric charge <ul style="list-style-type: none"> • 1- Electrophoresis • 2- Ion-exchange chromatography
Session 6 (Week 6)	Molecular exclusion chromatography (gel permeation or Gel filtration). Gas Chromatography (GC) High performance Liquid Chromatography (HPLC) Supercritical fluid chromatography
Session 7 (Week 7)	Quality control of herbal drugs and their extracts , include Evaluation of Medicinal Crude drugs.
Session 8 (Week 8)	Pharmacoepial Standards
Session 9 (Week 9)	Tissue culture , include: I. Introduction II. Applications
Session 10 (Week 10)	Plant Biotechnology
Session 11 (Week 11)	Midterm Assessment
Session 12 (Week 12)	
Session 13 (Week 13)	



Session 14 (Week 14)	
Session 15 (Week 15)	- Marine Natural Products Examples of Drugs derived from Algae Green Algae
Session 16 (Week 16)	Red Algae Brown Algae
Session 17 (Week 17)	- Tumor Inhibitors from Plants <ul style="list-style-type: none"> • Plant derived anticancer agents in clinical use • Detailed information about medicinal plants, family, part used and specific type of anticancer phytochemical and their mechanism of action against particular type of cancer
Session 18 (Week 18)	Plant derived anticancer agents in clinical use
Session 19 (Week 19)	Hallucinogenics & Drug Abuse - Stimulants
Session 20 (Week 20)	- Hallucinogenics - Narcotics
Session 21 (Week 21)	- Phytotherapy Including: CVS, GIT, Respiratory, Liver, Urinary tract, Endocrine, Reproductive system, Skin
Session 22 (Week 22)	- Aromatherapy
Session 23 (Week 23)	- Herbal Drug Interactions
Session 24 (Week 24)	Biosynthesis of secondary metabolites.
Session 25 (Week 25)	Structure elucidation of Natural Products
Session 26 (Week 26)	Spectroscopy , include: I. Ultraviolet spectroscopy II. Infra-red spectroscopy III. Mass spectrometry IV. Nuclear Magnetic resonance
Session 27 (Week 27)	Toxic Plants in Libya
Session 28 (Week 27)	Toxic Plants in Libya (continue)
	Final Exam
Practical Work	1-Safety Rules
	2-Extraction Methods
	3-Phytochemical screening
	4-Chromatography Column, Thin Layer and Paper Chromatography Separation of Mixture of Dyes by Radial paper chromatography and Column chromatography
	5-Separation of Mixture of Carbohydrates (Sugars) by I paper chromatography
	6-Identification for alkaloid by microcrystalline tests
	7-Quality control of drugs containing alkaloids Microscopically, TLC of Cinchona bark, and Mixture of Powder
	8-Quality control of drugs containing Volatile oils Microscopically, TLC of Clove oil, and Mixture of Powder
	9-Quality control of drugs containing Glycosides



	Microscopically, TLC of Rhubarb extract, and Mixture of Powder 10-Screening of Libyan Medicinal Plants 11- Final Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.

Clinical Biochemistry

1	Course name	Clinical Biochemistry
2	Course Code	PH 304
3	Course type: /general/specialty/optional	General
4	Accredited units	3 units (2 hrs./week theoretical 2 hrs./week practical)
5	Educational hours	4 hours / week
6	Pre-requisite requirements	Biology, pathology and organic chemistry
7	Program offered the course	Department of Pharmaceutical chemistry
8	Instruction Language	English
9	Date of course approval	12/2021



Brief Description:	Clinical biochemistry is the division of laboratory medicine that deals with the measurement of chemicals (both natural and unnatural) in blood, urine and other body fluids. The subject deals with study of acid-base balance of the body, normal and abnormal serum levels of electrolytes, enzyme, hormones and CBC levels.
Textbooks required for this Course:	1- Clinical biochemistry. By GawMurphy cowanetal. 4 th edition. Elsvier 2. Clinical Biochemistry: An illustrated color text. By Allan Gaw, Michael J Murphy, Rajeev Srivastava, Robert A Cowan, and Denis St J O'Reilly. Elsevier Ltd 3. Basic Concepts in Clinical Biochemistry: A Practical Guide. By Vijay Kumar, Kiran Dip Gill. Springer Nature. 4. Clinical Biochemistry: Lecture Notes. By -Peter Rae, MikeCrane, Rebecca Pattenden. John Wiley & Sons Ltd
Course Duration	28 weeks
Delivery	<ul style="list-style-type: none"> Lecture-based, Group interaction and discussion, Use of video technique, practical classes.
Course Objectives:	<p>By the end of the course, students should be able to:</p> <ol style="list-style-type: none"> Study of the biochemical composition of the human body. Summarizing changes in biochemical indicators of diseases Understand the mechanism of metabolism and the changes associated with different disease states. Explanation of ways to ensure the quality of medical laboratories. performance and the interpretation of the various results. Determining the accurate description of changes in blood chemistry and describing the disease and its origin.
Course Assessments	<p>20% Assessment Exam 10% in lab activities 10% in class activities e.g.: quizzes 40% Final theoretical exam 20 % Final Practical Exam Total 100%</p>
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1(Week 1)	<p>Unit 1: Introduction: (3 hr.)</p> <ol style="list-style-type: none"> Definition of clinical biochemistry laboratory The use of the laboratory The interpretation of results Reference intervals Specimen collection
Session 2(Week 2)	<p>Unit 2-Fluid, electrolyte balance adrenal functions (9hrs.)</p> <ol style="list-style-type: none"> Concept and vocabulary types of buffering system. acid-base homeostasis. (alkalosis and acidosis)
Session 3(Week 3)	<ol style="list-style-type: none"> Hypernatremia and hyponatremia Hyperkalemia and hypokalemia



Session 4(Week 4)	Unit 3. Investigation of renal function: (6 hr) a. Functions of the kidney b. Glomerular function c. Principal of GFR d. Renal tubular function
Session 5(Week 5)	e. Acute renal failure f. Chronic renal failure g. Tubular dysfunction h. Specific proteinuria i. Glycosuria
Session 6(Week 6)	Unit 4-Blood Biochemistry and Clinical enzymology (6hrs) a. Acid base metabolic disorders b. Blood gases and respiratory disorders
Session 7(Week 7)	c. plasma protein and enzymes of clinical significance d. Immunoglobulin and acute phase proteins
Session 8(Week 8)	Unit 5. Endocrinology and diabetes (15 hrs.) a. Biochemical regulators b. Hormone structure c. Assessment of endocrine Control d. Types of endocrine control
Session 9(Week 9)	a. <u>Pituitary function</u> (Anterior & Posterior pituitary hormones) b. Pituitary tumors c. Hypopituitarism d. Growth disorders and acromegaly e. Growth hormone insufficiency
Session 10(Week 10)	a. Thyroid biochemistry and thyroid disorders (- Goiter, Grave's disease, hypothyroidism, hyperthyroidism). b. Adrenal biochemistry and adrenal disorders (Hypofunction and Hyperfunction of the adrenal cortex)
Session 11(Week 11)	Assessment
Session 12(Week 12)	
Session 13(Week 13)	
Session 14(Week 14)	
Session 16(Week 16)	a. Gonadal functions and dynamic functions tests b. g. Hypothalamic–pituitary–gonadal axis c. h. Disorders of male sex hormones d. Disorders of female sex hormones
Session 17(Week 17)	Glucose metabolism and diabetes mellitus: a. Insulin b. Diabetes mellitus c. Factor affecting blood glucose level d. Diagnosis and monitoring of diabetes mellitus
Session 18(Week 18)	Unit 6. GIT biochemistry (3 hr) a. Enzyme analysis b. Fecal analysis



Session 19(Week 19)	Unit 7. Plasma enzyme in diagnosis: (3 hr) Introduction, assays of enzymes, and enzymes of diagnostic value
Session 20(Week 20)	Unit 8. Clinical biochemistry of the Liver (6 hrs.) a. Liver function tests and liver enzyme b. bilirubin metabolism c. Jaundice and liver diseases: acute and chronic liver diseases.
Session 21(Week 21)	c. Viral Hepatitis: investigation and interpretation of lab findings
Session 22(Week 22)	Unit 9. Plasma lipid & Lipoprotein: (3 hr) a. Chemical classification of plasma lipid & atherogenic profiles. b. Classification of plasma lipoproteins, metabolism, & their function
Session 23(Week 23)	Unit 10- Clinical biochemistry of CVS (3 hrs.) a. Myocardial infarction. b. Cardiac markers c. Hypertension
Session 24(Week 24)	Unit 11. Clinical biochemistry of skeleton (3 hrs.) a. Calcium regulation, calcium status and bone metabolism b. Bone diseases, osteoporosis and rickets c. Hyperuricemia and gout d. Risk factors.
Session 25(Week 25)	Unit 12. Hematology: (3 hr) a. Red & white blood cells) b. Blood cells production (site of production, hematopoiesis) c. Anemias d. leukemias
Session 26(Week 26)	Unit 13. Special topics (9 hrs.) a. Paediatric biochemistry biochemistry of Pregnancy and Clinical Gynecology c. Point of care testing (POCT)
Session 27(Week 27)	d. DNA diagnosis e. Tumor markers
Session 28(Week 28)	f. Therapeutic drug monitoring g. Fetal monitoring, prenatal diagnosis and Newborn screening
	Final Exam.
Practical work (one/week)	Practical Part: 1. Common Clinical Laboratory Hazards and Waste Disposal 2- Blood Collection 3- Quality Control in Laboratory 4. Determination of blood acidity and alkalinity (blood gases). Case history 5. Investigation & case history 6. Estimation of Urea in Serum and Urine 7. Determine Urea Clearance 8. -Estimated GFR. Case history 9. Review 10. Biochemical tests in liver function. Case history 11. RBS, FBS, OGTT. Case history



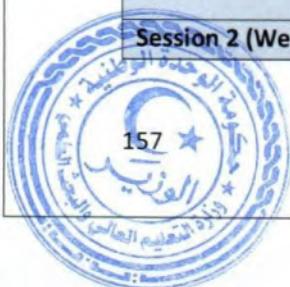
	<p>12. Lipid Profile in Serum Sample. Case history</p> <p>13. CBC, blood types, Laboratory investigation of iron disorders, Case history</p> <p>14. Biochemistry testing in calcium disorders or bone disease</p> <p>15. Dynamic function tests (Insulin stress test, GnRH test, OGTT with GH, Measurement, TRH test,)</p> <p>16. Pituitary function, Case history</p> <p>17. Tests of growth hormone Insufficiency, -Case history</p> <p>18. Thyroid function tests. -Case history</p> <p>19. Assessing the Hypothalamic-Pituitary-adrenocortical, Axis function. - Case history.</p> <p>20. -Synacthen tests – Dexamethasone, - suppression tests, - Case history.</p> <p>21. Urine analysis and fecal analysis</p>
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.

Pharmacology II

1	Course name	Pharmacology II
2	Course Code	PH 305
3	Course type: /general/specialty/optional	Specialty
4	Accredited units	4 Units (Theoretical 3 Lecture/Week Practical 2 hours/Week)
5	Educational hours	5hrs/week
6	Pre-requisite requirements	Pass pharmacology I course
7	Program offered the course	Department of Pharmacology and Toxicology
8	Instruction Language	English Language
9	Date of course approval	12/2021



Brief Description:	This course aims to offer students with a comprehensive background in the pharmacology of drugs used in central nervous, endocrine, and gastrointestinal systems, as well as chemotherapy drugs Lectures will focus on drugs classes, action and mechanisms, pharmacokinetics, clinical uses, adverse effects, and drug-drug interaction
Textbooks required for this Course:	1. Lippincott Illustrated Reviews: Pharmacology, 7th Edition 2. Goodman & Gilman's: The Pharmacological Basis of Therapeutics 3. Rang and Dale's pharmacology. Additional Resources: 4. Lectures Notes, 5. Practical notes.
Course Duration	28 weeks
Delivery	-Lectures (Tools: board, data show). -Tutorials group discussions. -Assignments (if applicable). -Videos -Practical classes (Lab experiments+ computerized experiments simulation)
Course Objectives:	Upon successful completion of this course, the students should be able to: <ol style="list-style-type: none"> 1. Describe the Pathophysiology of diseases and explain the rational basis for the use of drugs. 2. Classify drugs used of central nervous (CNS), endocrine, and gastrointestinal (GIT) systems and explain the mechanism of action, pharmacological actions and their therapeutic actions. 3. Describe the adverse and toxic effects of drugs used in various CNS, endocrine, GIT disorders and drug interaction. 4. Discuss patient and drug related factors that influence the selection of the appropriate antimicrobial agent and discuss the pharmacokinetic and Pharmacodynamics considerations. 5. Identify the most common/serious drug interactions, adverse effects and compare contrast the therapeutic of antimicrobial drugs that are appropriate for treating the disease state.
Course Assessments	20% Assessment Exam 10% in lab activities 10% in class activities e.g.: quizzes 40% Final theoretical exam 20 % Final Practical Exam Total 100%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1 (Week 1)	CNS <ol style="list-style-type: none"> 1. Introduction: Anatomical & physiological Considerations; central neurotransmitters and their receptors. 2. Sedatives, hypnotics, and anxiolytics.
Session 2 (Week 2)	CNS



	3. Alcohols: Ethyl alcohol and pharmacology: - Acute poisoning and treatment CNS 4. General anesthetics including pre-anesthetic medication 5. Local anesthetics:
Session 3 (Week 3)	CNS 6. Antiepileptic drugs: principles of treatment of epilepsy: Experimental methods
Session 4 (Week 4)	CNS 7. Drugs in Parkinson's disease and ether neurodegenerative diseases 8. Central muscle relaxants
Session 5 (Week 5)	CNS 9. Antipsychotics – typical and atypical & Anti-depressants and anti-mania drugs
Session 6 (Week 6)	CNS 10. Opioidanalgesics: a. Pathophysiology of Endogenous opioids & system b. Opioidanalgesics: c. Drugs of abuse and treatment: hallucinogen
Session 7 (Week 7)	CNS 11. Non-opioid analgesics & ant gout types
Session 8 (Week 8)	GIT 1. Drugs used in peptic ulcer 2. drugs treatment of constipation (laxative and purgatives).
Session 9 (Week 9)	GIT 1. Antidiarrheal drugs 2. Emetics and anti-emetics
Session 10 (Week 10)	Endocrine pharmacology 1. Overview of hormones of hypothalamus and anterior pituitary; directly acting and controlling hormones; pharmacology of growth and prolactin 2. Hormones of posterior: Oxytocin and A.D.H
Session 11 (Week 11)	
Session 12 (Week 12)	Assessment exam
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	Endocrine pharmacology



