



## Course Specification of Pharmacology I

| <b>I. Course Identification and General Information:</b> |  |   |     |     |          |       |
|--|--|---|-----|-----|----------|-------|
| 1.   | Course Title   | Pharmacology I  |     |     |          |       |
| 2.   | Course Number & Code:                                  | Ph455   |     |     |          |       |
| 3.   | Credit hours:  | C.H   |     |     |          | Total |
|  |  | Th.   | Pr. | Tr. | Seminar. |       |
|  |  | 2   | 2   |     |          |       |
| 4.   | Study level/ semester at which this course is offered: | 3 <sup>rd</sup> level /1 <sup>st</sup> semester   |     |     |          |       |
| 5.   | Pre –requisite (if any):                               | <input type="checkbox"/> Anatomy and Histology<br><input type="checkbox"/> Physiology I, II |     |     |          |       |
| 6.   | Co –requisite (if any):                                | -   |     |     |          |       |
| 7.   | Program (s) in which the course is offered:            | Bachelor of Pharmacy  |     |     |          |       |
| 8.   | Language of teaching the course:                       | English   |     |     |          |       |
| 9.   | The department in which the course is offered:         | -   |     |     |          |       |
| 10.  | Location of teaching the course:                       | Faculty of Pharmacy- Sana'a university  |     |     |          |       |
| 11.  | Prepared by:   | Associate Prof. Fahmy M. Al-Wasei   |     |     |          |       |
| 12.  | Date of approval:                                      |   |     |     |          |       |

## **II. Course description:**

This course is an essential topic for pharmacy, which provides students with the basic principles of the science of pharmacology and familiarizes them with the necessary terminology. This module has a reflective, interactive and analytical contextual focus. However, it deals with concept of drug receptor interaction, the mode of action of drugs, the modifying responses and adverse effects, the dose-response relationship, drug toxicity, drug absorption, distribution, protein binding, metabolism, and excretion. It also includes detailed information about drugs acting on the autonomic nervous system and drugs acting on CNS as well as the histaminergic and serotonergic drugs. The module also covers drug abuse.



### III. Intended Learning Outcomes (ILOs) of the Course:

At the end of this course, the students will be able to:

1. Explicit the various types of pharmacokinetics (pharmacodynamics), mechanisms of action (MAO) , adverse effects , doses (effective, lethal ) , therapeutic index and drug interactions of drugs.
2. Determine pharmacokinetics (absorption, distribution, metabolism and excretion) and drug benefits (therapeutic actions, indications, efficacy and potency) & drug posology of drugs affecting autonomic nervous system, skeletal muscles.
3. Discuss drug limitations (side effects, contraindications, precautions, use in special patent categories and drug interactions) of drugs affecting autonomic nervous system, skeletal muscles.
4. Comprehend his/her role as a pharmacist in providing correct information on rational use of medications.
5. Classify drugs used for disorders of drugs affecting autonomic nervous system, skeletal muscles.
6. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency) and drug limitations.
7. Relate drug indications to MAO of drugs.
8. Predict drug limitations on the basis of Drug MOA.
9. Select an appropriate drug for patients based on drug benefits and limitation.
10. Calculate accurately drug's dosage, bioavailability, plasma half-life and volume of distribution in different patient populations.
11. Carry out appropriate techniques and measurements in experimental pharmacology.
12. Identify the common laboratory animals, laboratory equipment and conduct analytical procedures, appropriate to pharmacology, in a safe, accurate and precise used in experimental pharmacology.
13. Prepare critical, scientific and referenced reports
14. Share successfully in team-work.
15. Show respect to life.
16. Demonstrate time management and self-learning during performing practical and professional works and assignments.



#### IV. Intended Learning Outcomes (ILOs) of the Course:

##### (A) Knowledge and Understanding:

Alignment Course Intended Learning Outcomes (CILOs) to Program Intended Learning Outcomes (PILOs) in:  
**Knowledge and Understanding.**

| Program Intended Learning Outcomes<br>(Sub- PILOs) in:<br><b>Knowledge and Understanding</b> |  | Course Intended Learning Outcomes<br>(CILOs) in:<br><b>Knowledge and Understanding</b> |   |
|--|--|--|---|
| After completing this program, students would be able to:                                    |  | After participating in the course, students would be able to:                          |   |
| A2-  | Recognize the physicochemical properties, preparation, structure activity relationship (SAR), toxicity and the modern methods of analysis of various substances of chemical and natural products of therapeutic potential as well as the basic principle of drug discovery, design and development.  | a1-  | Explicit the various types of pharmacokinetics (pharmacodynamics), mechanisms of action (MAO) , adverse effects , doses (effective, lethal ) , therapeutic index and drug interactions of drugs.  |
| A3-  | Describe the general cellular, biochemical and physiological aspects of human body and recognize the pharmacokinetics, pharmacodynamics, disease pathophysiology, and pharmacogenetic of therapeutic agents to provide pharmaceutical care and facilitate management of patient's medication, rationalize drug use and overall health needs. | a2-  | Determine pharmacokinetics (absorption, distribution, metabolism and excretion) and drug benefits (therapeutic actions, indications, efficacy and potency) & drug posology of drugs affecting autonomic nervous system, skeletal muscles. |
|  |  | a3-  | Discuss drug limitations (side effects, contraindications, precautions, use in special patent categories and drug interactions) of drugs affecting autonomic nervous system, skeletal muscles.  |
|  |  | a4-  | Comprehend his/her role as a pharmacist in providing correct information on rational use of medications.  |



