Program and Courses
Specifications for
MD
Clinical Pharmacology

**CODE: MD06-PHAR**

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**Department of Clinical Pharmacology**

**Faculty of Medicine**

**Menoufia University**

**2010-2011**
# Contents of clinical Pharmacology MD

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<td></td>
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<td></td>
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Program Specification of MD Clinical Pharmacology

Menoufia University
Faculty of Medicine

A-Administrative Information

Program Title: (MD) of clinical Pharmacology
Award / degree: (MD) of clinical Pharmacology
Program type: single
Department responsible: Clinical pharmacology department
Coordinator: Dr/ Mohamed Farouk Ahmed
External Evaluators: - Prof. Dr./Mohamed Ahdy Attia , professor of clinical pharmacology, Mansoura University.
Date of program accreditation: 11/2010

B-Professional Information:

1. Program Aims:

By the end of the program the candidate will be able to understand the fundamental information and general principle underlying the use of different pharmacological agents.

- Perfect the bases and methods of medical research.
- Enrich pharmacology field through original medical researchers.
- Apply analytical and critical methods when dealing with medical problems.
- Deeply oriented with the current medical problems, and up to date hypothesis in pharmacology.
- Detect professional problems and suggest innovative solutions.
- Perfect large scale of professional skills in his specialty.
- Adopt positive attitude towards the development of new modalities and methods of professional practice in pharmacology.
- Perfect use of technological tools needed in his practice.
- Communicate and lead team in systematic professional manner.
- Effectively manage available resources, planning to increase it, and develop new resources.
- Oriented with his role in community development, and environmental safety.
- React in professional manner reflecting his commitment towards impartiality, credibility, medical ethics, and responsibilities.
- Commit to continuous self development and transfer of his medical experience to others.
2-Intended Learning Outcomes (ILOs) for program

A-Knowledge and Understanding:
By the end of the program the candidate should be able to:

a.1- Describe updates of drug-receptors interactions, pharmacodynamics and pharmacokinetics in depth understanding equations used.

a.2- Discuss the mechanism of action of drugs at molecular and sub molecular levels in an advanced and updated manner.

a.3- Assess different research trial designs.

a.4- Evaluate important drug adverse reactions and pharmacovigilance.

a.5- Discuss important mechanisms of actions of overdose or poisoning and how to manage.

a.6- Explain the basis of evidence based pharmacology.

a.7- Mention the principles of quality assurance in therapy.

a.8- Mention the effect of medical practice on surrounding environment, and how to develop and protect environment.

a.9- Apply ethics of medical research and of professional practice.

b- Intellectual Skills
The postgraduate degree provides opportunities for candidates to achieve and demonstrate the following intellectual qualities:

b.1- Interpret phase studies of drug action in human.

b.2- Apply pharmacokinetic principles to optimize drug administration and effect.

b.3- Evaluate risk in medical practice.

b.4- Innovate solutions to medical problems in clinical pharmacology.

b.5- Plan medical research to add new to his specialty.

b.6- Suggest rational therapeutic strategies for both acute and chronic clinical conditions and take into account the various variable that influence these strategies and evaluate risks in medical practice.

b.7- Judge the need for individualization of therapy when necessary.

b.8- Diagnose the possibility that clinical events are drug-related.

c- Professional and Practical Skills
By the end of the program, candidate should be able to:

c.1- Practice perfectly basic and recent professional medical skills in clinical pharmacology.

c.2- Perform laboratory experiments safely.

c.3- Use updated equipments related to the field of clinical pharmacology appropriately.

c.4 - Perform the different methods of drug evaluation.
c.5-Write and evaluate a professional medical report related to clinical pharmacology.

**D-General and Transferable Skills**

By the end of the program, candidate should be able to:
d.1- Communicate effectively with his colleagues patients, students and laboratory technicians.
d.2- Use proficiently different learning resources to develop professional practice and education.
d.3- Set parameters for evaluations of junior staff, students and lab technicians.
d.4- Select trial design, recruit research subjects, obtain consent and keep records.
d.5- Manage scientific seminars, with good time management.
d.6- Lead properly health care and academic medical educational and research teams.
d.7- Apply self evaluation and specify his medical educational needs, and perform continuous medical educations.