	<p>3. Gonadotropic hormones: Control of male and female sex hormones; Oestrogens, progestins; Oral contraceptives females</p>
Session 16 (Week 16)	<p>Endocrine pharmacology</p> <p>4. Androgens and anabolic steroids: male contraceptives</p> <p>5. Iodine metabolism: TSH; The regulation of thyroid hormones; Thyroid hormones, antithyroid and their pharmacology</p>
Session 17 (Week 17)	<p>Endocrine pharmacology</p> <p>6. ACTH and regulation of corticosteroids secretion; Hormones of adrenal cortex and synthetic substitutes and their pharmacology</p>
Session 18 (Week 18)	<p>Endocrine pharmacology</p> <p>7. Calcium metabolism: pharmacology of calcitriol, parathormone and calcitonin</p>
Session 19 (Week 19)	<p>Endocrine pharmacology</p> <p>8. Glucose metabolism; pancreatic hormones; Diabetes mellitus and anti-diabetic drugs (Insulin and oral drugs) (2 lectures)</p>
Session 20 (Week 20)	<p>Chemotherapy</p> <p>1. General chemotherapy:</p> <p>a. principles of antimicrobial drug action, Microbes and drugs of choice, Resistance to antimicrobial drugs</p> <p>b. Antifungal agents</p> <p>c. Antiviral drugs</p>
Session 21 (Week 21)	<p>Chemotherapy</p> <p>1. General chemotherapy:</p> <p>d. Antibacterial drugs (Chemotherapeutic agents & Antibiotics)</p>
Session 22 (Week 22)	<p>Chemotherapy</p> <p>1. General chemotherapy:</p> <p>d. Antibacterial drugs (Chemotherapeutic agents & Antibiotics)</p>
Session 23 (Week 23)	<p>Chemotherapy</p> <p>2. Specific chemotherapy</p> <p>a. Chemotherapy of tuberculosis and leprosy</p>
Session 24 (Week 24)	<p>Chemotherapy</p>



	2. Specific chemotherapy b. Drugs in helminth infestation
Session 25 (Week 25)	Chemotherapy 2. Specific chemotherapy c. Drugs in protozoal Infestation
Session 26 (Week 26)	Chemotherapy 2. Specific chemotherapy d. Chemotherapy of malignancy
Session 27 (Week 27)	Immunosuppressants
Session 28 (Week 28)	Vitamins
Practical work	prescription writing. Screening of analgesic effect using (Writhing test). Screening of analgesic effect analgesics using (Hot plate analgesiometer). Sedative and hypnotics experiments. Experimental Parkinsonism. Induction of convulsants and evaluation of anticonvulsants effect. Local anesthetics (on Rabbit eye) Frog rectus abdominus muscle. Collection of blood from laboratory animals.
	10- Final Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.



Medicinal chemistry I

1	Course name	Medicinal chemistry I
2	Course Code	BP306
3	Course type: /general/specialty/optional	General
4	Accredited units	4 units (3 hrs./week theoretical 2 hrs./week practical)
5	Educational hours	5 hours/week
6	Pre-requisite requirements	Organic chemistry I & II, Analytical Chemistry, Instrumental analysis
7	Program offered the course	Department of Pharmaceutical chemistry
8	Instruction Language	English
9	Date of course approval	12/2021

Brief Description:	The course is designed to give students the important foundations of pharmaceutical chemistry. This course includes an introduction to the physicochemical properties of drugs and their relationship to absorption, distribution and metabolism and their effects on bioreceptors to cause physiological response. the course also includes a study in some detail of the chemical structure, the relationship between the chemical structure and activity, and the chemical aspects of drug biotransformation. In addition, it includes the synthesis of the compounds, and certain therapeutic uses and adverse effects.
Textbooks required for this Course:	<ul style="list-style-type: none"> • Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry Applied Therapeutics: The Clinical Use of Drugs. • Foye's Principles of Medicinal Chemistry. • Textbook of medicinal chemistry Volumel. • Textbook of medicinal chemistry Volumell. • Experiments in Pharmaceutical Chemistry. • Advanced Practical Medicinal Chemistry. • David G Watson-Pharmaceutical and medicinal chemistry.
Course Duration	28 weeks
Delivery	• Lecture-based, Group interaction and discussion, medical clerkshipetc.
Course Objectives:	By the end of the course, students should be able to: <ul style="list-style-type: none"> • Mention the physicochemical properties of different drugs



	<ul style="list-style-type: none"> • Understanding the mode of action of drugs and way bonding to their receptors, and overcome adverse effect • Development and synthesize new drugs • Classify the newly discovered drugs.
Course Assessments	20% Assessment Exam 10% in lab activities 10% in class activities e.g.: quizzes 40% Final theoretical exam 20 % Final Practical Exam Total 100%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1 (Week 1)	Unit I: Introduction: Processes of drug discovery Modern drug discovery Biotechnology and Drug Discovery
Session 2 (Week 2)	Physicochemical Properties and biological activity: <ul style="list-style-type: none"> • Solubility and partition coefficient • Ionized and unionized species (ionization constant) • Surface activity (nature of receptor site) • Hydrogen bonding and chelation
Session 3 (Week 3)	<ul style="list-style-type: none"> • Receptor and drug-receptor interaction • Concepts of: <ol style="list-style-type: none"> i. Nonspecific and specific drugs ii. Prodrugs and soft drugs iii. Isosters and bioisosters
Session 4 (Week 4)	Unit II: Drug metabolism: <ul style="list-style-type: none"> • General pathways of drug metabolism (Phase I and II). • Sites of drug biotransformation • Factors Affecting Metabolism • Drug Biotransformation Pathway (Phase 1), Monooxygenase, Human Hepatic Cytochrome P450 Enzyme System • Drug Conjugation Pathways (Phase 2) • Elimination Pathways
Session 5 (Week 5)	<ul style="list-style-type: none"> • Drug Metabolism and Age • Genetic Polymorphism • Oral Bioavailability • Extrahepatic Metabolism • Stereochemical Aspects of Drug Metabolism • Structure-activity relationship, specific use and adverse effect.
Session 6 (Week 6)	Unit III: Drugs acting on the autonomic nervous system: Introduction to ANS , Cholinergic Drugs: I. Direct acting cholinergic agonists.
Session 7 (Week 7)	II. Indirect acting cholinergic agonists.



	III. Cholinesterase inhibitors: synthesis of Carbachol, neostigmine bromide and Isofuropate.
Session 8 (Week 8)	<ul style="list-style-type: none"> Anticholinergic Drugs or cholinergic blocking agents: <ol style="list-style-type: none"> Parasympathetic postcholinergic - blocking agents (solanaceous alkaloids "and synthetic analogous", aminoalcohol ether, aminoalcohol ester, aminoamides, papaveracous alkaloids and their synthetic analogies). Ganglionic blocking agents (curares "and related compound", succinylcholine, decamethonium. Gallamin, and hexafluorinium bromide) - Synthesis of succinylcholine chloride.
Session 9 (Week 9)	<ul style="list-style-type: none"> Adrenergic Drugs <ol style="list-style-type: none"> Direct sympathomimetic agent. indirect sympathomimetic agent Adrenergic Blockers: <ol style="list-style-type: none"> α-Adrenergic Blockers. β-Adrenergic Blockers. Synthesis of Phenylepherine, Prazocin HCL and Atenolol.
Session 10 (Week 10)	Unit IV: Diuretics: <ul style="list-style-type: none"> Introduction of nephrons Site 1 diuretics carbonic anhydrase inhibitors Site 2 diuretics thiazide and thiazide-like drugs Site 3 diuretics high-ceiling or loop diuretics Site 4 diuretics potassium-sparing diuretics Miscellaneous diuretics.
Session 11 (Week 11)	Assessment
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	Unit V: Drugs acting on cardiovascular system: <ul style="list-style-type: none"> Cardiotonic agents Antianginal and vasodilators <ol style="list-style-type: none"> Ester of nitrous and nitric acids Calcium antagonist: synthesis of Nifedipine and Diltiazem. Antiarrhythmic
Session 16 (Week 16)	<ul style="list-style-type: none"> Antihypertensive agents <ol style="list-style-type: none"> Agents affecting peripheral sympathetic nerve Centrally acting adrenergic drugs Drugs acting directly on smooth muscles (vasodilators): Angiotensin-converting enzyme inhibitors. synthesis of hydralazine, Captopril and Methyldopa.
Session 17 (Week 17)	<ul style="list-style-type: none"> Antihyperlipidemics: Synthesis of Clofibrate. Anticoagulants
Session 18 (Week 18)	Unit VI: Antihistaminic agent: <ul style="list-style-type: none"> H1-antagonist; synthesis of diphenhydramine, tripelenamine, and chlorpheniramine H1-antagonist; synthesis of cimetidine and ranitidine. Proton pump inhibitors
Session 19 (Week 19)	Unit VII: Local anesthetics:



	<ul style="list-style-type: none"> Synthesis of procaine, benzocaine, and lidocaine
Session 20 (Week 20)	Unit VIII: Anti- diabetic drugs: <ul style="list-style-type: none"> Insulin and its preparations. Oral hypoglycemic agents: Synthesis of Tolbutamide, Glybenclamide and Phenformin HCL.
Session 21 (Week 21)	Unit V: Antineoplastic and Immunoactive drugs: <ul style="list-style-type: none"> Types of neoplasms Metastasis Synthesis of chlorambucil, thiotepa,
Session 22 (Week 22)	<ul style="list-style-type: none"> Synthesis of cyclophosphamide, methotrexate.
Session 23 (Week 23)	<ul style="list-style-type: none"> Synthesis of 6-mercaptopurine, and 5-fluorouracil.
Session 24 (Week 24)	<ul style="list-style-type: none"> Immunoactive drugs:
Session 25 (Week 25)	Unit VIII: Diagnostic agents: Contrast media: <ul style="list-style-type: none"> Barium sulphate
Session 26 (Week 26)	<ul style="list-style-type: none"> Iodine compounds
Session 27 (Week 27)	Review
Session 28 (Week 28)	Review
Practical work (one/week)	Practical Part: A. Identification of some drugs <ul style="list-style-type: none"> To carry out characteristic chemical tests for identification of some studied in theory, as specified in the BP 1993 (VOL I & II). B. Assay of some drugs (with emphasis on the functional group analysis) <ul style="list-style-type: none"> To carry out the assay (estimation and % purity) of some drugs studied in theory by following the procedures given in BP 1993 (VOL I & II) and emphasis will be given on the functional group wherever applicable. Phenols (or Chlorocresol or Chloroxyleneol), Hydrogen peroxide, Formaldehyde, Methyl salicylate, Cephalexin, INH, Fusidic acid, Sulphur ointment, Benzoic acid and Salicylic acid ointment, Nicotinamide, Ascorbic acid, Diphenhydramine HCl, CPM, Chloroquine phosphate, Chlorambucil, Lidocaine HCl, Sulpha drugs (Sulphanilamide or Sulphacetamide sodium). C. Synthesis of some representative drugs: <ul style="list-style-type: none"> Sulphanilamide Sulphacetamide Benzocaine Note: In addition to determination of the percentage purity of drug, the principle of calculations involved in the functional groups have to be studied during the assay of the drugs containing a distinct mono-functional group.
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.



Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
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Pharmaceutical Microbiology II

1	Course name	Pharmaceutical Microbiology II
2	Course Code	PH307
3	Course type: /general/specialty/optional	Specialty
4	Accredited units	3 units (3 theory + 2 Practical)
5	Educational hours	5 hours/week
6	Pre-requisite requirements	Microbiology II
7	Program offered the course	Bachelor's degree in Pharmaceutical Sciences
8	Instruction Language	English language
9	Date of course approval	12/2021

Brief Description:	This course provides learning opportunities for understanding the principles of immunology and being familiar with the role of the immune system in health well-being. In addition, this course is taught pathogenicity (the mechanisms by which the microbes cause the diseases). Also, this course explains the phenomena of biofilm and the mechanisms by which the pathogens resist antimicrobial agents, and how the antimicrobial agents fight the pathogens. Furthermore, this course is concerned with providing knowledge about how to explore new antimicrobial agents from microbes to kill other microbes by use of fermentation and recombinant DNA techniques.
Textbooks required for this Course:	<ol style="list-style-type: none"> 1. Pharmaceutical biotechnology Fundamental and application, 5th Edition. Daan J.A. Crommelin, Robert D. Sindelar, Bernd Meibohm Editors. Springer 2. Pharmaceutical biotechnology Concept and application. Gary Walsh. John Welly&Sons.Ltd



	<p>3. Microbiology an Introduction,9th edition; (2004).Tortora GJ, Funke BR & Case CL. (Pearson International edition)</p> <p>4. Additional Resources: Lectures Notes</p>												
Course Duration	28 weeks												
Delivery	<p>1. Lectures (Tools: board, data show).</p> <p>2. Practical classes (Lab experiments+ computerized experiments simulation)</p> <p>3. Assignments, reports and power point presentation thesis.</p> <p>4. Construction of illustrated posters.</p>												
Course Objectives:	<p>At the end of course the student will be able to</p> <ol style="list-style-type: none"> 1. explain the nature and definitions of immunology, illustrate the concept of immunology and its function and describe the differences between the innate and the acquired immune system. 2. The student will be able to explain the microbial mechanism by which microbes cause disease and to explain the properties of biofilms and their effect on medicine and industry. 3. The student will be able to explain the concept and importance of industrial pharmaceutical microbiology. 4. . The student will be able to explain the basics of fermentation techniques and their importance in exploring new pharmaceutical substances of interest. 5. The student will be able to demonstrate the technique of cloning and gene expression and its importance in the exploration of new pharmaceutical materials of interest. 6. The student will have acquired the skill of using the microscope. 7. The student will be able to interpret the results and find and assess the information of different microbial diseases quickly and reliably. 8. The student will be able to use the internet to search and prepare reports and do a presentation. 												
Course Assessments	<table> <tr> <td>Assessment Exam</td> <td>20%</td> </tr> <tr> <td>Quizzes, reports, presentation</td> <td>10%</td> </tr> <tr> <td>Lab classes and activities</td> <td>10%</td> </tr> <tr> <td>Final lab exam</td> <td>10%</td> </tr> <tr> <td>Final theoretical exam</td> <td>40%</td> </tr> <tr> <td>Total</td> <td>100%</td> </tr> </table>	Assessment Exam	20%	Quizzes, reports, presentation	10%	Lab classes and activities	10%	Final lab exam	10%	Final theoretical exam	40%	Total	100%
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Quizzes, reports, presentation	10%												
Lab classes and activities	10%												
Final lab exam	10%												
Final theoretical exam	40%												
Total	100%												
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage												
Session 1 (Week 1)	General introduction to immunology												
Session 2 (Week 2)	Innate immune system (cells, functions, and mechanisms)												
Session 3 (Week 3)	Acquired immune system (cells, functions and mechanisms)												
Session 4 (Week 4)	Autoimmune diseases and Hypersensitivity												
Session 5 (Week 5)	Workshop session / scientific activity/ presentation												
Session 6 (Week 6)	Introduction in microbial Pathogenicity & predispose factors of infection with True and Opportunistic pathogens												