| <b>Teaching And Assessment Methods For Achieving Learning Outcomes:</b>  |   |   |
|--|---|---|
| <b>Alignment Learning Outcomes of Knowledge and Understanding to Teaching and Assessment Methods:</b>  |   |   |
| <b>Course Intended Learning Outcomes (CILOs) in Knowledge and Understanding</b><br>After participating in the course, students would be able to:   | <b>Teaching strategies/methods to be used</b>   | <b>Methods of assessment</b>  |
| <b>a1-</b> Explicit the various types of pharmacokinetics (pharmacodynamics), mechanisms of action (MAO) , adverse effects , doses (effective, lethal) , therapeutic index and drug interactions of drugs.   | Lectures methods ,<br>Computer based teaching and learning, group discussion and tutorial | Quizzes, Attendance, Participation, Short answers, reports, homework, and Written exam. |
| <b>a2-</b> Determine pharmacokinetics (absorption, distribution, metabolism and excretion) and drug benefits (therapeutic actions, indications, efficacy and potency) & drug posology of drugs affecting autonomic nervous system, skeletal muscles. |   |   |
| <b>a3-</b> Discuss drug limitations (side effects, contraindications, precautions, use in special patent categories and drug interactions) of drugs affecting autonomic nervous system, skeletal muscles.  |   |   |
| <b>a4-</b> Comprehend his/her role as a pharmacist in providing correct information on rational use of medications.  |   |   |

| <b>(B) Intellectual Skills:</b>  |   |
|--|---|
| <b>Alignment Course Intended Learning Outcomes (CILOs) to Program Intended Learning Outcomes (PILOs) in: Intellectual skills</b> |   |
| <b>Program Intended Learning Outcomes (Sub-PILOs) in Intellectual skills</b>   | <b>Course Intended Learning Outcomes (CILOs) of Intellectual Skills</b> |
| <b>After completing this program, students would be able to:</b>   | <b>After participating in the course, students would be able to:</b>    |



|            |  |            |   |
|------------|--|------------|---|
| <b>B1-</b> | Consolidate the chemical, biochemical and physiological principles to construct the pharmacophores of the structure and their effect on the stability, pharmacokinetic and pharmacodynamic profiles of the drug. | <b>b1-</b> | Classify drugs used for disorders of drugs affecting autonomic nervous system, skeletal muscles.                                |
|            |  | <b>b2-</b> | Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency) and drug limitations. |
| <b>B2-</b> | Categorize the synthetic and natural drugs according to their mechanism of action, systemic effect, therapeutic uses, contraindication and toxicity.   | <b>b3-</b> | Relate drug indications to MAO of drugs.  |
|            |  | <b>b4-</b> | Predict drug limitations on the basis of Drug MOA.  |
| <b>B5-</b> | Interpret the prescriptions, patient and clinical data, Analysis all the encountered pharmaceutical problems and plan the strategies for their solution, to develop the health care.                             | <b>b5-</b> | Select an appropriate drug for patients based on drug benefits and limitation.  |

### Teaching And Assessment Methods For Achieving Learning Outcomes:

#### Alignment Learning Outcomes of Intellectual Skills to Teaching Methods and Assessment Methods:

| <i>Course Intended Learning Outcomes (CILOs) in Intellectual Skills.</i> |   | <i>Teaching strategies/methods to be used.</i>   | <i>Methods of assessment</i>  |
|--|---|--|---|
| After participating in the course, students would be able to:            |   |  |   |
| <b>b1-</b>   | Classify drugs used for disorders of drugs affecting autonomic nervous system, skeletal muscles.                                | Lectures methods, Group Discussion, Problem solving sessions, brainstorming and Computer based teaching and learning | Quizzes, Attendance, Participation, Short answers, reports, homework, and Written exam. |
| <b>b2-</b>   | Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency) and drug limitations. |  |   |
| <b>b3-</b>   | Relate drug indications to MAO of drugs.  |  |   |
| <b>b4-</b>   | Predict drug limitations on the basis of Drug MOA.  |  |   |
| <b>b5-</b>   | Select an appropriate drug for patients based on drug benefits and limitation.  |  |   |



### (C) Professional and Practical Skills.

Alignment Course Intended Learning Outcomes (CILOs) to Program Intended Learning Outcomes (PILOs) in: **Professional and Practical Skills**

| Program Intended Learning Outcomes (Sub- PILOs) in Professional and Practical Skills |   | Course Intended Learning Outcomes (CILOs) in Professional and Practical Skills |   |
|--|---|--|---|
| After completing this program, students would be able to:                            |   | After participating in the course, students would be able to:                  |   |
| C1-  | Operate different pharmaceutical equipments and instruments and use emerging technologies in design, synthesis, pre-formulation, formulation, packaging, storage and analysis of pharmaceutical products according to GLP, GSP and cGMP guidelines. | c1-  | Calculate accurately drug's dosage, bioavailability, plasma half-life and volume of distribution in different patient populations.  |
|  |   | c2-  | Carry out appropriate techniques and measurements in experimental pharmacology.   |
|  |   | c3-  | Identify the common laboratory animals, laboratory equipment and conduct analytical procedures, appropriate to pharmacology, in a safe, accurate and precise used in experimental pharmacology. |
| C2-  | Handle and dispose chemicals and pharmaceutical preparations including radiopharmaceuticals safely and effectively.   | c4-  | Prepare critical, scientific and referenced reports   |
| C5-  | Conduct research studies and utilize the results in different pharmaceutical fields.  |  |   |

### Teaching And Assessment Methods For Achieving Learning Outcomes:

Alignment Learning Outcomes of Professional and Practical Skills to Teaching and Assessment Methods:

| Course Intended Learning Outcomes (CILOs) in Professional and Practical Skills | Teaching strategies/methods to be used | Methods of assessment |
|--|--|-----------------------|
| After participating in the course, students would be able to:                  |  |                       |



|     |   |   |  |
|-----|---|---|--|
| c1- | Calculate accurately drug's dosage, bioavailability, plasma half-life and volume of distribution in different patient populations.  | Lectures methods, practical session, brainstorming and group discussion | Practical works, homework, practical exam and practical reports. |
| c2- | Carry out appropriate techniques and measurements in experimental pharmacology.   |   |  |
| c3- | Identify the common laboratory animals, laboratory equipment and conduct analytical procedures, appropriate to pharmacology, in a safe, accurate and precise used in experimental pharmacology. |   |  |
| c4- | Prepare critical, scientific and referenced reports   |   |  |