3-The Academic References standards of MD pharmacology in Menoufia faculty of Medicine:

3a- Academic Reference Standards (ARS) Menoufia academic reference standards for MD degree postgraduate students of clinical Pharmacology (Annex 1): for this program were compiled according to the general Academic Reference Standards provided by the national authority for quality assurance and accreditation of education (naqae) for postgraduate programs (published on February 2009). This program ARS were approved by the faculty council on 19/9/2010 decree NO. 45/1/9/2010

3b. Comparison between ARS and ILOS of the program (Annex 2).

4-Program Structure and Contents

4.a- Program duration (credit hours): 60 hours
4.b- Program structure:-
   - First part covered in (6 credit hours).
   - Second part covered in (30 credit hours).
   - No. of hours per week in each year / semester:-
     First part covered in (6 credit hours).
     - Include: Basic pharmacology, 3 credit hours.
- Optional courses, 3 credit hours.

**Second part covered in (30 credit hours).**
- Include: Clinical pharmacology, 28 credit hours.
- Optional courses, 2 credit hours.
- Log Book 9 credit hours
- Thesis 15 credit hours

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**5. Courses contributing to the program**

**5.1. First Semester**

**A. Compulsory**
- Code No.: PHAR 811
- Course Title: Basic Pharmacology
- No. of hours/week: covered in (3 credit hours).
- Program ILOs covered: Annex 3

**b. Optional – number required**
- Code No.: PHAR 812, 816, 817, 818, 8111
- Course Title: Receptors & channels
- No. of hours/week: covered in (3 credit hours).

**5.2. Second Semester**

**A. Compulsory**
- Code No.: PHAR 817
- Course Title: Clinical Pharmacology
- No. of hours/week: covered in (28 credit hours).
- Program ILOs covered: Annex 3

**b. Optional – number required**
- Code No.: PHAR 818
- Course Title: Receptors & channels
- No. of hours/week: covered in (2 credit hours).

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**6. Program Course ILOs Matrix (Annex 3)**

**7. Program admission requirements**
- Master degree in clinical pharmacology

**8. Regulations for progression and Program completion**

**First year / Level / Semester:**
- attendance criteria: minimum acceptance attendance is 75%

**Second year / Level / Semester:**

- log book should be fulfilled and signed by head of department

9. Evaluation of program intended learning outcomes

Evaluators:
Senior students: Tool: Questionnaire   Sample: 20
Alumni: Tool: Questionnaire   Sample: graduates of last year.
External Evaluator(s) External Examiner (s): Tool: reports
Others: ...........................

We verify that all of the information required to deliver this program is contained in the above specification and will be implemented. All course specification for this program are in place.

Program coordinator:
Name: Dr. Mohamed Farouk
Dean:
Name: ..........................
Head of Quality Assurance Unit:
Name: Prof.Dr. Wafaa Zahran
Course Specification of Basic pharmacology for MD of Clinical Pharmacology

A- Administrative Information

Course Title: Basic pharmacology
Code: PHAR811
Program title: MD of clinical pharmacology.
Department giving the program: Clinical pharmacology department.
Department offering the course: Clinical pharmacology department.
Academic Level: First part.
No. of credit hours: 3 lectures: 2 credit hours. Practical: 1 credit hours
Authorization date of Course specification: 2010

B- Professional Information:

1- Overall course aims:

By the end of the course the candidate will be able to understand the fundamental information and general principle underlying the use of different pharmacological agents.
- Perfect the bases and methods of medical research.
- Enrich pharmacology field through original medical researchers.
- Detect professional problems and suggest innovative solutions.
- Perfect use of technological tools needed in his practice.