Session 7 (Week 7)	Microbial Portal of entry and portal of exit and specificity of portals to specific microbes and microbial virulence factor Major steps of pathogenicity & minimum infectious dose (MID) & Strategies of microbe to evade the host defense
Session 8 (Week 8)	Classification of antimicrobial agents according to the microbial biology Mode of action of antibiotics against pathogenic bacteria, bacteriostatic and bactericide concept and
Session 9 (Week 9)	Assessment of minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC)
Session 10 (Week 10)	Workshop session / scientific activity/ presentation
Session 11 (Week 11)	Assessment exam
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	
Session 16 (Week 16)	Biofilm: definition, origin, characteristics, stages of biofilm development, Quorum Sensing, and dispersal
Session 17 (Week 17)	Antibiofilm agents (natural and synthetics)
Session 18 (Week 18)	Biofilm risk on medicine and industry and types of anti-biofilm agents (natural and chemical)
Session 19 (Week 19)	Rate of Microbial Death and Conditions influencing the Effectiveness of Antimicrobial Agent Activity.
Session 20 (Week 20)	Workshop (Assignment, discussion, and presentation)
Session 21 (Week 21)	History, medical importance, and general introduction to pharmaceutical biotechnology (Fermentation and type of fermentation & Recombinant DNA) Fermentation: (fermenter, Media, Batch/continuous/feed batch fermentation) and differences between fermenter and Bioreactor
Session 22 (Week 22)	Fermentation Production of vinegar (slow process, quick process, and natural fermentation and uses of vinegar), and alcohol
Session 23 (Week 23)	Fermentation Production of vitamins and amino acids
Session 24 (Week 24)	Fermentation Production of organic acid; Lactic acid
Session 25 (Week 25)	Fermentation Production of organic acid; Acetic acid
Session 26 (Week 26)	Fermentation production of antibiotics, steroid s
Session 27 (Week 27)	Production of vaccines from microbes
Session 28 (Week 28)	Gen cloning (recombinant DNA)
Practical work (one/week)	1-Laboratory regulations: -Equipment and aids in microbiology labs. 2-Determination of minimum inhibitory concentration (MIC) 3- Determination of minimum bactericidal concentration (MBC) 4-Assessment of bacterial sensitivity to antibiotics. 5- Assessment of bacterial resistance to antibiotics. 6- Practicing the fermentation technique



	Final practical exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	By the end of the course the students will have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in this course
Course Change	Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students if happen. Timetables also will be revised continuously.

Hospital pharmacy

1	Course name	Hospital pharmacy
2	Course Code	PH308
3	Course type: /general/specialty/optional	Specialty
4	Accredited units	3 units (2 hr. lecture, 1 lab /week)
5	Educational hours	4 hrs/week
6	Pre-requisite requirements	Pharmacology I,II and pharmaceutics
7	Program offered the course	Bachelor's degree in Pharmaceutical Sciences
8	Instruction Language	English Language
9	Date of course approval	12/2021



Brief Description:	Teaching of the syllabus will be in accordance with current Libyan regulation and WHO proposals. This course will provide students with a fundamental understanding of the national and international legislation and law in pharmacy. activities of the pharmacist. Good Storage Practice. Classifications of hospitals, its function and pharmacy department. Drug information center. Large volume medications and principles of radio pharmaceuticals and radiopharmaceuticals. As well as the use of nuclear radiation in the management of some disease.
Textbooks required for this Course:	1. Modern dispensing and hospital pharmacy. N K Jain, G D Gupta 2018 2. Hospital pharmacy sciences 3. Aulton's pharmaceuticals 4. Sciences direct website 5. Additional Resources: Lectures Notes
Course Duration	24 weeks
Delivery	Lectures (Tools: board, data show, video). Practical classes (Lab experiments+ preparation and sterilization of normal saline, evaluation of prescription form,
Course Objectives:	At the end of the course students will be able to: - Explain local and international legalization in the field of pharmacy. - Describe the organization structure of hospital and hospital pharmacy. - Understand the manufacturing practice of various large volume medications. - Understand the admixtures and incompatibilities of medications. - Describe the management of inventory control in the hospital pharmacy. - Classify the radioactive materials and understanding their clinical uses .
Course Assessments	- Midyear exam 20% - Quizzes, reports, presentation 10% - Lab activities, exam 10% - Final Practical exam 20% - Final theoretical exam 40% - Total 100%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1 (Week 1)	Unit I: Outlines of pharmacy legislation including Local regulations. (4 hr.)
Session 2 (Week 2)	Outlines of pharmacy legislation including Local regulations.
Session 3 (Week 3)	Unit II: Pharmacy as a system in health –care delivery. (8 hr.) - Introduction. -The scope of pharmacy & activities of the pharmacist: - The procedure for procurement & warehousing of drugs and pharmaceuticals in the hospitals



Session 4 (Week 4)	-The scope of pharmacy & activities of the pharmacist: - The responsibility of the hospital pharmacist. - Different methods of drug distribution systems in hospitals. - The procedure for Distribution of Narcotic and other controlled substances
Session 5 (Week 5)	-The scope of pharmacy & activities of the pharmacist. - Hospital pharmacist's participation in continuing education programme. - inventory control, methods and types of inventory control.
Session 6 (Week 6)	- Pharmacy as a profession.
Session 7 (Week 7)	Unit III: Storage of medical products. (5 hr.) including: - outlines of Good Storage Practice (GSP).
Session 8 (Week 8)	- Outlines of Good Storage Practice (GSP).
Session 9 (Week 9)	- Outlines of Good Storage Practice (GSP). Unit IV: Hospital and its organization: (7 hr.) - The hospital and its requirements.
Session 10 (Week 10)	- Classifications of hospitals. - Functions of hospitals. - The hospital pharmacy department.
Session 11 (Week 11)	Midterm exam
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	- The practices of hospital pharmacist in hospital.
Session 16 (Week 16)	- Location, facilities and personal. - The pharmacy and therapeutic committee.
Session 17 (Week 17)	Unit VI: Drug information center (DIC): (6 hr.) - Primary source of information. - Secondary source of information. - Tertiary source of information.
Session 18 (Week 18)	- Guidelines to establish (DIC) in hospitals. - Services offered by DIC.
Session 19 (Week 19)	- Common faults in advising patients. - The hospital formulary.
Session 20 (Week 20)	Unit VII: In-patient pharmacy service: (6 +2hr.) - Fluid and electrolyte therapy.
Session 21 (Week 21)	- Fluid and electrolyte therapy.
Session 22(Week 22)	- Fluid and electrolyte therapy. - Parenteral nutrition.
Session 23 (Week 23)	Unit VIII: Parenteral admixtures and incompatibilities. (3 hr)
Session 24 (Week 24)	Unit IX: Methods of I.V administration and sets including flow rates, & flow control. (5 hr.)



Session 25 (Week 25)	- Methods of I.V administration and sets including flow rates, & flow control.
Session 26 (Week 26)	Unit X: Radio pharmacy: (6 hr.) - Introduction. - importance of radiopharmaceuticals, frequently used radio pharmaceuticals in the hospital.
Session 27 (Week 27)	- Therapeutic and diagnostic radiopharmaceuticals in pharmacy
Session 28 (Week 28)	- The method for handling radiopharmaceuticals in hospital. - Radio-pharmaceutical quality control.
Practical work	Part II: Practical in Hospital Pharmacy: (One lab/ week) 1) Test for pyrogens on water for injection. 2) Evaluation of the plastic transfusion bottles used for large volume parenterals. 3) Operation of the sterilization equipment (Autoclave). 4) Test for hydrolytic resistance of glass containers used for parenterals. 5) Evaluation of prescription form. 6) Preparation and sterilization of normal saline IP. 7) Preparation and sterilization of dextrose injection IP. 8) Study of drug profile of radiopharmaceuticals. 9) Study of poisons information service. 10) Study of drug information service.
Session 29(Week 29)	Final Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.



مقررات السنة الرابعة



Pharmaceutical Biotechnology

1	Course name	Pharmaceutical biotechnology
2	Course Code	PH 401
3	Course type: /general/specialty/optional	2 hours theory
4	Accredited units	2 units
5	Educational hours	2 hours/week
6	Pre-requisite requirements	Biology
7	Program offered the course	Department of biomedical science
8	Instruction Language	English
9	Date of course approval	12/2021



Brief Description:	<ul style="list-style-type: none"> • Biotechnology has a long promise to revolutionize the biological sciences and technology. • Scientific application of biotechnology in the field of genetic engineering, medicine and fermentation technology makes the subject interesting. • Biotechnology is leading to new biological revolutions in diagnosis, prevention and cure of diseases, new and cheaper pharmaceutical drugs. • Biotechnology has already produced transgenic crops and animals and the future promises lot more. • It is basically a research-based subject. 												
Textbooks required for this Course:	<ol style="list-style-type: none"> 1. B.R. Glick and J.J. Pasternak: Molecular Biotechnology: Principles and Applications of Recombinant DNA: ASM Press Washington D.C. 2. RA Goldshy et. al., : Kuby Immunology. 3. J.W. Goding: Monoclonal Antibodies. 4. J.M. Walker and E.B. Gingold: Molecular Biology and Biotechnology by Royal Society of Chemistry. 5. Zaborsky: Immobilized Enzymes, CRC Press, Degraland, Ohio. 6. S.B. Primrose: Molecular Biotechnology (Second Edition) Blackwell Scientific Publication. 7. Stanbury F., P., Whitakar A., and Hall J., S., Principles of fermentation technology, 2nd edition, Aditya books Ltd., New Delhi 												
Course Duration	28 weeks												
Delivery	<ul style="list-style-type: none"> • Lecture-based, Group interaction and discussion, Use of video technique, practical classes. 												
Course Objectives:	<p>Upon completion of the subject student shall be able to;</p> <ol style="list-style-type: none"> 1. Understanding the importance of Immobilized enzymes in Pharmaceutical Industries 2. Genetic engineering applications in relation to production of pharmaceuticals 3. Importance of Monoclonal antibodies in Industries 4. Appreciate the use of microorganisms in fermentation technology 												
Course Assessments	<table> <tr> <td>- Midyear exam</td> <td>20%</td> </tr> <tr> <td>- Quizzes, reports, presentation</td> <td>10%</td> </tr> <tr> <td>- Lab activities, exam</td> <td>10%</td> </tr> <tr> <td>- Final Practical exam</td> <td>20%</td> </tr> <tr> <td>- Final theoretical exam</td> <td>40%</td> </tr> <tr> <td>- Total</td> <td>100%</td> </tr> </table>	- Midyear exam	20%	- Quizzes, reports, presentation	10%	- Lab activities, exam	10%	- Final Practical exam	20%	- Final theoretical exam	40%	- Total	100%
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- Quizzes, reports, presentation	10%												
- Lab activities, exam	10%												
- Final Practical exam	20%												
- Final theoretical exam	40%												
- Total	100%												
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage												
Session 1 (Week 1)	<p>Unit I (10 Hours)</p> <p>a) Brief introduction to Biotechnology with reference to Pharmaceutical Sciences.</p>												



	b) Enzyme Biotechnology- Methods of enzyme immobilization and applications.
Session 2 (Week 2)	c) Biosensors- Working and applications of biosensors in Pharmaceutical Industries. d) Brief introduction to Protein Engineering. e) Use of microbes in industry. Production of Enzymes- General consideration -Amylase, Catalase, Peroxidase, Lipase, Protease, Penicillinase.
Session 3 (Week 3)	f) Basic principles of genetic engineering.
Session 4 (Week 4)	g) Brief introduction to PCR.
Session 5 (Week 5)	h) Study of cloning vectors, restriction endonucleases and DNA ligase. i) Overview protein and protein chemistry.
Session 6 (Week 6)	j) Protein extraction and protein purification (chromatography)
Session 7 (Week 7)	k) protein assay and electrophoresis (agarose and SDS-PAGE)
Session 8 (Week 8)	Unit II (10 hours) a. Florescence protein, FRET and using fluorescence in measurement drug protein interaction.
Session 9 (Week 9)	b) Recombinant protein
Session 10 (Week 10)	c) Recombinant DNA technology. Application of genetic engineering in medicine. c) Application of r DNA technology and genetic engineering in the production of: i) Interferon ii) Vaccines- hepatitis- B
Session 11 (Week 11)	
Session 12 (Week 12)	Assessment
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	iii) Hormones-Insulin.
Session 16 (Week 16)	d) Brief introduction to PCR
Session 17 (Week 17)	Unit III (10 Hours) Types of immunity- humoral immunity, cellular immunity a) Structure of Immunoglobulins b) Structure and Function of MHC
Session 18 (Week 18)	c) Hypersensitivity reactions, Immune stimulation, and Immune suppressions. d) General method of the preparation of bacterial vaccines, toxoids, viral vaccine, antitoxins, serum-immune blood derivatives and other products relative to immunity.
Session 19 (Week 19)	e) Storage conditions and stability of official vaccines
Session 20 (Week 20)	f) Hybridoma technology- Production, Purification and Applications g) Blood products and Plasma Substituties
Session 21 (Week 21)	Unit IV (08Hours)



	a) Immuno blotting techniques- ELISA, Western blotting, Southern blotting. b) Genetic organization of Eukaryotes and Prokaryotes
Session 22 (Week 22)	c) Microbial genetics including transformation, transduction, conjugation, plasmids and transposons.
Session 23 (Week 23)	d) Introduction to Microbial biotransformation and applications.
Session 24 (Week 24)	e) Mutation: Types of mutation/mutants.
Session 25 (Week 25)	Unit V (07 Hours) a) Fermentation methods and general requirements, study of media, equipments, sterilization methods, aeration process, stirring.
Session 26 (Week 26)	b) large scale production fermenter design and its various controls. c) Study of the production of - penicillins, citric acid, Vitamin B12, Glutamic acid, Griseofulvin,
Session 27 (Week 27)	c) Study of the production of - penicillins, citric acid, Vitamin B12, Glutamic acid, Griseofulvin.
Session 28 (Week 28)	d) Blood Products: Collection, Processing and Storage of whole human blood, dried human plasma, plasma Substitutes.
	Final theoretical Exam.
Practical work (one/week)	1. Competent bacteria (Top 10 and BL21). 2. Insert plasmid in competent bacteria. 3. protein production and purification (affinity column). 4. Assay protein.
	Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.