#### (D) General / Transferable Skills:

Alignment Course Intended Learning Outcomes (CILOs) to Program Intended Learning Outcomes (PILOs) in: **General and Transferable skills**

| Program Intended Learning Outcomes (PILOs) in General / Transferable skills |   | Course Intended Learning Outcomes (CILOs) in General / Transferable skills |   |
|---|---|--|---|
| After completing this program, students would be able to:                   |   | After participating in the course, students would be able to:              |   |
| D1-   | Practice independent learning needed for continuous professional development      | d1-  | Share successfully in team-work.  |
| D5-   | Apply information and communication technology and working effectively in a team. | d2-  | Show respect to life.   |
|   |   | d3-  | Demonstrate time management and self-learning during performing practical and professional works and assignments. |

Alignment Learning Outcomes of General and Transferable skills to Teaching and Assessment Methods.

| Course Intended Learning Outcomes (CILOs) in General and Transferable Skills |                                  | Teaching strategies/methods to be used.                  | Methods of assessment |
|--|----------------------------------|--|-----------------------|
| After participating in the course, students would be able to:                |                                  |  |                       |
| d1-  | Share successfully in team-work. | Small group discussions, Tutorials and Practical session | Homework and reports. |
| d2-  | Show respect to life.            |  |                       |



|     |   |  |  |
|-----|---|--|--|
| d3- | Demonstrate time management and self-learning during performing practical and professional works and assignments. |  |  |
|-----|---|--|--|

## V. Course Content:

### 1 – Course Topics/Items:

#### a – Theoretical Aspect

| Order | Topic List / Units   | CILOs (symbols) | Sub-topic List   | Number of weeks | Contact hours |
|-------|--|-----------------|--|-----------------|---------------|
| 1.    | <b>Introduction to Pharmacology</b><br>( General Pharmacology) | a1-4, b2-5,d2   | <input type="checkbox"/> Definition, brief history<br><input type="checkbox"/> Divisions of pharmacology<br>(pharmacokinetics, pharmacodynamics : definitions, field of concern)<br><input type="checkbox"/> Dose-Response curve<br><input type="checkbox"/> Types of dose (effective, lethal), therapeutic index<br><input type="checkbox"/> Drug efficacy and drug potency<br><input type="checkbox"/> Mechanisms of drug action : drug targets (receptors, enzymes, ion channels, etc).<br><input type="checkbox"/> receptor theory , types of receptors, affinity, specificity, selectivity, agonist, antagonist, competitive and non-competitive , reversible and irreversible.<br><input type="checkbox"/> Enzymes as drug targets : types, examples, mechanisms | 4               | 8             |





|    |  |                     |   |   |   |
|----|--|---------------------|---|---|---|
|    |  |                     | <input type="checkbox"/> Ion channels as drug target : types, examples, mechanisms<br><input type="checkbox"/> Neurotransmitters and autacoids: physiopathologic roles<br><input type="checkbox"/> Types of drug adverse effects with examples<br><input type="checkbox"/> Types of drug interactions effects with examples<br><input type="checkbox"/> Pharmacokinetics ( in brief) : drug absorption, distribution, metabolism, excretion   |   |   |
| 2. | <b>Drugs Acting on the Autonomics Nervous System</b> | a2-4, b1-5<br>d1,d2 | Pharmacokinetics, Pharmacodynamics [ drug benefits : MOA, therapeutic action, indications, efficacy and potency) and drug limitation (side effects, precautions, contraindications) and comparison of :<br><input type="checkbox"/> Indirectly sympathomimetics<br><input type="checkbox"/> Direct symapthomimetics: adrenergic agonists<br><input type="checkbox"/> Indirectly sympatholytic drugs<br><input type="checkbox"/> Directly sympatholytic drugs : adrenergic blocking agents | 3 | 6 |



| 3. | Midterm Exam  | a2-4, b1-5          |   | 1 | 2 |
|----|---|---------------------|---|---|---|
| 4. | <b>Drugs acting on the autonomic nervous system</b> | a2-4, b1-5<br>d1,d2 | Pharmacokinetics,<br>Pharmacodynamics [ drug benefits : MOA, therapeutic action, indications, efficacy and potency) and drug limitation (side effects, precautions, contraindications) and comparison of :<br>Indirectly <input type="checkbox"/><br>parasympathomimetics<br>Direct <input type="checkbox"/><br>parasympathomimetics :<br>cholinergic agonists<br>Indirectly <input type="checkbox"/><br>parasympatholytic drugs<br>Directly <input type="checkbox"/><br>sympatholytic drugs :<br>cholinergic blocking agents<br>Drugs affecting <input type="checkbox"/><br>autonomic ganglia:<br>ganglia stimulants ,<br>ganglia blockers | 2 | 4 |
| 5. | <b>Drugs Affecting Skeletal Muscles</b>             | a2-4, b1-5<br>d1,d3 | Pharmacokinetics,<br>Pharmacodynamics [ drug benefits : MOA, therapeutic action, indications, efficacy and potency) and drug limitation (side effects, precautions, contraindications) and comparison of :<br><input type="checkbox"/> Neuromuscular blocking agents  | 1 | 2 |



|  |               |                     |   |           |           |
|--|---------------|---------------------|---|-----------|-----------|
|  |               |                     | <input type="checkbox"/> Central muscles relaxants.   |           |           |
| 6.   | Autacoids     | a2-4, b1-5<br>d1,d3 | <input type="checkbox"/> Histamine and Antihistamines.<br><input type="checkbox"/> Prostaglandine.<br><input type="checkbox"/> Serotonin and Serotonin antagonist.<br><input type="checkbox"/> Kinins and other peptides. | 3         | 6         |
| 7.   | Course Review | a1-4, b1-5,d1-3     | Review of the course topics by discussion session.  | 1         | 2         |
| 8.   | Final Exam    | a1-5, b1-4          |   | 1         | 2         |
| <b>Number of Weeks /and Units Per Semester</b> |               |                     |   | <b>16</b> | <b>32</b> |