2- Intended learning outcomes (ILOs):

a- Knowledge and understanding:

By the end of the course the candidate should be able to:

a.1- Describe principles of drug-receptors interactions, pharmacodynamics and pharmacokinetics in depth discussing equations used.

a.2- Identify and outline the mechanism of action of drugs at molecular and submolecular levels in an advanced and updated manner.

a.3- Explain the basis of evidence based pharmacology.

b- Intellectual skills:

The postgraduate degree provides opportunities for candidates to achieve and demonstrate the following intellectual qualities:

b.1- Interpret phase studies of drug action in human.
b.2- Apply pharmacokinetic principles to optimize drug administration.
b.3- Analyze and manage adverse drug reactions.

c- Professional and Practical Skills:

By the end of the course, candidate should be able to:
c.1- Practice perfectly basic and recent professional medical skills in clinical pharmacology.
c.2- Diagnose the possibility that clinical events are drug-related.
c.3- Perform the different methods of drug evaluation.

d- General and transferable skills:

By the end of the course, candidate should be able to:
d.1- Review and analyze relevant literature, write trial protocols.
d.2- Use different learning resources to get knowledge and information.
d.3- Communicate effectively with his colleagues.

3- Course Content:

Credit hours: 3 hr
Lectures and seminars: 2 practical: 1

<table>
<thead>
<tr>
<th>Topic Title</th>
<th>Lectures &amp; Seminar</th>
<th>Lab.</th>
<th>Total</th>
</tr>
</thead>
</table>
| A - First Part:  
1 - Basic Pharmacology  
- introduction  
- dosage forms of drugs  
- routes of drug administration  
- evaluation of new drugs  
- prescription writing  
- adverse drug reaction  
- pharmacokinetics  
- pharmacodynamics  
- influence of disease on pharmacokinetics and pharmacodynamics  
- Drugs at the extremes of age  
- drug interaction | 3 | 3 | 6 |
| | 3 | 3 | 6 |
| | 3 | 3 | 6 |
| | 3 | 3 | 6 |
| | 3 | 3 | 6 |
| | 3 | 3 | 6 |
| | 3 | 3 | 6 |
| Total | 30 | 30 | 60 |
| Total credit hours | 2 | 1 | 3 |

1 credit hour = 15 hours theoretical
1 credit hour = 30 hours practical
4- Teaching And Learning Methods:
4.1- Lectures.

5- Assessment Rules:
5.1- attendance criteria: minimum acceptance attendance is 75%.
* Doctorate degree of clinical pharmacology (First Part).

<table>
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<tr>
<th>Tools</th>
<th>Marks</th>
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<tr>
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<td>٢٦</td>
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<td>٣٤</td>
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<td><strong>Total</strong></td>
<td>150</td>
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6- List of References:
6.1- Essential Books:
- Goodman and Gelmans, the pharmacological basis of therapeutics
- Rang and Dale of pharmacology
- Lippincott Illustrated Pharmacology Review
- Essential of medical pharmacology by Tripathi
- Laurence Clinical Pharmacology
- Principles of Clinical Pharmacology by Arther Atkinson and Others
- Practical pharmacology

6.2- Periodical
6.3- Web Sites:


We certified that all of the information required to deliver this course is contained in the above specification and will be implemented.

* Head of department:  Prof. Dr/ Adel Hussein Omar
* Course Coordinator: Dr/ Mohamed Farouk Ahmed
Course Specification of Receptors and Channels for MD of Clinical Pharmacology

A- Administrative Information

Course Title: Receptors and channels
Course code: PHAR 812
Program title: MD of clinical pharmacology (First Part).
Department giving the program: Clinical pharmacology department.
Department offering the course: Clinical pharmacology department.
Academic Level: First part.
No. of credit hours: 3 credit hours.
Authorization date of Course specification: 2010

B- Professional Information:

1- Overall course aims:

By the end of the course the candidate will be able to understand the fundamental information and general principle underlying the use of different pharmacological agents.

- Perfect the bases and methods of medical research.
- Enrich pharmacology field through original medical researchers.