Clinical Pharmacy

1	Course name	Clinical Pharmacy
2	Course Code	PH402
3	Course type: /general/specialty/optional	general
4	Accredited units	4 units (3 hrs/week theoretical 2 hrs/week practical)
5	Educational hours	5 hours/week
6	Pre-requisite requirements	Pharmacology 1& 2
7	Program offered the course	Department of Pharmaceutical Care
8	Instruction Language	English
9	Date of course approval	12/2021
Brief Description:		<ul style="list-style-type: none"> The common diseases covering etiology, clinical picture, diagnosis, investigations, and therapy
Textbooks required for this Course:		<ul style="list-style-type: none"> Patient Assessment in Clinical Pharmacy Applied Therapeutics: The Clinical Use of Drugs. Marry Anne Koda-Kimble Pharmacotherapy: A Pathophysiologic approach - Joseph T. Dipiro et al. Appleton & Lange
Course Duration		28 weeks
Delivery		Lecture-based, Group interaction and discussion, medical clerkshipetc.
Course Objectives:		<p>By the end of the course, students should be able to:</p> <ul style="list-style-type: none"> Understanding the pathophysiology of selected disease states Understanding the rationale for drug therapy and the management of a range of acute and chronic conditions. Identifies Drug Therapy Problems (DTPs) Makes Clinical Decisions through individualizing therapeutic plans. Skills in the critical evaluation of a range of health services literature
Course Assessments		<ul style="list-style-type: none"> - Midyear Exam 20% - Quizzes, reports, presentation 10% - Practical exam and 10% - Final Practical Exam. 20% - Final Theoretical Exam 40%



	- Total	100%
Session 1 (Week 1)	Introduction to the Patient Care Process:	
	<ul style="list-style-type: none"> • Definition of clinical pharmacy. • Define and understand the role of the patient care process in providing care. • Describe the components of comprehensive patient history taking. • Apply a process to assess a patient for drug-related problems. • Outline the components of patients' comprehensive care plans. • Develop appropriate documentation of patient care. 	
Session 2 (Week 2)	Principles of Patient Assessment	
	<ul style="list-style-type: none"> • Describe the role of patient assessment in pharmacy practice. • Describe the steps of symptoms assessment. • Physical Assessment skills for Pharmacists • List available comprehensive guides to physical assessment. 	
Session 3 (Week 3)	Critical Care Assessment:	
	<ul style="list-style-type: none"> • Describe the role of the pharmacist in the intensive care unit (ICU) and in the care of critically ill patients • Describe the steps of critical care assessment, including collecting patient history, assessing the history of present illness, and conducting a review of systems Apply knowledge of routes of administration, intravenous compatibility, and pharmacokinetic. • Changes in the critically ill to ensure effective and safe medication delivery to the patient. 	
Session 4 (Week 4)	Drug interactions and adverse drug reactions	
Session 5 (Week 5)	Clinical pharmacokinetics and therapeutic drug monitoring of selected drugs (Vancomycin, Aminoglycosides, digoxin, theophylline, carbamazepine)	
Session 6 (Week 6)	Drug therapy in special populations: Pregnancy, Lactation, Pediatric, Geriatric:	
	<ul style="list-style-type: none"> • Describe the goals of therapy and management strategy for menopause. • Assess women for menopausal symptoms and who may be considering hormone therapy. • Describe the goals of therapy and the therapeutic options for women seeking hormonal contraceptives. • Assess women who are seeking combined hormonal contraception. 	
Session 7 (Week 7)	Drug therapy in special populations: Pregnancy, Lactation, Pediatric, Geriatric:	
	<ul style="list-style-type: none"> • Recognize challenges related to patient assessment that are unique to pediatrics and neonatology. • Describe the required components of a complete pharmacy assessment that are unique to pediatrics and neonatology. • Gain a basic understanding of the differences in pediatric assessment as it relates to vital signs and common laboratory parameters • Describe the process of comprehensive geriatric assessment. • Identify the domains of comprehensive geriatric assessment. • Describe practical tools that pharmacists cause in their assessment of older adults. 	



Session 8 (Week 8)	Drug management of endocrine disorders: Diabetes Mellitus. <ul style="list-style-type: none"> • Describe the diagnostic criteria and tests for diabetes. • Describe glycemic control targets for different populations with diabetes. • Describe treatment options for patients with diabetes. • Apply various tests to assess glycemic control. • Describe hypoglycemia, its symptoms and its treatment, and how to avoid it.
Session 9 (Week 9)	Drug management of cardiovascular disorders: Dyslipidemia: <ul style="list-style-type: none"> • Understanding the pathophysiology and its classifications and Major Risk Factors • Identify appropriate standards for the diagnosis of dyslipidemia and determine risk and prognosis for developing cardiovascular disease. • Outline the management and treatment lines of hyperlipidemia
Session 10 (Week 10)	Hypertension: <ul style="list-style-type: none"> • Understanding approach of assessing a patient with hypertension. • To outline the various methods of diagnosis and monitoring for those with hypertension. • To outline appropriate follow-up and monitoring parameters for patients with hypertension. • Complications of Hypertension • General Management of hypertension and Special patient groups • Resistant hypertension, hypertensive urgencies, and emergencies
Session 11 (Week 11)	Assessment
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	Heart Failure: <ul style="list-style-type: none"> • To define heart failure (HF) • To review the diagnosis of HF including common signs and symptoms, risk factors and common diagnostic tests • To highlight goals of therapy in patients with HF • To outline a general approach to a patient with HF including initial assessment and ongoing evaluation and monitoring • To provide an approach to pharmacotherapy in HF including parameters for initiation and titration of therapy.
Session 16 (Week 16)	Coronary heart disease: <ul style="list-style-type: none"> • Pathophysiology of disease. • Clinical presentation and diagnosis. • Modifiable and non-modifiable Risk factors • Clinical syndromes • Medical management and prevention • Evaluation of therapeutic outcomes.



Session 17 (Week 17)	Thrombosis: <ul style="list-style-type: none"> • clinical manifestations of venous thromboembolism • pulmonary embolism • management of bleeding and excessive anticoagulation • general approach to the treatment • of venous thromboembolism. treatment of venous • thromboembolism in special populations. • clinical presentation and diagnosis of hit & pharmacologic treatment options
Session 18 (Week 18)	Stroke: <ul style="list-style-type: none"> • Pathophysiology and classification • Etiology and Risk factors. • Clinical presentation (including diagnostic considerations. • General approach to treatment. • general information regarding safety and efficacy • Use available parameters to measure and monitor target lipid goals for patients under treatment for dyslipidemia. Review recommendation of pivotal clinical trials).
Session 19 (Week 19)	Drug management of respiratory disorders: Asthma: <ul style="list-style-type: none"> • Describe the epidemiology, risk factors, clinical presentation, and diagnosis of asthma. • Describe the goals of therapy and management strategies for asthma. • Conduct an initial assessment of patients newly diagnosed with asthma. • Describe the role of inhaled medications and optimal inhalation device use in asthma management. • Conduct a follow-up assessment of patients with asthma.
Session 20 (Week 20)	Chronic Obstructive Pulmonary Disease: <ul style="list-style-type: none"> • Non-specific & specific immunity. • Cells involved in the immune response • Types of immunoglobulin & mechanism of antibody production. • Hypersensitivity reactions. • Serological tests.
Session 21 (Week 21)	Drug management of neurological disorders: Epilepsy: <ul style="list-style-type: none"> • Describe the epidemiology, etiology, risk factors, and pathophysiology of epilepsy. • Describe the classification of different seizure types. • Conduct initial assessment of patients newly diagnosed with epilepsy. • Apply the general principles of antiepileptic drug therapy in the follow-up assessment of patients with epilepsy.
Session 22 (Week 22)	Drug management of psychiatric disorders: Depression:



	<ul style="list-style-type: none"> • Describe the disease burden, epidemiology, diagnosis, prognosis, and management of major depressive disorder and other depressive disorders. • Conduct initial assessment of patients who present with new diagnosis of depression or who are suspected of having depression but have not been formally diagnosed. • Outline monitoring parameters and follow-up plans for patients using pharmacological therapy to manage their depression. • Provide guidance to patients on how to manage partial/non-response or adverse effects of medications.
Session 23 (Week 23)	<p>Drug management of bone and joint disorders:</p> <p>Osteoporosis:</p> <ul style="list-style-type: none"> • Assess fracture risk in patients using bone mineal density and risk factors. • Identify potential complications from osteoporosis drug therapy. • Assess appropriate monitoring parameters in osteoporosis including lab work and imaging. <p>Rheumatoid Arthritis:</p> <ul style="list-style-type: none"> • Describe the epidemiology, etiology, clinical presentation, and diagnosis of rheumatoid arthritis. • Describe the goals of therapy and the management strategy for rheumatoid arthritis. • Conduct an initial assessment of a patient newly diagnosed with rheumatoid arthritis. • Conduct a follow-up assessment of a patient on disease-modifying ant rheumatic drug therapy, considering the regimen’s effectiveness and safety and the patient’s ability to adhere
Session 24 (Week 24)	<p>Drug management of infectious diseases:</p> <ul style="list-style-type: none"> • Describe the core elements of approach to infectious disease assessment. • Describe the use of empiric, definitive, and prophylactic antimicrobial therapies. • Describe the use of an antibiogram. • Describe the approach to interpretation of culture results.
Session 25 (Week 25)	<p>CNS infection:</p> <ul style="list-style-type: none"> • Pathophysiology of CNS infections ⊗ • Most common pathogens & risk factors • Antibiotic selection issues • Appropriate empirical antimicrobial regimens • Prevention strategies • Adjunctive therapy • Components of monitoring plan
Session 26 (Week 26)	<p>Oncology:</p> <ul style="list-style-type: none"> • Pathophysiology, Type of cancer and risk factors • Diagnosis and staging of tumor cancer • Clinical presentation and Complications of Malignancy



	<ul style="list-style-type: none"> • Oncology management. Combination chemotherapy, Adjuvant Chemotherapy, Neoadjuvant chemotherapy. • Complication of cancer chemotherapy.
Session 27 (Week 27)	<p>Leukemia and Lymphoma:</p> <ul style="list-style-type: none"> • Types and symptoms • Risk factors and diagnostic methods, • Management of therapy, <p>Chronic Non-cancer pain:</p> <ul style="list-style-type: none"> • To identify key features of chronic non-cancer pain as a pathological form of pain • To review assessment strategies that allow the clinical pharmacist to assess pain and evidence of reduced coping in chronic pain Patients. • To link pain and coping assessments to pharmacotherapy optimization and management
Session 28 (Week 28)	<p>Drug management of anemia:</p> <ul style="list-style-type: none"> • Describe the classification of anemia. • Complete a patient assessment and interpret laboratory findings to determine the most likely cause of anemia. • Apply a monitoring and follow-up plan for patients initiated on treatment for anemia.
Practical Part:	<p>➤ Practical Part:</p> <p>Clinical pharmacy Clerkship: the fundamental goal of the clinical pharmacy clerkship is to provide a structured, practical and closely supervised professional experience that enables the students to better assume their future role as a competent clinical pharmacist. This goal includes the development of professional judgment, pharmaceutical care practice competencies and technical skills. At the completion of clerkship, the students should be able to demonstrate competencies in the following areas</p> <ul style="list-style-type: none"> ➤ To obtain accurate medication histories & gather other relevant patient's data. ➤ To learn medical terminologies commonly used by health care professionals in the patient care areas. ➤ To learn interpretation of common clinical laboratory tests. ➤ To perform effective drug regimen reviews and identify actual and potential medication – related problems. ➤ To develop a pharmaceutical care plan for the patient. ➤ To recommend a therapeutic drug monitoring plan, including drug concentration monitoring and indicators of efficacy and toxicity. ➤ To assess drug therapy regimen in a patient with alter renal or hepatic function. ➤ To demonstrate an awareness of the assessment skills in areas necessary to monitor medication outcomes.



	<ul style="list-style-type: none"> ➤ Communicate effectively with health care professionals and others both orally and in ➤ To perform complete and accurate patient counseling and enhance patient education and compliance. ➤ To provide drug information to health care professionals and patients and to demonstrate competencies in the following areas: <ul style="list-style-type: none"> • Indication – specific prescribing practice • Appropriate drug dosage selection • Appropriate dosage – form selection • Drug use in pregnancy • Drug use in pediatrics • Drug use in geriatrics • Dosage adjustment in renal impairment • Dosage adjustment in hepatic impairment • Management of drug interactions • Detection & management of adverse reaction & drug induced diseases. ➤ To demonstrate professional attitude, motivation and ethics. ➤ To demonstrate the fundamental knowledge of pharmacotherapeutics in the areas necessary to provide the service. ➤ To provide the student opportunities to engage in scholarly activities (i.e, special projects, presentations, research activities).
	Final Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.
	<p>Description / routine activities of students during the clerkship</p> <ul style="list-style-type: none"> • Student will perform the following activities during clerkship rotations: <ul style="list-style-type: none"> ○ Taking history from the patient with special emphasis on medication history. ○ Participation in Medical Rounds to learn how health care professionals. ○ Assess/ identify patient's disease and medication related problems

- Treat/ resolve actual disease and medication related problems
- Prevent potential disease and medication related problem
- Learning medical terminologies commonly used by health care professionals in patient- care areas.
- Developing written and oral communication skills i.e. how to communicate effectively with health care professionals and others, both orally and in writing.
- Monitoring patient compliance status & adherence to drug therapy and to identify the factors responsible for non-compliance.
- Patient education and counseling to improve compliance during patient stay at the hospital and at the time of discharge.
- Reviewing patient medication therapy in the ward in order to learn how health care professionals diagnose/ detect/ identify & manage the following medication related problems.
 - Untreated conditions(s)
 - Drug(s) without indication(s)
 - Improper drug selection/ taking wrong drug
 - Sub therapeutic dose
 - Excessive dose
 - Improper duration
 - Drug(s) not administered/ Failure to receive medication
 - Drug interactions
 - Adverse drug reactions/ intolerances
 - Requiring dose adjustment in renal impairment.
 - Requiring dose adjustment in hepatic impairment
 - Therapeutic duplication
 - Pregnancy/ lactation related problem(s)
 - Inappropriate dosage-form/ route of administration
 - Non-compliance
 - Use of narrow therapeutic index drug(s) without monitoring
 - Polypharmacy
 - Cost related problems
 - Miscellaneous medication related problems
- Developing pharmaceutical care plan for the patient.
- Learning how to provide Drug information to the patients and health care professionals.
- Any other activity which the supervisor considers necessary to be performed by the students.