### b - Practical Aspect

| Order | Tasks/ Experiments   | CILOs (symbols) | Number of Weeks | Contact Hours |
|-------|--|-----------------|-----------------|---------------|
| 1     | Study of the common laboratory animals used in experimental pharmacology and their handling.                                       | c1-c4, d1-d3    | 1               | 2             |
| 2.    | Study of the dosage forms and the routes of administration of drugs in mice/rats.  | c1-c4, d1-d3    | 1               | 2             |
| 3     | Study of the effect of hepatic microsomal enzyme inhibitors and induction on the duration of action of pentobarbitone in mice/rat. | c1-c4, d1-d3    | 1               | 2             |
| 4     | Study of the effect of neuromuscular blockers and anticholinesterase on the skeletal muscles.                                      | c1-c4, d1-d3    | 1               | 2             |
| 5     | Effect of cholinergic agents on rabbit eye   | c1-c4, d1-d3    | 1               | 2             |
| 6     | Effect of anticholinergic agents on rabbit eye   | c1-c4, d1-d3    | 1               | 2             |
| 7     | Study of agonistic and antagonistic effects of drugs, using isolated rat/mice intestine.   | c1-c4, d1-d3    | 2               | 4             |



|  |   |              |           |           |
|--|---|--------------|-----------|-----------|
| 8  | Mid-Exam  | c1-c4, d1-d3 | 1         | 2         |
| 9  | Record the effect of physostigmine on the concentration response curve of acetylcholine using isolated rectus abdominis muscle preparation of frog. | c1-c4, d1-d3 | 1         | 2         |
| 10   | Study the Analgesic activity of some drugs on tail flick apparatus in rats.   | c1-c4, d1-d3 | 1         | 2         |
| 11   |   | c1-c4, d1-d3 | 1         | 2         |
| 12   | Study the anti-inflammatory activity of ibuprofen in rats.  | c1-c4, d1-d3 | 1         | 2         |
| 13   | Use of computer simulated CDs or Video cassettes for pharmacology practical whenever possible.  | c1-c4, d1-d3 | 2         | 4         |
| 14   | Final Exam  | c1-c4        | 1         | 2         |
| <b>Number of Weeks /and Units Per Semester</b> |   |              | <b>16</b> | <b>32</b> |

#### VI. a-Teaching strategies of the course:

Lecture method, Group Discussion, Problem solving sessions and Computer based teaching and learning, tutorials, brainstorming and Practical sessions.

#### b- Assessment Methods:

Quizzes, Attendance, Participation, Short answers, reports, homework, and Written exam  
Practical works, practical exam and practical reports.

#### VII. Assignments:

| No. | Assignments             | Aligned CILOs (symbols) | Week Due                      | Mark |
|-----|-------------------------|-------------------------|-------------------------------|------|
| 1   | Homework<br>Assignments | a1-4, b1-3, d1-3        | Sporadic through the semester | 10   |
| 2   | Reports                 | c1-4, d1-3              |                               |      |

#### I. Schedule of Assessment Tasks for Students During the Semester:

رئيس الجامعة  
إ.د. القاسم محمد عباس

مركز التطوير الأكاديمي وضمان الجودة  
إ.د. هدى العماد

عميد الكلية  
إ.د. خالد الشويه

وحدة ضمان الجودة  
إ.د. محمود البريهي



| No.          | Assessment Method                              | Week Due                      | Mark       | Proportion of Final Assessment | Aligned Course Learning Outcomes (CILOs symbols) |
|--------------|--|-------------------------------|------------|--------------------------------|--|
| 1.           | Attendance, Participation, reports and quizzes | All Weeks                     | 10         | 7%                             | a1-4,b1-5, d1-3                                  |
| 2.           | Quizzes and Homework-assignments               | Sporadic through the semester | 10         | 7%                             | a1-5, b1-3, d1-3                                 |
| 3.           | Attendance, Practical Reports                  | All Weeks                     | 15         | 10%                            | c1-4   |
| 4.           | Practical mid-semester exam                    | 8 <sup>th</sup>               | 15         | 10%                            | c1-4   |
| 5.           | Theoretical mid-semester exam                  | 8 <sup>th</sup>               | 30         | 20%                            | a1, a2, a3, b1, b3                               |
| 6.           | Final Exam (theoretical)                       | 16 <sup>th</sup>              | 50         | 33%                            | a1-4, b1-5                                       |
| 7.           | Final Exam (practical)                         | 16 <sup>th</sup>              | 20         | 13%                            | c1-4   |
| <b>Total</b> |  |                               | <b>150</b> | <b>100%</b>                    |  |

## II. Students' Support:

| Office Hours/week          | Other Procedures (if any) |
|----------------------------|---------------------------|
| Two contact hours per week | None                      |