2- Intended learning outcomes (ILOs):

a- Knowledge and understanding:

By the end of the course the candidate should be able to:

a.1- Describe principles of drug-receptors interactions, pharmacodynamics and pharmacokinetics in depth discussing equations used.

a.2- Identify and outline the mechanism of action of drugs at molecular and submolecular levels in an advanced and updated manner.

b- Intellectual skills:

The postgraduate degree provides opportunities for candidates to achieve and demonstrate the following intellectual qualities:

b.1- Interpret phase studies of drug action in human.

b.2- Apply pharmacokinetic principles to optimize drug administration.

b.3- Analyze and manage adverse drug reactions.
c- Professional and Practical Skills:
By the end of the course, candidate should be able to:
c.1- Perform laboratory experiments safely.
c.2- Diagnose the possibility that clinical events are drug-related.
c.3- Write and evaluate a professional medical report related to clinical pharmacology.

d- General and transferable skills:
By the end of the course, candidate should be able to:
d.1- Review and analyze relevant literature, write trial protocols.
d.2- Use different learning resources to get knowledge and information.
d.3- Communicate effectively with his colleagues.

3- Course Content:
First part: 3 credit hours.

<table>
<thead>
<tr>
<th>Topic Title</th>
<th>Lectures</th>
<th>Seminar</th>
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<tr>
<td>- receptors</td>
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<tr>
<td>- Ion channels</td>
<td>6</td>
<td>3</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>- drug transporters</td>
<td>6</td>
<td>3</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>- biochemical mechanism of drug toxicity</td>
<td>6</td>
<td>3</td>
<td>-</td>
<td>9</td>
</tr>
<tr>
<td>- biological markers of drug effects</td>
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<td><strong>Total</strong></td>
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**Total credit hours**

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<th>Lab.</th>
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<td>3</td>
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</table>

1 credit hour = 15 hours theoretical
1 credit hour = 30 hours practical
4-Student assessment methods

4.1 final written and oral exams

- 5- Assessment schedule          Final exams only
- 6- Weighting of assessments

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<tr>
<th>Tools</th>
<th>Marks</th>
<th>% of Total Marks</th>
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5-Teaching And Learning Methods:

4.1- Lectures.

6-List of References:

6.1- Essential Books:
- Goodman and Gelmans, the pharmacological basis of therapeutics
- Rang and Dale of pharmacology
- Lippincott Illustrated Pharmacology Review
- Essential of medical pharmacology by Tripathi
- Laurence Clinical Pharmacology
- Principles of Clinical Pharmacology by Arther Atkinson and Others
- Practical pharmacology

6.2- Periodical

6.3- Web Sites:
- direct
- www. Wiley Blackwell
- www. micromedix
- www.science

*We certified that all of the information required to deliver this course is contained in the above specification and will be implemented.*

*Head of department*: Prof. Dr/ Adel Hussein Omar  
Signature: Date:

*Course Coordinator*: Dr/ Mohamed Farouk Ahmed  
Signature: Date:
A- Administrative Information

Course Title: clinical pharmacology
Course code: PHAR 817
Program title: M D of clinical pharmacology (Second Part)
Department giving the program: Clinical pharmacology department.
Department offering the course: Clinical pharmacology department.
Academic Level: Second part.
No. of credit hours (28 hours):
-Authorization date of Course specification: 2010

B- Professional Information:

1-Overall course aims:

By the end of the course the candidate will be able to understand the fundamental information and general principle underlying the use of different pharmacological agents.

- Orient with the current medical problems, and up to date hypothesis in pharmacology.
- Perfect large scale of professional skills in his specialty.
- Adopt positive attitude towards the development of new modalities and methods of professional practice in pharmacology.
- Communicate and lead team in systematic professional manner.
- Effectively manage available resources, planning to increase it, and develop new resources.
- Oriented with his role in community development, and environmental safety.
- React in professional manner reflecting his commitment towards impartiality, credibility, medical ethics, and responsibilities.
- Commit to continuous self development and transfer of his medical experience to others.
2-Intended learning outcomes (ILOs):

a- Knowledge and understanding:
   By the end of the course the candidate should be able to:
   a.1- Describe different trial designs and principles of research ethics.
   a.2- Discuss important drug adverse reactions and pharmacovigillance
   a.3- Evaluate important mechanisms of actions of overdose or poisoning and how to manage.
   a.4- Describe common statistical tests and principles of qualification.
   a.5- Mention the principles of quality assurance in therapy.
   a.6- Mention the effect of medical practice on surrounding environment, and how to develop and protect environment.