Toxicology and First aid

1	Course name	Toxicology and First aid
2	Course Code	BH403
3	Course type: /general/specialty/optional	Specialty
4	Accredited units	3 Units (Theoretical 2 Lecture/Week Practical 2 hours/Week)
5	Educational hours	5 hr/week
6	Pre-requisite requirements	Pass in Pharmacology and Therapeutics
7	The program offered the course	B.Sc. in Pharmaceutical Sciences
8	Instruction Language	English
9	Date of course approval	12/2021

Brief Description:	This course will provide students with a fundamental understanding of the basic principles of molecular, systemic, clinical, and environmental toxicology and their applications. To know the basic principles of emergency medicine.
Textbooks required for this Course:	<ol style="list-style-type: none"> 1. Casarett & Doull's: The Basic Science of Poisons (7th Edition) 2. Loomis's Essentials of Toxicology (4th Edition) Lu's Basic Toxicology Fundamentals, Target Organs, and Risk Assessment, Seventh Edition 3. Clinical Toxicology and antidotal therapy 4. Science Toxicology: A Case-Oriented Approach John Joseph Fenton 5. http://www.benghazi.edu.ly/ 6. http://toxnet.nlm.nih.gov/ 7. Practical notes
Course Duration	28 weeks
Delivery	Lectures Practical classes (Lab experiments+ computerized experiments simulation) Tutorials and group discussions E- Tutorials (if applicable)



	<p>Presentations Assignments (if applicable) Videos. Case studies</p>												
Course Objectives:	<p>A. Knowledge and understanding: 1a-Illustrate different routes of exposure to toxicants, their metabolic pathways, and experimental techniques used to assess their harmful effects on the cellular organ system and the whole body. 2a-Classify toxic agent and environmental toxic substances that have known effects on individuals or populations. 3a- Know about the laboratory analysis and how to identify drugs or toxins 4a- Understand and know how to diagnose properly and what the emergency management of acute poisoning.</p> <p>B. Intellectual Skills: 1b- Analyze, evaluate, and interpret toxicological information in daily practice e.g., information regarding overdoses of drugs and management of poisoning. 2b- Recognize different populations at risk due to toxic agent exposure, occupational and environmental exposure. 3b-Know how to give emergency help to avoid death and complication and how to treat the complication. 4c- Assessing the poisoned patient with taking a history, Clinical Examination.</p> <p>C. Professional and Practical Skills: 1c- Assess the relative toxicity or safety of various compounds. 2c-Use different materials and techniques in first aid properly.</p> <p>D. General and Transferable Skills: 1d-Design a research project using biological assay methods. 2d-Interpret, critically analyze, and discuss different experimental results and research papers. 3d-Provide advice and help in poisoning and emergency cases.</p>												
Course Assessments	<table> <tr> <td>- Midyear exam</td> <td>20%</td> </tr> <tr> <td>- Quizzes, reports, presentation</td> <td>10%</td> </tr> <tr> <td>- Practical continuous assessment, exam</td> <td>10%</td> </tr> <tr> <td>- Final Practical exam</td> <td>20%</td> </tr> <tr> <td>- Final theoretical exam</td> <td>40%</td> </tr> <tr> <td>- Total</td> <td>100%</td> </tr> </table>	- Midyear exam	20%	- Quizzes, reports, presentation	10%	- Practical continuous assessment, exam	10%	- Final Practical exam	20%	- Final theoretical exam	40%	- Total	100%
- Midyear exam	20%												
- Quizzes, reports, presentation	10%												
- Practical continuous assessment, exam	10%												
- Final Practical exam	20%												
- Final theoretical exam	40%												
- Total	100%												
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage												
Session 1 (Week 1)	<p>General toxicology Introduction to toxicology, Definitions of terms, Basic principles of toxicology: Areas of toxicology, Spectrum of the toxic dosage, Classification of toxic agents. Characteristic of exposure, Type of exposure, Toxic effects, Characteristic of Toxic Effect, Dose response curve, LD50, Mechanisms of selective toxicity. Animal toxicity testing</p>												



	Toxicokinetics , Toxicodynamics, Type of interactions
Session 2 (Week 2)	Mechanisms of cellular injury and Factors affecting Toxicity.
Session 3 (Week 3)	Genetic Toxicity; Introduction to genetics, The targets of DNA damages. Types of DNA Damages and damaging agents. Responses of the cell to DNA damage. DNA repair mechanisms. mutation and types of mutations (small and large genetic anomalies)
Session 4 (Week 4)	Examples of genetic defects and pattern of inheritance of genetic defects. mutation and cancer. mutagen testing system (genotoxicity tests).
Session 5 (Week 5)	Chemical Carcinogenesis; definition of terms, the major genetic properties of cancer (hallmarks of cancer), Classification of carcinogens, Types of chemical carcinogens (genotoxic and nongenotoxic carcinogens). Mechanism of carcinogenesis (multistage process).
Session 6 (Week 6)	International regulations of the testing procedure required for the safety of chemicals and pharmaceuticals for human use. Developmental toxicology; Teratogenesis Definitions of terms. Principles of Teratology. Normal morphological development. Factors that affect teratogenicity.
Session 7 (Week 7)	Mechanisms of Teratogenic effects. Patterns of dose exposure. Factors that modify the developmental toxicity of xenobiotics.
Session 8 (Week 8)	Systemic toxicology: Toxic response of the blood; Hematopoiesis, Toxicology of the erythrocytes and toxicology of platelets and hemostasis. Toxic response of the respiratory system; Structure of the respiratory tract, Pulmonary physiology, Classification of inhaled toxic materials, Factors influence regional deposition. Defense mechanisms. Acute pulmonary injury and Chronic pulmonary injury.
Session 9 (Week 9)	Toxic response of the heart and vascular system; Cardiac electrophysiology, General mechanisms of cardiac toxicity, Cardiotoxic agents. Toxic responses of the eye; External contact agents, Systemic drug affecting the cornea and Some drugs that affect the lens and retina.
Session 10 (Week 10)	Toxic responses of the Kidney; Site of action of nephrotoxicants and Nephrotoxicants therapeutic agents. Toxic responses of the Liver; Mechanism of liver injury and Factors involved in liver injury
Session 11 (Week 11)	Midterm Assessment
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	Toxic responses of the Nervous system; Patterns of neurotoxic injury. Compounds associated with different type of neurotoxic injury. Toxic responses of the Skin; Skin histology, Percutaneous absorption. Biotransformation.



	Contact dermatitis, Chemical burns, Photo toxicology, Acne, Pigmentary disturbance, and Skin cancer.
Session 16 (Week 16)	Toxic responses of the immune system. -the concept of immunomodulation. -immunosuppression: halogenated aromatic hydrocarbons, polychlorinated biphenyls, polycyclic aromatic hydrocarbons, nitrosamines, inhaled substances, mycotoxins, natural and synthetic hormones, therapeutic agent, electromagnetic fields and ultraviolet radiation. -immune-mediated diseases.
Session 17 (Week 17)	Toxic agents. A-Heavy metals, Heavy Metals, Sources, Chemical forms, Site of action and Mechanism of toxicity. Absorption, Distribution, Elimination, and Excretion Types of heavy metal intoxication and Treatment of heavy metal toxicity 1-Arsenic: Mechanism of action, Clinical presentation, and Management 2-Lead: Mechanism of action, Mechanism of action, Clinical presentation, and Management 3-Mercury: Mechanism of action, Clinical presentation, and Management
Session 18 (Week 18)	B-Pesticides: 1-Insecticides: Classification of insecticides: a-Organochlorinated, b- anticholinesterase, and c-pyrethroids Pesticides 2-Herbicides. 3-Rodenticides
Session 19 (Week 19)	Environmental Toxicology. Air pollution, Water, and soil pollution. Food pollution.
Session 20 (Week 20)	Plant and animal toxin. Occupational toxicology Risk assessment
Session 21 (Week 21)	Clinical Toxicology
Session 22 (Week 22)	Clinical Toxicology continues.
Session 23 (Week 23)	Forensic Toxicology
Session 24 (Week 24)	Fist Aids: Introduction; Definitions; purpose of first aid-fixing of priorities in first aid, how to confront an emergency. Medical emergency cards and symbols. Physical injuries, signs and symptoms and first aid treatment [2] Abrasion, Wounds-classification, and Concussion.
Session 25 (Week 25)	Bleedings -types (capillary, venous, arterial) and differences, examples of manifest and concealed bleedings, methods of stopping bleedings- different pressure points included. Muscle disorders Fractures , definitions, types, causes, general methods of immobilization, transfer to hospital. Dislocations , important dislocations, and methods of correction (shoulder, mandible, finger)
Session 26 (Week 26)	Foreign bodies; Sign and symptoms, methods of removal; foreign bodies in skin, eyes, nose, ear, stomach, respiratory tract- phases and methods to remove. Water drowning; Types, prophylaxis and pathophysiology of fresh water and saline-water drowning, treatment (FA) and management.



	<p>Accidents with chemicals:</p> <p>(a) Chemical burns-acid and alkali burns, prevention and first aid management.</p> <p>(b) Acute poisoning-causes and management, methods of decreasing absorption, removal from body, antidotes.</p> <p>(c) Nerve gas- signs and symptoms and treatments.</p>
Session27 (Week 27)	<p>Emergencies with temperature</p> <p>(a) Frost bite- signs and symptoms and treatment.</p> <p>(b) Sun stroke (head stroke), causes, susceptible persons, treatment.</p> <p>(c) Heat burns-types (steam, hot water, fire)</p> <p>Animal bites</p> <p>Signs and symptoms and first aid management and prophylaxis.</p> <p>Bee bite, scorpion, snakes: classification of types and differentiation between poisonous and nonpoisonous snakes, poisonous spiders. Dogs bite-prophylaxis and treatment.</p>
Session 28 (Week 28)	<p>Complications and their treatment [1]</p> <p>(i) Shock.</p> <p>(ii) Acute respiratory arrest</p>
Session 29 (Week 29)	<p>(iii)Acute cardiac arrest.</p> <p>(iv)Coma</p> <p>(v)Convulsions.</p>
Final Exam	
Practical Work 2hr /week	<p>1-Lethality studies and determination of LD50.</p> <p>2-Toxic response of the blood.</p> <p>3-Corrosives and irritants.</p> <p>4-CNS stimulants.</p> <p>5-Carbon monoxide and cyanide.</p> <p>6-Picrotoxin and strychnine poisoning.</p> <p>First Aid practical.</p>
Attendance Expectations	<p>Students are expected to attend every session of class, arriving on time.</p> <p>Absences are permitted only for medical reasons and must be supported with a doctor's note.</p>
Generic Skills	<p>Independent learning, critical thinking, and problem solving.</p> <p>Basic IT and presentation skills.</p> <p>Integration of different fields of knowledge.</p> <p>Team working.</p> <p>Communication skills.</p>
Course Change	<p>The details of course contents are updated according to the outcomes of new research and published paper. Content of the courses is revised on an ongoing basis to ensure that the course fit the graduation competences and community needs. Any changes will be approved by the department's scientific committee and department council.</p>



Bioassay

1	Course name	Bioassay
2	Course Code	PH 404
3	Course type: /general/specialty/optional	Specialty
4	Accredited units	3 Units (Theoretical 2 Lecture/Week Practical 2 hours/Week)
5	Educational hours	4 hr/week
6	Pre-requisite requirements	Pharmacology I, II
7	The program offered the course	Department of Pharmacology and Toxicology
8	Instruction Language	English /Arabic
9	Date of course approval	12/2021

Brief Description:	To know the basic methods of bioassay and drug screening.	
Textbooks required for this Course:	No.	Reference
	1.	Drug screening methods (Editor SK Gupta)
	2.	Essentials of Bioassay & Screening of drugs (A.S. Elhwuegi& S.S. Ahmed)
	3.	Science
	4.	http://www.benghazi.edu.ly/
	5.	http://toxnet.nlm.nih.gov/
6.	Practical notes	
Course Duration	28 weeks	
Delivery	Lectures Practical classes (Lab experiments+ computerized experiments simulation) Tutorials and group discussions E- tutorials (if applicable) Presentations Assignments (if applicable) Videos.	