## III. Learning Resources:

### 1- Required Textbook(s) ( maximum two ).

1- Katzung–Basic and Clinical Pharmacology, (2007), McGraw-Hill



|   |  |
|---|--|
|   | 2- Rang, Dale and Ritter. Pharmacology, (2007), Churchill Livingstone.   |
| <b>2- Recommended Books and Reference Materials.</b>  |  |
|   | 1. Richard A. Harvey. Lippincott's Pharmacology, 2000, Lippincott William and Wilkins.<br>2. Udaykumar. Text Book of Medical Pharmacology<br>3. Lectures Notes and Practical Manual.   |
| <b>3- Electronic Materials and Web Sites etc.</b>   |  |
|   | <a href="http://www.en.wikipedia.org/">www.en.wikipedia.org/</a>   |
| <b>IV. Facilities Required:</b>   |  |
| <b>1 - Accommodation:</b>   | <ul style="list-style-type: none"> <li>- Well-equipped lecture halls with data show facilities, whiteboards, net connection, etc.</li> <li>- Well-equipped laboratories with all required equipment and reagents.</li> </ul>   |
| <b>2 - Computing resources:</b>   | <ul style="list-style-type: none"> <li>- Computer laboratory with internet facilities.</li> </ul>  |
| <b>V. Course Improvement Processes:</b>   |  |
| <b>1- Strategies for obtaining student feedback on effectiveness of teaching</b>              |  |
|   | <ul style="list-style-type: none"> <li>▪ Student-based assessment of the effectiveness of teaching using a questionnaire designed by the Quality Assurance Unit at the end of the semester.</li> <li>▪ Meeting with students and faculty (once per semester).</li> </ul>   |
| <b>2- Other strategies for evaluation of teaching by the instructor or by the department.</b> |  |
|   | <ul style="list-style-type: none"> <li>▪ Assessment of the course syllabus and contents by the teachers using a questionnaire designed by the Quality Assurance Unit of the university at the end of the semester.</li> <li>▪ Regular meeting and discussion of the course content between the Head of Department and the teaching staff of the course (for theory and practice).</li> </ul> |
| <b>3- Processes for improvement of teaching.</b>  |  |
|   | <ul style="list-style-type: none"> <li>▪ Revision of the course specification and its teaching strategies every three academic years after consideration of all issues raised by the teachers and/or students during regular meetings and discussions.</li> </ul>  |



|  |   |
|--|---|
|  | <ul style="list-style-type: none"> <li>Exploring any possible defects in the course that might be encountered by the teaching staff and their mitigation in subsequent improved versions of course specification.</li> </ul>  |
| <b>4- Processes for Verifying Standards of Students' Achievement</b>                                 |   |
|  | <ul style="list-style-type: none"> <li>Checking of a sample of students' work by an independent faculty member.</li> <li>Periodic exchange and check marking of a sample of students' assignments with a faculty member from another institution.</li> <li>Adoption of scoring rubrics to assess the students' achievement (both for ongoing or summative assessments).</li> <li>Regular follow-up of laboratory logbooks to assess the practical achievement of students.</li> </ul> |
| <b>5- Procedures for Periodically Reviewing of Course Effectiveness and Planning for Improvement</b> |   |
|  | <ul style="list-style-type: none"> <li>Student rating and feedback</li> <li>Peer rating and feedback</li> <li>Regular meeting of the Curriculum Committee of the faculty.</li> </ul>  |
| <b>6- Course Development Plans</b>   |   |
|  | <ul style="list-style-type: none"> <li>Conducting regular workshops for the staff for improving their course specification skills.</li> <li>Regular revision of course specification and syllabus items.</li> </ul>   |

### VIII. Course Policies: (including plagiarism, academic honesty, attendance etc)

The University Regulations on academic misconduct will be strictly enforced. Please refer to -----

|          |  |
|----------|--|
| <b>1</b> | <p><b>Class Attendance:</b></p> <ul style="list-style-type: none"> <li>Attendance of all lectures and practical sessions is required. Unexcused absence exceeding 25% of the lectures or practical sessions will disqualify the student from entering the final exam.</li> </ul>                               |
| <b>2</b> | <p><b>Tardy:</b></p> <p>- Roll will be called in the very beginning of each lecture and practical class. Retardation for more than three weeks without a reasonable excursion, the student involved shall not be allowed to attend the class any longer and consequently shall be considered to be absent.</p> |



|   |   |
|---|---|
| 3 | <b>Exam Attendance/Punctuality:</b> <ul style="list-style-type: none"><li>Exam attendance is obligatory unless being excused by the department and faculty.</li><li>Absence from assignments or exams will be dealt with according to the general policy of the university.</li></ul> |
| 4 | <b>Assignments &amp; Projects:</b> <ul style="list-style-type: none"><li>Assignments: Written and oral; Laboratory logbook signed by the responsible demonstrator.</li><li>Projects: Not applicable.</li></ul>  |
| 5 | <b>Cheating:</b> <ul style="list-style-type: none"><li>Punishment of cheating will be according to the general policy of the university in this respect.</li></ul>  |
| 6 | <b>Plagiarism:</b> <ul style="list-style-type: none"><li>Plagiarism in written essays, reports, etc. is not accepted, and students who plagiarize the works of others will be punished according to the general policy of the university.</li></ul>                                   |
| 7 | <b>Other policies:</b> <ul style="list-style-type: none"><li>General policies of the Students' Affairs of the University and the Quality Assurance Unit.</li></ul>  |





## Course Plan of Pharmacology I

| I- Information about Faculty Member Responsible for the Course: |                   |              |     |     |     |     |
|---|-------------------|--------------|-----|-----|-----|-----|
| Name of Faculty Member  | Fahmy M. Al-Wasei | Office Hours |     |     |     |     |
| Location & Telephone No.  |                   | SAT          | SUN | MON | TUE | WED |
| E-mail  |                   |              | 4h  |     |     |     |

| II- Course Identification and General Information: |   |   |         |     |        |       |
|--|---|---|---------|-----|--------|-------|
| 1-   | Course Title:                                     | Pharmacology I  |         |     |        |       |
| 2-   | Course Number & Code:                             | Ph455   |         |     |        |       |
| 3-   | Credit hours:                                     | C.H   |         |     |        | Total |
|  |   | Th.   | Seminar | Pr. | F. Tr. |       |
|  |   | 2   | -       | 2   | 3      |       |
| 4-   | Study level/year at which this course is offered: | 3 <sup>rd</sup> level /1 <sup>st</sup> semester   |         |     |        |       |
| 5-   | Pre –requisite (if any):                          | <input type="checkbox"/> Anatomy and Histology<br><input type="checkbox"/> Physiology I, II |         |     |        |       |
| 6-   | Co –requisite (if any):                           | -   |         |     |        |       |
| 7-   | Program (s) in which the course is offered        | Bachelor of Pharmacy  |         |     |        |       |
| 8-   | Language of teaching the course:                  | English   |         |     |        |       |
| 9-   | System of Study:                                  | Semesters   |         |     |        |       |



|     |   |  |
|-----|---|--|
| 10- | <b>Mode of delivery:</b>                | Regular                                |
| 11- | <b>Location of teaching the course:</b> | Faculty of Pharmacy- Sana`a university |

### III- Course description:

This course is an essential topic for pharmacy, which provides students with the basic principles of the science of pharmacology and familiarizes them with the necessary terminology. This module has a reflective, interactive and analytical contextual focus. However, it deals with concept of drug receptor interaction, the mode of action of drugs, the modifying responses and adverse effects, the dose-response relationship, drug toxicity, drug absorption, distribution, protein binding, metabolism, and excretion. It also includes detailed information about drugs acting on the autonomic nervous system and drugs acting on CNS as well as the histaminergic and serotonergic drugs. The module also covers drug abuse.

### IV- Intended learning outcomes (ILOs) of the course:

**At the end of this course, the students will be able to:**

1. Explicit the various types of pharmacokinetics (pharmacodynamics), mechanisms of action (MAO), adverse effects, doses (effective, lethal), therapeutic index and drug interactions of drugs.
2. Determine pharmacokinetics (absorption, distribution, metabolism and excretion) and drug benefits (therapeutic actions, indications, efficacy and potency) & drug posology of drugs affecting autonomic nervous system, skeletal muscles.
3. Discuss drug limitations (side effects, contraindications, precautions, use in special patent categories and drug interactions) of drugs affecting autonomic nervous system, skeletal muscles.
4. Comprehend his/her role as a pharmacist in providing correct information on rational use of medications.
5. Classify drugs used for disorders of drugs affecting autonomic nervous system, skeletal muscles.
6. Compare between therapeutically related drugs based on drug benefits (in particular efficacy and potency) and drug limitations.
7. Relate drug indications to MAO of drugs.
8. Predict drug limitations on the basis of Drug MOA.
9. Select an appropriate drug for patients based on drug benefits and limitation.



10. Calculate accurately drug's dosage, bioavailability, plasma half-life and volume of distribution in different patient populations.
11. Carry out appropriate techniques and measurements in experimental pharmacology.
12. Identify the common laboratory animals, laboratory equipment and conduct analytical procedures, appropriate to pharmacology, in a safe, accurate and precise used in experimental pharmacology.
13. Prepare critical, scientific and referenced reports
14. Share successfully in team-work.
15. Show respect to life.
16. Demonstrate time management and self-learning during performing practical and professional works and assignments.

## V- Course Content:

### 1 – Course Topics/Items:

#### a – Theoretical Aspect

| Order | Topic List / Units   | CILOs (symbols) | Sub-topic List   | Week Due | Contact hours |
|-------|--|-----------------|--|----------|---------------|
| 1.    | <b>Introduction To Pharmacology</b><br>( General Pharmacology) | a1-4, b2-5,d2   | <input type="checkbox"/> Definition, brief history<br><input type="checkbox"/> Divisions of pharmacology<br>(pharmacokinetics, pharmacodynamics : definitions, field of concern)<br><input type="checkbox"/> Dose-Response curve<br><input type="checkbox"/> Types of dose (effective, lethal), therapeutic index<br><input type="checkbox"/> Drug efficacy and drug potency<br><input type="checkbox"/> Mechanisms of drug action : drug targets (receptors, enzymes, ion channels, etc). | 1-4      | 8             |



|    |  |                     |   |     |   |
|----|--|---------------------|---|-----|---|
|    |  |                     | <ul style="list-style-type: none"> <li><input type="checkbox"/> receptor theory , types of receptors, affinity, specificity, selectivity, agonist, antagonist, competitive and non-competitive , reversible and irreversible.</li> <li><input type="checkbox"/> Enzymes as drug targets : types, examples, mechanisms</li> <li><input type="checkbox"/> Ion channels as drug target : types, examples, mechanisms</li> <li><input type="checkbox"/> Neurotransmitters and autacoids: physiopathologic roles</li> <li><input type="checkbox"/> Types of drug adverse effects with examples</li> <li><input type="checkbox"/> Types of drug interactions effects with examples</li> <li><input type="checkbox"/> Pharmacokinetics ( in brief) : drug absorption, distribution, metabolism, excretion</li> </ul> |     |   |
| 2. | <b>Drugs Acting on the Autonomics Nervous System</b> | a2-4, b1-5<br>d1,d2 | <p>Pharmacokinetics, Pharmacodynamics [ drug benefits : MOA, therapeutic action, indications, efficacy and potency) and drug limitation (side effects, precautions, contraindications) and comparison of :</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Indirectly sympathomimetics</li> </ul>   | 5-7 | 6 |



|    |   |                     |  |      |   |
|----|---|---------------------|--|------|---|
|    |   |                     | <input type="checkbox"/> Direct<br>sympathomimetics: adrenergic<br>agonists<br><br><input type="checkbox"/> Indirectly sympatholytic<br>drugs<br><br><input type="checkbox"/> Directly sympatholytic<br>drugs : adrenergic blocking<br>agents  |      |   |
| 3. | Midterm Exam  | a2-4, b1-5          |  | 8    | 2 |
| 4. | Drugs Acting on the<br>Autonomics Nervous<br>System | a2-4, b1-5<br>d1,d2 | Pharmacokinetics,<br>Pharmacodynamics [<br>drug benefits : MOA,<br>therapeutic action,<br>indications, efficacy and<br>potency) and drug<br>limitation (side effects,<br>precautions,<br>contraindications) and<br>comparison of :<br>Indirectly <input type="checkbox"/><br>parasympathomimetics<br>Direct <input type="checkbox"/><br>parasympathomimetics :<br>cholinergic agonists<br>Indirectly <input type="checkbox"/><br>parasympatholytic drugs<br>Directly <input type="checkbox"/><br>sympatholytic drugs :<br>cholinergic blocking<br>agents<br>Drugs affecting <input type="checkbox"/><br>autonomic ganglia:<br>ganglia stimulants ,<br>ganglia blockers | 9,10 | 4 |
| 5. | Drugs Affecting Skeletal<br>Muscles                 | a2-4, b1-5<br>d1,d3 | Pharmacokinetics,<br>Pharmacodynamics [ drug   | 11   | 2 |