Course Objectives:	<p>A. Knowledge and understanding: Demonstrate the different methods of biological assays and the application of statistical tests in these assays.</p> <p>B. Intellectual Skills: Design screening methods for different drug groups.</p> <p>C. Professional and Practical Skills: Screening of newly discovered drugs.</p> <p>D. General and Transferable Skills: 1d-Design a research project using biological assay methods. 2d-Interpret, critically analyze, and discuss different experimental results and research papers.</p>	
Course Assessments	Midyear Examination	20.0%
	Practical continuous Assessment	10.0%
	Quizzes, reports, presentation	10.0%
	Final practical Examination	20.0%
	Final written Examination	40.0%
	Total	100%
Content Breakdown	Topical Coverage	
Session 1 (Week 1)	<p>Introduction Definition; assay, bioassay, standardization, biostandardization, international units. Objectives of bioassay, principles of bioassay. Requirements. Advantages and disadvantages of bioassay.</p>	
Session 2 (Week 2)	<p>Biological variation and how to reduce it. Use of controls and reference standard, Type of control. Limitation in animal experiments. How to perform bioassay.</p>	
Session 3 (Week 3)	<p>Methods of bioassay 1-Direct methods; a-Bioassay of Digitalis. b-Bioassay of D- tubocurarine 2-Graded response methods. a-Direct method techniques. b-Multiple point bioassay. (i) 3-point assay (ii) 4- point assay (iii) 6-point assay Their advantages and disadvantages. Introduction of bioassay</p>	
Session 4 (Week 4)	<p>Toxicity studies: Acute toxicity test, Sub-acute toxicity tests, Sub-chronic toxicity tests and Chronic toxicity tests. Other studies; Clinical studies and clinical trials: objectives, Principle, Phases and Sequential trials. Special Tests: Teratogenicity, Carcinogenicity.</p>	
Session 5 (Week 5)	<p>Bioassay of Hormones 1-Anterior pituitary hormones: Growth hormones, Prolactin, hormones Gonadotropic</p>	
Session 6 (Week 6)	<p>ACTH and TSH (thyrotrophin). 2-Posterior pituitary hormones: Oxytocin, Vasopressin.</p>	



Session 7 (Week 7)	3-Peripheral hormones; Insulin and methods to produce experimental diabetes, Glucogen, Corticosteroids, Calcitonin, Thyroxin,
Session 8 (Week 8)	Parathyroid hormones and Sex hormones and related drugs (Oestrogens. Progestrone, Androgens. And Anabolic Steroids).
Session 9 (Week 9)	Bioassay of Biological Products; Heparin , and Vitamins: A, D and C.
Session 10 (Week 10)	Bioassay (wherever applicable) and screening of drugs. Introduction: Definitions and typed of screening objectives and principles. Screening of drugs, type of screening.
Session 11 (W- 11)	Midterm Assessment
Session 12 (W- 12)	
Session 13 (W-13)	
Session 14 (W- 14)	
Session 15 (Week 15)	1- Simple screening, 2-Blind screening: a-Neuropharmacological observations, , b-Cardiovascular system tests. C-2-Cardiovascular system tests and 4-Tests on guinea pig ileum andvas deferens preparation. 3- Programmed screening.
Session 16 (Week 16)	Screening of important systemic drugs. a) Autonomic drugs: a) Cholinergic and anticholinergic. b) Adrenergic and ant adrenergic. c) mixture of adrenalin and nor-adrenaline. d) Ganglion blocking agents.
Session 17 (Week 17)	b) Muscle relaxants
Session 18 (Week 18)	c) Cardiovascular system Screening for antihypertensive drugs. Methods of producing experimental hypertension.
Session 19 (Week 19)	Screening for cardiotoxic drugs. Experimental methods to produce heart failure. Screening for diuretic activity.
Session 20 (Week 20)	Screening for anti-arrhythmic activity. Experimental methods to produce arrhythmias in animals. Screening for anti-anginal activity.
Session 21 (Week 21)	Drugs used for gastro-intestinal tract. Screening for anti-peptic ulcer activity. Methods to produce experimental gastro-intestinal tract. Screening for anti-diarrheal activity and Screening for purgative action of a drug.
Session 22 (Week 22)	Drugs used for central nervous system A-Psychopharmacological drugs, including experimental methods. 1- Screening for anti-psychotic activity. Drugs for schizophrenia and Antidepressant drugs 2-Screening for anti-anxiety drugs; B- Screening for hypnotic drugs, b-Screening for anticonvulsant activity-Various experimental methods.
Session 23 (Week 23)	C-Anti-parkinsonism drugs-experimental parkinsonism. D-Screening for analgesic activity-experimental pain models. E-Screening for anti-pyretic and anti-inflammatory activity-different models of



	experimental inflammation (acute and chronic).
Session 24 (Week 24)	Bioassay of histamine and other autocooids (Angiotensin, 5-HT, bradykinin, Prostaglandins
Session 25 (Week 25)	Drugs in malignancy-methods to produce experimental tumors.
Session26 (Week 26)	Miscellaneous topics. -Preliminary studies in toxicity evaluation -Study of antagonistic activity-types of antagonists-study of determination of competitive and non-competitive antagonism
Session 27 (Week 27)	-Physiological salt-solutions
Session 28 (Week 28)	-Radio-immunoassay-principles and methods
	Final Exam
Practical Work	1-Whole Animal: Irwin Primary Test Table 2-Standard Response on Cat Blood Pressure and Nictitating Membrane (Demonstration only). 3-Methods of Bioassay Models for Screening: 4-Photoelectric Cell Meter for Measurement of Spontaneous Motor Activity. 5-The Plus Maze for Screening of Anxiolytic and Measuring the SMA (Demonstration only). 6-Swimming Maze for Screening of Antidepressant Drugs. 7-Muricide behavior. 8- Final Practical Exam.
	Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	Independent learning, critical thinking, and problem solving. Basic IT and presentation skills. Integration of different fields of knowledge. Team working. Communication skills.
Course Change	The details of course contents are updated according to the outcomes of new research and published paper. Content of the courses is revised on an ongoing basis to ensure that the course fit the graduation competences and community needs. Any changes will be approved by the department' scientific committee and department council.



Medicinal chemistry II

1	Course name	Medicinal chemistry II
2	Course Code	BP405
3	Course type: /general/specialty/optional	General
4	Accredited units	4 units (3 hrs./week theoretical 2 hrs./week practical)
5	Educational hours	5 hours/week
6	Pre-requisite requirements	Medicinal chemistry I, Organic chemistry I & II, pharmacology I & II
7	Program offered the course	Department of pharmaceutical chemistry
8	Instruction Language	English
9	Date of course approval	12/2021



Brief Description:	The course includes the study of agents that used as antiseptic and disincentive, antimicrobial drugs as well as study of CNS depressant and stimulants, analgesic with knowledge of the relationship between structure and biological activity. The course also deals with the hormones and antineoplastic agents. It deals with studying the mechanism of action, synthesis and drug metabolism of some drugs.												
Textbooks required for this Course:	<ul style="list-style-type: none"> • Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry Applied Therapeutics: The Clinical Use of Drugs. • Foye's Principles of Medicinal Chemistry. • Textbook of medicinal chemistry Volume I. • Textbook of medicinal chemistry Volume II. • Experiments in Pharmaceutical Chemistry. • Advanced Practical Medicinal Chemistry. • David G Watson-Pharmaceutical and medicinal chemistry. 												
Course Duration	28 weeks												
Delivery	• Lecture-based, Group interaction and discussion, medical clerkshipetc.												
Course Objectives:	<p>By the end of the course, students should be able to:</p> <ul style="list-style-type: none"> • Mention the physicochemical properties of different drugs • Understanding the mode of action of drugs and way bonding to their receptors, and overcome adverse effect • Development and synthesize new drugs • Classify the newly discovered drugs 												
Course Assessments	<table border="0"> <tr> <td>- Midyear exam</td> <td>20%</td> </tr> <tr> <td>- Quizzes, reports, presentation</td> <td>10%</td> </tr> <tr> <td>- Lab activities, exam</td> <td>10%</td> </tr> <tr> <td>- Final Practical exam</td> <td>20%</td> </tr> <tr> <td>- Final theoretical exam</td> <td>40%</td> </tr> <tr> <td>- Total</td> <td>100%</td> </tr> </table>	- Midyear exam	20%	- Quizzes, reports, presentation	10%	- Lab activities, exam	10%	- Final Practical exam	20%	- Final theoretical exam	40%	- Total	100%
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- Quizzes, reports, presentation	10%												
- Lab activities, exam	10%												
- Final Practical exam	20%												
- Final theoretical exam	40%												
- Total	100%												
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage												
Session1(Week 1)	<p>Unit I: Chemotherapy:</p> <ul style="list-style-type: none"> • Antiseptic and disinfectants: preparation, action, uses: <ol style="list-style-type: none"> a) Benzalkonium chloride: structure, action and uses. b) Alcohols: Ethanol, Synthesis, concentration, uses as antiseptic. c) Isopropyl alcohol: structure, uses, preparation. d) Ethylene oxide: method of preparation, uses as antiseptics. e) Formalin: structure, method of preparation, uses. 												
Session 2(Week 2)	<ol style="list-style-type: none"> a) Boric acid: structure and uses. b) Gentian violet: structure, method of preparation, uses. c) Phenol: preparation, mechanism of action, uses. d) Cresol: (orth, meta, para): uses. e) Hydrogen peroxide: composition, mechanism of action as an oxidizing agent, uses. f) Chlorothymol: preparation, uses. 												



	<ul style="list-style-type: none"> g) Chloroxyleneol (Dettol)[®]: structure, uses. h) Potassium permanganate: as an oxidizing agent, concentration, uses. i) Iodine: solubility, concentration, mechanism of action, j) Silver nitrate: medical uses. k) Organic halogenated compounds as chloramine and Chloramine T: action, structure, uses. l) Mercurochrome: structure, uses.
Session 3 (Week 3)	Preservatives: <ul style="list-style-type: none"> a) Benzyl alcohol: composition, preparation, and methods of uses. b) Beta-phenyl alcohol: composition, preparation, and methods of uses. Sodium benzoate: composition, preparation, and methods of uses.
Session 4 (Week 4)	Antimicrobial and antibiotics: <ul style="list-style-type: none"> a) Sulpha drugs and miscellaneous antibacterial, general method of synthesis of sulph drugs; trimethoprim and its synthesis
Session 5 (Week 5)	<ul style="list-style-type: none"> • Antibiotics: <ul style="list-style-type: none"> a) Beta-lactam antibiotic; penicillin, cephalosporin, and beta-lactamase inhibitors. b) Chloramphenicol including stereochemistry c) Tetracycline d) Polypeptide inhibitors; Bacitracin and polymycin B (as representatives) e) Macrolide antibiotics: erythromycin (as representatives) f) vi. Miscellaneous antibiotics: Fusidic acid, lincomycin and novobiocin
Session 6 (Week6)	<ul style="list-style-type: none"> • Antimycobacterial agent: concepts of multi-drug therapy (MDT) <ul style="list-style-type: none"> a) Antitubercular agents: synthesis of PAS, INH, and ethambutol b) ii. Antileprotic drug: synthesis of dapsone
Session 7 (Week7)	<ul style="list-style-type: none"> • Antifungal agents: synthesis of miconazole.
Session 8 (Week 8)	<ul style="list-style-type: none"> • Antiviral agents and an introduction of current anti-AIDS therapy
Session 9 (Week9)	<ul style="list-style-type: none"> • Antimalarial agents: synthesis of chloroquine and primaquine • Anthelmintics: synthesis of diethylcarbamazine citrate, pyrantel pamoate, and mebendazole
Session 10 (Week10)	Antiamoebics: synthesis of metronidazole and diloxanide furoate
Session 11(Week11)	
Session 12 (Week12)	Assessment
Session 13 (Week13)	
Session 14 (Week14)	
Session 15 (Week15)	Unit II: Central nervous system depressant: <ul style="list-style-type: none"> • General anesthesia • Anxiolytic, Sedative, and hypnotic agent (synthesis of phenobarbital, diazepam, and gluethimide) <ul style="list-style-type: none"> a) Benzodiazepines. ii. Barbiturates b) Miscellaneous sedative Hypnotics <ul style="list-style-type: none"> -Amides and imides -Alcohol and their carbamate derivatives



	-Aldehydes and their derivatives
Session 16 (Week16)	<ul style="list-style-type: none"> • Antipsychotics <ol style="list-style-type: none"> a) Synthesis of chlorpromazine, and haloperidol b) Phenothiazine c) Ring analogies of phenothiazines (Thioxanthines, Dibenzoxazepines, and Dibenzodiazepines)
Session 17 (Week17)	<ol style="list-style-type: none"> a) Fluorobutyrophenones b) β-Aminoketones c) Benzamides d) Antimanic agents
Session 18 (Week18)	<ul style="list-style-type: none"> • Anticonvulsant or Antiepileptic drugs (synthesis of phenytoin, ethosuximide, carbamazepine, and valporic) <ol style="list-style-type: none"> a) Barbiturates b) Oxazolidinones c) -Succinimides d) Benzodiazepines e) Ureas and monoacylureas (Phenacemide) a) Misellaneous agents (primidone)
Session 19 (Week19)	<ul style="list-style-type: none"> • CNS depressant with skeletal muscle relaxant properties <ol style="list-style-type: none"> a) Agents used in acute muscle spasm b) Drugs used in spasticity
Session 20 (Week20)	Unit III: CNS Stimulants: <ol style="list-style-type: none"> a) Analeptics b) Methylxanthines c) Central sympathomimetic agents (Psychomotor stimulants) d) Monoamine oxidase inhibitors e) Tricyclic antidepressant compound
Session 21 (Week21)	<ul style="list-style-type: none"> • Psychedelics <ol style="list-style-type: none"> a) Indolethylamines b) 2-Phenylethylamines c) Agents possessing both indolethylamines and a phenylethylamines moiety d) Dissociative agents e) Depressant – intoxicants
Session 22 (Week22)	Unit VI: Analgesic and NSAID: <ul style="list-style-type: none"> • Narcotic analgesics <ol style="list-style-type: none"> a) Morphine derivatives b) Morphinaons and benzomorpinons c) Mepridine derivatives • Antitussive agents
Session 23 (Week23)	<ul style="list-style-type: none"> • Non-narcotic analgesics (NSAID) <ol style="list-style-type: none"> a) Salicylates b) Arylacetic acid derivatives c) Aniline and <i>P</i>-aminophenol derivatives



	d) Pyrazolone and pyrazolidinone derivatives
Session 24 (Week24)	Unit VII: Hormones: <ul style="list-style-type: none"> • Steroidal hormones (sex hormones) <ul style="list-style-type: none"> a) Male sex hormones b) Female sex hormones c) Contraceptives
Session 25 (Week25)	<ul style="list-style-type: none"> d) Adrenocorticoids e) Mineralocorticoids • Other hormones <ul style="list-style-type: none"> a) Thyroid hormone b) Pancreatic hormones c) Adrenal medulla hormones d) Pituitary gland hormones and hypothalamic hormones
Session 26 (Week26)	IX: Development of drugs (drug design): <ul style="list-style-type: none"> a) Genesis of drugs (natural sources, semisynthetic drugs, and synthetic drugs) b) Serendipity (accidental discovery) c) Random screening d) Rationally directed random screening e) Rationally directed metabolite approach f) General processes (simplification “disjunction”, replication, hybridization, and addition) g) Special processes
Session 27 (Week27)	<ul style="list-style-type: none"> • Special processes <ul style="list-style-type: none"> a) Vinylogy principle b) Increase or decrease of the alkyl chain c) Isosteric substitution (isosteres and bioisosters) d) Introduction of bulky group e) Electron withdrawing and electron donating groups f) Others
Session 28 (Week28)	<ul style="list-style-type: none"> • Soft and hard drugs • Methods of lead optimization (topless sequential methods “<i>pi, sigma, es</i>”) • Drug latentiation (Prodrugs, bioprecursors, and targeted drugs) • Antimetabolite approach Molecular modelling (docking small molecule, homology modelling and molecular dynamic)
Practical work (one/week)	➤ Practical Part: A. Analysis of different examples of pharmaceutical chemicals and pharmaceutical dosage forms according to the official methods <ol style="list-style-type: none"> 1. Anti-inflammatory (Methyl salicylate, Naproxen, Phenazone, Phenylbutazone, Indomethacin, and Aspirin) 2. Antibiotics (Amoxicillin, Penicillin, Benzyl penicillin, Cephalexin, Fusidic acid, and Cycloserine) 3. Diuretics (Ethacrynic acid, and furosemide) 4. Oral contraceptive (Ethinylestradiol, Ethisterone, and mestranol)



	<p>5. Antineoplastic (Melfhalan, Lomustine, and Chlorambucil)</p> <p>6. Hypoglycemic (Chlorpropamide, and Tolazamide)</p> <p>7. Antituberculosis (Isoniazid, and Pyrazinamide)</p> <p>8. Antihistaminic (Dimethydrinate, and Chlorpheniramine)</p> <p>9. Sedative hypnotics (Chloral hydrate, Glutethimide, and mebrobamate)</p> <p>10. Antiseptics (Mercurochrome, and Resorcinol)</p> <p>B. Analysis of active constituents of different pharmaceutical dosage forms</p> <p>1. Aerosol inhalations:</p> <ol style="list-style-type: none"> Isoprenalions sulphate inhalation: ferrous chelate formation "spectrophotometry". Albuterol inhalation: colored derivative with <i>p</i>-dimethylaminoaniline "spectrophotometry". <p>2. Creams (analysis of triamcinolone cream by isoniazid method "spectrophotometry")</p> <p>3. Ointments:</p> <ol style="list-style-type: none"> Sulphur ointment: by oxidation to thiosulphate (titration method). Benzoic and salicylic acid ointments by acid-base titration <p>4. Suppositories:</p> <ol style="list-style-type: none"> Glycerin suppositories: determination of glycerol content by oxidation with sodium metaperiodate by titration method. Neo-haemorrhhan suppositories containing. <ul style="list-style-type: none"> - Prednisolone acetate by phenyltetrazole method "spectrophotometry". - Lignocaine (xylocaine) by acid-dye method: methyl orange or bromocresol purple by spectrophotometry - Zinc oxide and aluminum acetate by Compleximetric method. <p>C. Docking programs (MOE, autodock and Schrodinger), homology modeling and molecular dynamics.</p>
	Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.



Quality Control and Drug Analysis

1	Course name	Quality control and drug analysis
2	Course Code	PH 406
3	Course type: /general/specialty/optional	Specialty
4	Accredited units	4 units (3 hours theoretical and 2 hours practical)
5	Educational hours	5 hours/week
6	Pre-requisite requirements	Analytical chemistry, instrumental analysis, pharmaceutics and medicinal chemistry
7	Program offered the course	Department of pharmaceutical chemistry
8	Instruction Language	English
9	Date of course approval	12/2021

Brief Description:	<p>This course deals with the various aspects of quality control and quality assurance of pharmaceutical industries. It deals with the important aspects like cGMP, QC tests, documentation, quality certifications and regulatory affairs.</p> <p>The subject also provides an opportunity for the student to learn GMP, GLP, CGMP, ICH rules in pharmaceutical dosage form. The course covers also the analytical criteria for drug quality assessment, Procedures of QC, Functional group analysis, Titrimetric methods of drug analysis and Stability studies. In addition, the course deals with study of the automation in pharmaceutical analysis, assay of drugs and related substance in biological fluids and radiopharmaceutical agents.</p>
Textbooks required for this Course:	<ol style="list-style-type: none"> 1. Good Laboratory Practice Regulations, 2nd Edition, Sandy Weinberg Vol. 69. 2. Quality Assurance of Pharmaceuticals- A compendium of Guidelines and Related materials Vol I WHO Publications. 3. How to Practice GMP's – P P Sharma. 4. ISO 9000 and Total Quality Management – Sadhank G Ghosh 5. The International Pharmacopoeia – Vol I, II, III, IV- General Methods of Analysis and Quality specification for Pharmaceutical Substances, Excipients and Dosage forms. 6. Good laboratory Practices – Marcel Dekker Series. 7. ICH guidelines, ISO 9000 and 14000 guidelines.
Course Duration	28 weeks



Delivery	<ul style="list-style-type: none"> Lecture-based, Group interaction and discussion, Use of video technique, practical classes.
Course Objectives:	<p>Upon completion of the subject student shall be able to;</p> <ol style="list-style-type: none"> know WHO guidelines for quality control of drugs know Quality assurance in drug industry know the regulatory approval process and their registration in Libya and international markets appreciate EU and ICH guidelines for quality control of drugs. understand the cGMP aspects in a pharmaceutical industry appreciate the importance of documentation understand the scope of quality certifications applicable to pharmaceutical industries understand the responsibilities of QA & QC departments
Course Assessments	<p>20% Assessment Exam 10% in lab activities 10% in class activities e.g.: quizzes 40% Final theoretical exam 20 % Final Practical Exam Total 100%</p>
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1 (Week 1)	<p>Unit I: Introduction: (3 hr)</p> <ul style="list-style-type: none"> Definitions Drug quality control (QC), rules, QC lab. (Official and industry), lab records. Quality assurance (QA), documentation, self-inspection and validation process of food and drug administration of USK. Total quality management (TQM) Different types of ISO Organization dealing with drug legislations: FDA, European (EMEA), Japanese and ICH system.
Session 2 (Week 2)	Unit II: GMP, GLP, CGMP, ICH rules (9 hr)
Session 3 (Week 3)	<ul style="list-style-type: none"> GMP, GLP, CGMP, ICH rules
Session 4 (Week 4)	<ul style="list-style-type: none"> GMP, GLP, CGMP, ICH rules
Session 5 (Week 5)	<p>Unit III: introduction of new drugs: (3 hr)</p> <ul style="list-style-type: none"> Drug registration: FDA, IVH, European and Libyan system of registration. Stability testing for new drugs Drug approval process.
Session 6 (Week 6)	<p>Unit IV: Pharmaceutical quality control (3 hr)</p> <ul style="list-style-type: none"> Product specifications (reference standards, raw materials, recipient, in-process QC, finished product QC), batches recall, batch record.
Session 7 (Week 7)	Unit V: Analytical criteria for drug quality assessment (2 hr)



	<ul style="list-style-type: none"> Types of criteria judging drug quality, pharmacopeial standards (USP, BP, IP) specification of quality.
Session 8 (Week 8)	Unit VI: Chemical purity and its control (2 hr) <ul style="list-style-type: none"> Drug impurities and limit tests, chiral purity
Session 9 (Week 9)	Unit VII: Procedures of QC (4 hr) <ul style="list-style-type: none"> Logic sequence of QC Quarantine Sampling Interpretation of statistical data Integration of different results Types of errors Rejection of doubtful results Certificate of analysis Product release (raw materials, packaging materials and finished products)
Session 10 (Week 10)	Unit VIII: Stability studies (4 hr) <ul style="list-style-type: none"> Impurities and degradation products
Session 11 (Week 11)	Assessment
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	<ul style="list-style-type: none"> Shelf-life determination
Session 16 (Week 16)	Unit IX: Dosage form analysis (3 hr) <ul style="list-style-type: none"> Inhaled dosage form, solids, semisolids, liquids, drops, injectable drugs, transdermal patches, medicated forms. Multi-component dosage forms.
Session 17 (Week 17)	Unit X: Functional group analysis (9 hr)
Session 18 (Week 18)	<ul style="list-style-type: none"> Functional group analysis
Session 19 (Week 19)	<ul style="list-style-type: none"> Functional group analysis
Session 20 (Week 20)	Unit XI: Titrimetric methods of drug analysis (6 hr) <ul style="list-style-type: none"> Volumetric methods (acid-base, gravimetry, compleximetry, redox titration, ..etc.
Session 21 (Week 21)	<ul style="list-style-type: none"> Volumetric methods (acid-base, gravimetry, compleximetry, redox titration, ..etc.
Session 22 (Week 22)	Unit XII: Instrumental methods of analysis (12 hr) <ul style="list-style-type: none"> UV-Visible, diodarray, flourimetry, spectroscopy (IR, FTIR, NMR, MS)
Session 23 (Week 23)	<ul style="list-style-type: none"> Electrochemical methods (polarography, potentiometry, conductimetry, ..etc
Session 24 (Week 24)	<ul style="list-style-type: none"> Separation techniques (TLC, UP, TLC, GC, HPLC, CE)
Session 25 (Week 25)	<ul style="list-style-type: none"> Treatment of chromatographic data: qualitative and quantitative analysis



	<ul style="list-style-type: none"> Hyphenation of separation techniques with detection tools.
Session 26 (Week 26)	Unit XII: Automation in pharmaceutical analysis (2 hr)
Session 27 (Week 27)	Unit XIV: Assay of drugs and related substance in biological fluids (2 hr) Sample preparation; separation, and purification Extraction procedures
Session 28 (Week 28)	Unit XV: Radiopharmaceuticals (2 hr) Radiochemical methods, radioactive products, and radio labeling. QC of radiopharmaceuticals.
	Final theoretical Exam.
Practical work (one/week)	<p>Practical Part: Analysis of different dosage form Carrying out identification assay and physical parameters according to the official pharmacopeial methods and / or develop manufacturing companies' methods:</p> <ol style="list-style-type: none"> 1. Assay of aspirin tablets using UV-visible -- BP 2013. 2. Assay of paracetamol tablets using UV-visible – BP 2013. 3. Assay of nalidixic acid suspension – BP 2013. 4. Assay of enalapril tablets by potentiometer titration. 5. Assay of sodium bicarbonate infusion by direct acid titration – BP 2013. 6. Assay of chloramphenicol eye drop by UV-visible – PB 2013. 7. Assay of pyridoxine tables by UV-visible. 8. Assay of ORS sachet by UV-visible. 9. Detection of Zn in insulin using atomic emission spectroscopy. 10. Assay of tretinoin (Retina A)[®] gel using UV-divisible—BP 2013. 11 Assay of Nifedipine tables using HPLC – BP 2013.
	Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.



Pharmacy Practice

1	Course name	Pharmacy Practice
2	Course Code	PH 407
3	Course type: /general/specialty/optional	Specialty
4	Accredited units	3 Units (Theoretical 2 Lecture/Week Practical 2 hours/Week)
5	Educational hours	4 hr/week
6	Pre-requisite requirements	Pharmaceutics I, II and Pharmacology I, II
7	The program offered the course	Department of Pharmaceutical care
8	Instruction Language	English
9	Date of course approval	12/2021
Brief Description:		The course provides the students with knowledge in pharmacy practice laws and therapeutic plan. Also provides the students with the knowledge about Patient's factor's in drug-product selection. Study the Responding to symptoms in pharmacy practice. The course provides the students with information in pharmacy system. In this course the students will be learning various skill such as dispensing of drugs, responding to minor ailments by providing suitable safe medication, patient counselling for improved patient care in the community set up.
Textbooks required for this Course:		<ol style="list-style-type: none"> 1. Parthasarathi G, Karin Nyfort-Hansen, Milap C Nahata. <i>A textbook of Clinical Pharmacy Practice- essential concepts and skills</i>, 1st ed. Chennai: OrientLongman Private Limited; 2004. 2. William E. Hassan. <i>Hospital pharmacy</i>, 5th ed. Philadelphia: Lea & Febiger;1986. 3. Tipnis Bajaj. <i>Hospital Pharmacy</i>, 1st ed. Maharashtra: Career Publications; 2008. 4. Scott LT. <i>Basic skills in interpreting laboratory data</i>, 4thed. American Society ofHealth System Pharmacists Inc; 2009. 5. Parmar N.S. <i>Health Education and Community Pharmacy</i>, 18th ed. India: CBS Publishers & Distributers; 2008. <p>Journals:</p> <ol style="list-style-type: none"> 1. Therapeutic drug monitoring. ISSN: 0163-4356 2. Journal of pharmacy practice. ISSN : 0974-8326



	3. American journal of health system pharmacy. ISSN: 1535-2900 (online) 4. Pharmacy times (Monthly magazine)												
Course Duration	28 week												
Delivery	Lectures Practical classes (Lab experiments+ computerized experiments simulation) Tutorials and group discussions E-tutorials (if applicable) Presentations Assignments (if applicable) Videos.												
Course Objectives:	Upon completion of the course, the student shall be able to 1. know various drug distribution methods in a hospital 2. appreciate the pharmacy stores management and inventory control 3. monitor drug therapy of patient through medication chart review and clinical review 4. obtain medication history interview and counsel the patients 5. identify drug related problems 6. detect and assess adverse drug reactions 7. interpret selected laboratory results (as monitoring parameters in therapeutics) of specific disease states 8. know pharmaceutical care services 9. do patient counseling in community pharmacy. 10. appreciate the concept of Rational drug therapy.												
Course Assessments	<table border="1"> <tr> <td>Midyear Examination</td> <td>20.0%</td> </tr> <tr> <td>Practical continuous Assessment</td> <td>10.0%</td> </tr> <tr> <td>Quizzes, reports, presentation</td> <td>10.0%</td> </tr> <tr> <td>Final practical Examination</td> <td>20.0%</td> </tr> <tr> <td>Final written Examination</td> <td>40.0%</td> </tr> <tr> <td>Total</td> <td>100%</td> </tr> </table>	Midyear Examination	20.0%	Practical continuous Assessment	10.0%	Quizzes, reports, presentation	10.0%	Final practical Examination	20.0%	Final written Examination	40.0%	Total	100%
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Final practical Examination	20.0%												
Final written Examination	40.0%												
Total	100%												
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage												
Session 1 (Week 1)	Unit I: Pharmaceutical care: 8 hr. <ul style="list-style-type: none"> • Introduction to Pharmaceutical care • Pharmaceutical care and the scope of Pharmacy Practice • Essential components of pharmaceutical care Drug related problems. <ul style="list-style-type: none"> • The response of the profession of pharmacy to drug related problems. • Exploration of the drug process. • Clinical skills and Pharmacist's role in pharmaceutical care. 												