|  |               |                     |  |           |           |
|--|---------------|---------------------|--|-----------|-----------|
|  |               |                     | benefits : MOA, therapeutic action, indications, efficacy and potency) and drug limitation (side effects, precautions, contraindications) and comparison of :<br><br><input type="checkbox"/> Neuromuscular blocking agents<br><br><input type="checkbox"/> Central muscles relaxants. |           |           |
| 6.   | Autacoids     | a2-4, b1-5<br>d1,d3 | <input type="checkbox"/> Histamine and Antihistamines.<br><input type="checkbox"/> Prostaglandine.<br><input type="checkbox"/> Serotonin and Serotonin antagonist.<br><input type="checkbox"/> Kinins and other peptides.  | 12-14     | 6         |
| 7.   | Course Review | a1-4, b1-5,d1-3     | Review of the course topics by discussion session.   | 15        | 2         |
| 8.   | Final Exam    | a1-5, b1-4          |  | 16        | 2         |
| <b>Number of Weeks /and Units Per Semester</b> |               |                     |  | <b>16</b> | <b>32</b> |

### b - Practical Aspect

| Order | Tasks/ Experiments   | CILOs (symbols) | Week Due | Contact Hours |
|-------|--|-----------------|----------|---------------|
| 1     | Study of the common laboratory animals used in experimental pharmacology and their handling. | c1-c4, d1-d3    | 1        | 2             |
| 2.    | Study of the dosage forms and the routes of administration of drugs in mice/rats.            | c1-c4, d1-d3    | 2        | 2             |



|  |   |              |           |           |
|--|---|--------------|-----------|-----------|
| 3  | Study of the effect of hepatic microsomal enzyme inhibitors and induction on the duration of action of pentobarbitone in mice/rat.                  | c1-c4, d1-d3 | 3         | 2         |
| 4  | Study of the effect of neuromuscular blockers and anticholinesterase on the skeletal muscles.   | c1-c4, d1-d3 | 4         | 2         |
| 5  | Effect of cholinergic agents on rabbit eye  | c1-c4, d1-d3 | 5         | 2         |
| 6  | Effect of anticholinergic agents on rabbit eye  | c1-c4, d1-d3 | 6         | 2         |
| 7  | Study of agonistic and antagonistic effects of drugs, using isolated rat/mice intestine.  | c1-c4, d1-d3 | 7,8       | 4         |
| 8  | Mid-Exam  | c1-c4, d1-d3 | 9         | 2         |
| 9  | Record the effect of physostigmine on the concentration response curve of acetylcholine using isolated rectus abdominis muscle preparation of frog. | c1-c4, d1-d3 | 10        | 2         |
| 10   | Study the Analgesic activity of some drugs on tail flick apparatus in rats.   | c1-c4, d1-d3 | 11        | 2         |
| 11   |   | c1-c4, d1-d3 | 12        | 2         |
| 12   | Study the anti-inflammatory activity of ibuprofen in rats.  | c1-c4, d1-d3 | 13        | 2         |
| 13   | Use of computer simulated CDs or Video cassettes for pharmacology practical whenever possible.  | c1-c4, d1-d3 | 14,15     | 4         |
| 14   | Final Exam  | c1-c4        | 16        | 2         |
| <b>Number of Weeks /and Units Per Semester</b> |   |              | <b>16</b> | <b>32</b> |

|   |
|---|
| <b>VI- a-Teaching strategies of the course:</b>   |
| Lecture method, Group Discussion, Problem solving sessions and Computer based teaching and learning, tutorials, brainstorming and Practical sessions. |
| <b>b- Assessment Methods:</b>   |
| Quizzes, Attendance, Participation, Short answers, reports, homework, and Written exam<br>Practical works, practical exam and practical reports.      |



### VII. Assignments:

| No. | Assignments          | Aligned CILOs (symbols) | Week Due                      | Mark |
|-----|----------------------|-------------------------|-------------------------------|------|
| 1   | Homework Assignments | a1-4, b1-3, d1-3        | Sporadic through the semester | 10   |
| 2   | Reports              | c1-4, d1-3              |                               |      |

### VI. Schedule of Assessment Tasks for Students During the Semester:

| No.          | Assessment Method                              | Week Due                      | Mark       | Proportion of Final Assessment | Aligned Course Learning Outcomes (CILOs symbols) |
|--------------|--|-------------------------------|------------|--------------------------------|--|
| 8.           | Attendance, Participation, reports and quizzes | All Weeks                     | 10         | 7%                             | a1-4, b1-5, d1-3                                 |
| 9.           | Quizzes and Homework-assignments               | Sporadic through the semester | 10         | 7%                             | a1-5, b1-3, d1-3                                 |
| 10           | Attendance, Practical Reports                  | All Weeks                     | 15         | 10%                            | c1-4   |
| 11           | Practical mid-semester exam                    | 8 <sup>th</sup>               | 15         | 10%                            | c1-4   |
| 12           | Theoretical mid-semester exam                  | 8 <sup>th</sup>               | 30         | 20%                            | a1, a2, a3, b1, b3                               |
| 13           | Final Exam (theoretical)                       | 16 <sup>th</sup>              | 50         | 33%                            | a1-4, b1-5                                       |
| 14           | Final Exam (practical)                         | 16 <sup>th</sup>              | 20         | 13%                            | c1-4   |
| <b>Total</b> |  |                               | <b>150</b> | <b>100%</b>                    |  |

### VII. Students' Support:

| Office Hours/week | Other Procedures (if any) |
|-------------------|---------------------------|
|-------------------|---------------------------|

رئيس الجامعة  
إ.د. القاسم محمد عباس

مركز التطوير الأكاديمي وضمان الجودة  
إ.د. هدى العماد

عميد الكلية  
إ.د. خالد الشويه

وحدة ضمان الجودة  
إ.د. محمود البريهي





|                            |      |
|----------------------------|------|
| Two contact hours per week | None |
|----------------------------|------|

|   |  |
|---|--|
| <b>VIII. Learning Resources:</b>  |  |
| <b>1- Required Textbook(s) ( maximum two ).</b>   |  |
|   | 3- Katzung–Basic and Clinical Pharmacology, (2007), McGraw-Hill<br>4- Rang, Dale and Ritter. Pharmacology, (2007), Churchill Livingstone.  |
| <b>2- Recommended Books and Reference Materials.</b>  |  |
|   | 4. Richard A. Harvey. Lippincott's Pharmacology, 2000, Lippincott William and Wilkins.<br>5. Udaykumar. Text Book of Medical Pharmacology<br>6. Lectures Notes and Practical Manual.   |
| <b>3- Electronic Materials and Web Sites etc.</b>   |  |
|   | <a href="http://www.en.wikipedia.org/">www.en.wikipedia.org/</a>   |
| <b>IX. Facilities Required:</b>   |  |
| <b>1 - Accommodation:</b>   | - Well-equipped lecture halls with data show facilities, whiteboards, net connection, etc.<br>- Well-equipped laboratories with all required equipment and reagents.   |
| <b>3 - Computing resources:</b>   | - Computer laboratory with internet facilities.  |
| <b>X. Course Improvement Processes:</b>   |  |
| <b>6- Strategies for obtaining student feedback on effectiveness of teaching</b>              |  |
|   | <ul style="list-style-type: none"> <li>▪ Student-based assessment of the effectiveness of teaching using a questionnaire designed by the Quality Assurance Unit at the end of the semester.</li> <li>▪ Meeting with students and faculty (once per semester).</li> </ul> |
| <b>7- Other strategies for evaluation of teaching by the instructor or by the department.</b> |  |
|   | <ul style="list-style-type: none"> <li>▪ Assessment of the course syllabus and contents by the teachers using a questionnaire designed by the Quality Assurance Unit of the university at the end of the semester.</li> </ul>  |



|   |   |
|---|---|
|   | <ul style="list-style-type: none"> <li>Regular meeting and discussion of the course content between the Head of Department and the teaching staff of the course (for theory and practice).</li> </ul>   |
| <b>8- Processes for improvement of teaching.</b>  |   |
|   | <ul style="list-style-type: none"> <li>Revision of the course specification and its teaching strategies every three academic years after consideration of all issues raised by the teachers and/or students during regular meetings and discussions.</li> <li>Exploring any possible defects in the course that might be encountered by the teaching staff and their mitigation in subsequent improved versions of course specification.</li> </ul>                                   |
| <b>9- Processes for verifying standards of students' achievement</b>                                  |   |
|   | <ul style="list-style-type: none"> <li>Checking of a sample of students' work by an independent faculty member.</li> <li>Periodic exchange and check marking of a sample of students' assignments with a faculty member from another institution.</li> <li>Adoption of scoring rubrics to assess the students' achievement (both for ongoing or summative assessments).</li> <li>Regular follow-up of laboratory logbooks to assess the practical achievement of students.</li> </ul> |
| <b>10- Procedures for periodically reviewing of course effectiveness and planning for improvement</b> |   |
|   | <ul style="list-style-type: none"> <li>Student rating and feedback</li> <li>Peer rating and feedback</li> <li>Regular meeting of the Curriculum Committee of the faculty.</li> </ul>  |
| <b>6- Course development plans</b>  |   |
|   | <ul style="list-style-type: none"> <li>Conducting regular workshops for the staff for improving their course specification skills.</li> <li>Regular revision of course specification and syllabus items.</li> </ul>   |

## IX. Course Policies: (including plagiarism, academic honesty, attendance etc)



The University Regulations on academic misconduct will be strictly enforced. Please refer to -----

|   |   |
|---|---|
| 1 | <b>Class Attendance:</b> <ul style="list-style-type: none"><li>Attendance of all lectures and practical sessions is required. Unexcused absence exceeding 25% of the lectures or practical sessions will disqualify the student from entering the final exam.</li></ul>                                 |
| 2 | <b>Tardy:</b> <p>- Roll will be called in the very beginning of each lecture and practical class. Retardation for more than three weeks without a reasonable excursion, the student involved shall not be allowed to attend the class any longer and consequently shall be considered to be absent.</p> |
| 3 | <b>Exam Attendance/Punctuality:</b> <ul style="list-style-type: none"><li>Exam attendance is obligatory unless being excused by the department and faculty.</li><li>Absence from assignments or exams will be dealt with according to the general policy of the university.</li></ul>                   |
| 4 | <b>Assignments &amp; Projects:</b> <ul style="list-style-type: none"><li>Assignments: Written and oral; Laboratory logbook signed by the responsible demonstrator.</li><li>Projects: Not applicable.</li></ul>  |
| 5 | <b>Cheating:</b> <ul style="list-style-type: none"><li>Punishment of cheating will be according to the general policy of the university in this respect.</li></ul>  |
| 6 | <b>Plagiarism:</b> <ul style="list-style-type: none"><li>Plagiarism in written essays, reports, etc. is not accepted, and students who plagiarize the works of others will be punished according to the general policy of the university.</li></ul>   |
| 7 | <b>Other policies:</b> <ul style="list-style-type: none"><li>General policies of the Students' Affairs of the University and the Quality Assurance Unit.</li></ul>  |