Session 2 (Week 2)	The development of the concept of pharmaceutical care. <ul style="list-style-type: none"> • The pharmacist's functions. • Functions related to the individual patient. • Functions related to the community.
Session 3 (Week 3)	<ul style="list-style-type: none"> • The Pharmacist's Working up of Drug Therapy (The PWDT process) • Data collection (Patient data, patient past medical history, patient family history, patient social history, patient history of present illness, physical finding, laboratory and test results.
Session 4 (Week 4)	<ul style="list-style-type: none"> • Clinical Skills and Pharmacist's role in pharmaceutical care • Pharmaceutical car as the model of Pharmacy Practice
Session 5 (Week 5)	Unit II: Therapeutic Plan 8 hr. <ul style="list-style-type: none"> • The CORE pharmacotherapy plan • The CORE pharmacotherapy problems. • The FARM progress note
Session 6 (Week 6)	Patient's factors in drug-product selection: <ul style="list-style-type: none"> • The pharmacist's responsibility and role in drug product selection • Factors affecting drug-product selection • Patient acceptance consideration. • Patient age consideration • Environmental consideration
Session 7 (Week 7)	<ul style="list-style-type: none"> • Disease state consideration • Patient compliance • Biopharmaceutical consideration
Session 8 (Week 8)	<ul style="list-style-type: none"> • Performance of drugs in clinical practice and factories effects their methods of presentation • Concept of optimized drug products and controlled release delivery systems (CR-DDS) <ul style="list-style-type: none"> 1. Definitions 2. Optimized controlled release (CR) products 3. Advantages of sustained /controlled drug therapy 4. Categories of non-immediate delivery systems 5. Types of CR-DDS (examples)
Session 9 (Week 9)	Unit III: Drug supply (6 hours) <ul style="list-style-type: none"> • The goal of drug supply • The drug supply process
Session 10 (W- 10)	<ul style="list-style-type: none"> • Problems in the drug supply process



Session 11 (W11)	Midterm Assessment
Session 12 (W 12)	
Session 13 (W 13)	
Session 14 (W 14)	
Session 15 (W 15)	<ul style="list-style-type: none"> Improving drug supply The dimensions of drug supply
Session 16 (W- 16)	<p>Unit IV: Responding to symptoms in pharmacy practice through OTC and counseling:</p> <ul style="list-style-type: none"> Responding to symptoms in Pharmacy Practice 10 hours) The Communication Process <ol style="list-style-type: none"> The goal of effective communications The scope of medication-counseling sessions <ol style="list-style-type: none"> In organized health care setting In the community setting Patient assessment and consultation self-medication <ol style="list-style-type: none"> Importance of communication skills. Provision of pharmaceutical care through Patient-Pharmacist communication process
Session 17 (W- 17)	<p>Non-Prescription medications (OTC medications)</p> <ul style="list-style-type: none"> OTC criteria according to international stranded Label requirements for non-prescription medicine Non-prescription medication as a primary therapy and related conditions <ol style="list-style-type: none"> Antidiarrheal and other gastrointestinal products Laxative products Antacids and other gastrointestinal reflux disease products
Session 18 (W-18)	<ol style="list-style-type: none"> Cold and Allergy product Internal analgesics (management of headache, pain and fever) Menstrual products Acne Products Others
Session 19 (W- 19)	<p>In-home monitoring devices</p> <p>4- In-Home testing and monitoring devices</p> <ol style="list-style-type: none"> Diabetes care products and monitoring kits Pregnancy testing and ovulation prediction testing kits Fecal occult blood kits
Session 20 (W-20)	<ol style="list-style-type: none"> Cholesterol monitoring kit Home blood pressure and temperature monitoring



	f) Home respiratory devices
Session 21 (W- 21)	Unit V: Dispensing prescriptions 2 hr.
Session 22 (W- 22)	Unit VI: Mathematical principles of drug therapy 2 hr.
Session 23 (W- 23)	Unit VII: Pharmacy system 6 hr.
Session 24 (W- 24)	Pharmacy system
Session 25 (W- 25)	Pharmacy and therapeutic committee Organization, functions, Policies of the pharmacy and therapeutic committee in including drugs into formulary, inpatient and outpatient prescription, automatic stop order, and emergency drug list preparation.
Session 26 (W-26)	Unit VIII: Pharmacy information and research 4 hr.
Session 27 (W- 27)	Pharmacy information and research
Session 28 (W- 28)	Pharmacy information and research
	Final Exam
Practical Work	One lab per week: N.B. Practical sessions are illustrating the theoretical concepts of the above
Attendance Expectations	Students are expected to attend every session of class, arriving on time. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	Independent learning, critical thinking, and problem solving. Basic IT and presentation skills. Integration of different fields of knowledge. Team working. Communication skills.
Course Change	The details of course contents are updated according to the outcomes of new research and published paper. Content of the courses is revised on an ongoing basis to ensure that the course fit the graduation competences and community needs. Any changes will be approved by the department' scientific committee and department council.

المحاسبة وإدارة الأعمال الصيدلية

المحاسبة وإدارة الأعمال الصيدلية	اسم المقرر الدراسي	1
PH 408	رمز المقرر	2



3	طبيعة المقرر : عام / تخصص / اختياري	تخصص
4	عدد الوحدات المعتمدة	2
5	عدد الساعات التعليمية	2
6	المتطلبات المطلوبة مسبقاً	/
7	البرنامج التعليمي الذي يُقدم المقرر	الصيدلانيات
8	لغة التدريس	اللغة العربية والانجليزية
9	تاريخ اعتماد المقرر	2022

وصف موجز للمقرر	<p>المحاسبة وإدارة الأعمال الصيدلية أولاً: المحاسبة:</p> <p>يحتوي منهج المحاسبة التعريفات والأهداف والمصطلحات المحاسبية. ومعادلة الميزانية كذلك الدورة المحاسبية بخطواتها بشكل مختصر وقد تم التطرق إلى بعض الأمثلة الافتراضية عن عمليات البيع والشراء لشركات الأدوية والصيدليات حتى يسهل استيعاب الدورة لدى طالب الصيدلة</p> <p>ثانياً: إدارة الأعمال الصيدلية:</p> <p>يسلط الضوء على عمليات التسويق والدعاية والتسعير، وأيضاً دراسة اتفقيه الجات سنه 1994 وأثارها الإيجابية والسلبية. والتي ركزت على تجاره الأدوية وأثر هذه الاتفاقية على الدول النامية</p> <p>كما تم دراسة الرقابة على شركات الأدوية، وتقييم الأداء المالي ، ومشاكل التسويق والإنتاج والجودة ومستقبل شركات الأدوية في القرن ال 21، والفرق بين شركات الأدوية العربية والأجنبية</p>
الكتب المقررة	<p>مبادئ المحاسبة / إدريس اشتيوي إدارة الأعمال الصيدلية / محمد احمد بغدادي إدارة المستشفيات وشركات الأدوية / فريد النجار</p>
المدة الزمنية للمقرر	عدد الساعات المطلوب لتدريس المقرر 46 ساعة نظرية من المتوقع أن يتم تخصيص ساعات إضافية من الواجبات المنزلية يومياً خلال هذا المقرر
طريقة التدريس	المحاضرات، التفاعل والنقاش الجماعي، الأنشطة الموجهة ذاتياً، المشاركة النشطة، ...إلخ
الأهداف والمستهدف من المقرر	<p>بدراسة المقرر، سيكون الطالب قد أثبت بشكل موثوق القدرة على:</p> <ul style="list-style-type: none"> • فهم الدورة المحاسبية ومشاكل شركات الأدوية ووضع الحلول المقترحة.



<ul style="list-style-type: none"> • كيفية تحديد الأرباح لدى شركات الأدوية وتقييمها • التعرف على مجالات الرقابة الدوائية ومستقبل شركات الأدوية العربية. • تحديد المشكلة والأحكام والشروط عند استيراد الأدوية وتخزينها • تطوير مهارات الطالب في عمليات البيع والشراء في شركات الأدوية والصيدليات ومعرفة العمليات المدينة والدائنة 	
<ul style="list-style-type: none"> الامتحان النصفى الامتحان النهائى الواجبات المنزلية 	طريقة التقييم
محتوى المقرر الدراسي	محتويات المقرر
الإطار النظري لعلم المحاسبة	الأسبوع الأول
معادلة الميزانية	الأسبوع الثاني
معادلة الميزانية	الأسبوع الثالث
الدورة المحاسبية	الأسبوع الرابع
إجراء القيود اليوميه	الأسبوع الخامس
الترحيل إلى حساب الأستاذ	الأسبوع السادس
ترصيد الحسابات	الأسبوع السابع
مثال شامل وحلول تمارين	الأسبوع الثامن
إعداد ميزان المراجعة	الأسبوع التاسع
إعداد قائمة الدخل	الأسبوع العاشر
الامتحان الجزئي	الأسابيع 11.12.13.14
إعداد الميزانية العمومية	الأسبوع الخامس عشر
مثال شامل وحلول تمارين	الأسبوع السادس عشر
إدارة الأعمال الصيدلية: التسويق	الأسبوع السابع عشر
التسويق	الأسبوع الثامن عشر
الدعاية	الأسبوع التاسع عشر
التسعير	الأسبوع العشرون
اتفاقيه الجات	الأسبوع الحادي والعشرون
مشاكل الإنتاج والجودة لدى شركات الأدوية العربية	الأسبوع الثاني والعشرون
الرقابة على شركات الأدوية	الأسبوع الثالث والعشرون
تقييم أداء شركات الأدوية	الأسبوع الرابع والعشرون



الأسبوع الخامس والعشرون	مستقبل شركات الأدوية في القرن 21
الأسبوع السادس والعشرون	مقارنه شركات الأدوية العربية والأجنبية
الأسبوع السابع والعشرون	الحلول المقترحة وسبل التطوير
الأسبوع الثامن والعشرون	مراجعة عامة
الامتحان النهائي	
ملاحظة	تم إعداد المواضيع المقررة والمدة الزمنية المرتبطة بها . مع مراعاة الأسابيع المتعلقة بالامتحان الجزئي بعض الأسابيع التي ستجرى بها حلول تمارين واختبارات.
الحضور والغياب	يجب على الطلاب حضور كل المقرر الدراسي في الوقت المحدد ، ولا يسمح بالتغيب إلا لأسباب طبية ويجب دعمه بتقرير طبي.
مهارات عامة	تلتزم الكلية بضمان حصول الطلاب على كامل المعرفة والمهارات اللازمة للمشاركة الكاملة في جميع جوانب حياتهم، بما في ذلك المهارات التي تمكنهم من أن يكونوا متعلمين مدى الحياة. لضمان حصول الخريجين على هذا الإعداد، سيتم تضمين مهارات عامة مثل الكمبيوتر والاتصالات الشخصية ومهارات التفكير.
التغيير والتعديل في المقرر الدراسي	المعلومات الواردة في مخطط المقرر الدراسي هذا صحيحة وقت النشر. وينقح محتوى المقررات الدراسية على أساس مستمر لضمان ملائمتها لتغير العملية التعليمية واحتياجات سوق العمل. وسيسعى أستاذ المقرر إلى تقديم إشعار بالتغييرات للطلاب في الوقت المناسب. ويمكن أيضا تنقيح الجدول الزمني.

Research Methodology and Graduation Project

1	Course name	Research Methodology and Graduation Project
2	Course Code	PH 409
3	Course type: /general/specialty/optional	General
4	Accredited units	2 Units (Theoretical and project)
5	Educational hours	2 hr/week



6	Pre-requisite requirements	Courses of pharmacy						
7	The program offered the course	Departments of pharmacy college						
8	Instruction Language	English						
9	Date of course approval	12/2021						
Brief Description:		The study of this course includes two parts: the methodology of research and the project. The course will provide an overview of the important concepts of research design, data collection, statistical and interpretative analysis, and final report presentation. The second part of the course includes training the student to choose a research point, whether practical or theoretical, and to delve into it, and training him on how to conduct experiments or collect and analyze data, how to write it and the references on which he relied in his research, and how to present them before a committee to evaluate the work he did.						
Textbooks required for this Course:		<ol style="list-style-type: none"> 1. Research Design: Qualitative, Quantitative, and Mixed Methods Approaches Publisher: SAGE Publications, Inc; Fourth Edition, 2013 2. Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing. 3. Fink, A., 2009. Conducting Research Literature Reviews: From the Internet to Paper. Sage Publications 						
Course Duration		28 weeks (research methodology + Project)						
Delivery		Lectures Project Presentations						
Course Objectives:		<p>This course will be designed to enable students to meet the following final terminal learning objectives:</p> <ul style="list-style-type: none"> - Prepare a preliminary research design for projects in their subject matter areas. - Accurately collect, analyze and report data - Present complex data or situations clearly - Review and analyze research findings that affect their agency 						
Course Assessments		<table border="0"> <tr> <td>Methodology of research</td> <td>30%</td> </tr> <tr> <td>Project</td> <td>70% (30% supervisor and 40% discussion committee.</td> </tr> <tr> <td>Total</td> <td>100%</td> </tr> </table>	Methodology of research	30%	Project	70% (30% supervisor and 40% discussion committee.	Total	100%
Methodology of research	30%							
Project	70% (30% supervisor and 40% discussion committee.							
Total	100%							
Content breakdown		Topical Coverage						
Session 1 (Week 1)		Introduction and Basic Research Concepts						
Session 2 (Week 2)		Objectives of research						
Session 3 (Week 3)		Types of research						
Session 4 (Week 4)		Literature review						
Session 5 (Week 5)		Formation of research objectives						
Session 6 (Week 6)		Variables						



Session 7 (Week 7)	Data collection
Session 8 (Week 8)	Data analysis and interpretation
Session 9 (Week 9)	Data analysis and interpretation (continue).
Session 10 (W- 10)	Research ethics
Session 11 (W- 11)	Midterm Assessment
Session 12 (W-12)	
Session 13 (W- 13)	
Session 14 (W- 14)	
Session 15 (W-15)	Computer and its role in research, Use of statistical software SPSS
Session 16 (W- 16)	Writing a research proposal
Session 17 (W- 17)	References
Session 18 (W- 18)	Review
Session 19 (W- 19)	Review
Session 20 (W- 20)	Final Exam
Practical Work	Project work
Attendance Expectations	Students are expected to attend every session of class, arriving on time. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	Independent learning, critical thinking, and problem solving. Basic IT and presentation skills. Integration of different fields of knowledge. Team working. Communication skills.
Course Change	The details of course contents are updated according to the outcomes of new research and published paper. Content of the courses is revised on an ongoing basis to ensure that the course fit the graduation competences and community needs. Any changes will be approved by the department' scientific committee and department council.