b- Intellectual skills:
   The postgraduate degree provides opportunities for candidates to achieve and demonstrate the following intellectual qualities:
   b.1- Apply the appropriate statistical methods for clinical trials and proper design of clinical trial.
   b.2- Plan medical research to add new to his specialty.
   b.3- Suggest rational therapeutic strategies for both acute and chronic clinical conditions and take into account the various variable that influence these strategies and evaluate risks in medical practice.
   b.4- Plan to develop progress in his career practice.
   b.5- Formulate medical research proper.

c- Professional and Practical Skills:
   By the end of the course, candidate should be able to:
   c.1- Design experimental work on isolated animal tissues and living animals to understand principles of biological responses.
   c.2- Identify the need for individualization of therapy when necessary.
   c.3- Diagnose the possibility that clinical events are drug-related.
   c.4- Perform laboratory experiments safely with appropriate equipment.
   c.5- Perform the different methods of drug evaluation.

d- General and transferable skills:
   By the end of the course, candidate should be able to:
   d.1- Communicate effectively with his colleagues.
   d.2- Practice team working and lead teams in specified professional jobs.
   d.3- Manage scientific seminars, with good time management, and develop their communicative abilities within the various formats of presentations.
d.4- Use current internet for appropriate drug database to reach information about a specific medications.

3- Course Content :
  - **Second part** covered in (15 month, 28 credit hours).
  - Include: Clinical pharmacology, 28 credit hours.

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<tr>
<td>1- Clinical Pharmacology</td>
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<tr>
<td>1- Autonomic Nervous System</td>
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<td>2- Autacoids</td>
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<td>3- Cardiovascular system</td>
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<td>4- Renal pharmacology</td>
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<td>5- Pharmacology of blood</td>
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<td>6- Chemotherapy</td>
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<td>7- Central Nervous system</td>
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<td>8- Respiratory System</td>
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<td>30</td>
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<td>9- Endocrine System</td>
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<td>2</td>
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<tr>
<td>10- Pharmacology of GIT</td>
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<td>30</td>
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<tr>
<td>11- Miscellaneous Topics</td>
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<tr>
<td>- vitamins</td>
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<td>- dermatological pharmacology</td>
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1 credit hour = 15 hours theoretical
1 credit hour = 30 hours practical

4- Teaching And Learning Methods :
4.1- Lectures.
4.2- Seminars.
4.3- Practical techniques.
5-Student assessment methods

5.1 final written, practical and oral exams
5.2 log book should be fulfilled and signed by head of department

Assessment schedule
Final exams

Weighting of assessments

<table>
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<tr>
<th>Tools</th>
<th>Marks</th>
<th>% of Total Marks</th>
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<tr>
<td>1- compulsory course :</td>
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<tr>
<td>- written exam</td>
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<td>- oral exam</td>
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</tr>
<tr>
<td>Total</td>
<td>1400</td>
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</tr>
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6-List of References:

6.1 Essential Books:
- Goodman and Gelmans, the pharmacological basis of therapeutics
- Rang and Dale of pharmacology
- Lippincott Illustrated Pharmacology Review
- Essential of medical pharmacology by Tripathi
- Laurence Clinical Pharmacology
- Principles of Clinical Pharmacology by Arther Atkinson and Others
- Practical pharmacology

6.2 Periodical

6.3 Web Sites:

We certified that all of the information required to deliver this course is contained in the above specification and will be implemented.

* Head of department: Prof. Dr/ Adel Hussein Omar
* Course Coordinator: Dr/ Mohamed Farouk Ahmed
# Course Specification of Clinical Pharmacology for MD of Clinical Pharmacology

## A- Administrative Information

<table>
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<tr>
<th>Course Title:</th>
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<td>Department giving the program:</td>
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<tr>
<td>Department offering the course:</td>
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<tr>
<td>Academic Level:</td>
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</tr>
<tr>
<td>No. of credit hours (2 hours):</td>
<td>Second part: 2 credit hours</td>
</tr>
<tr>
<td>Authorization date of Course specification:</td>
<td>2010</td>
</tr>
</tbody>
</table>

## B- Professional Information:

1. **Overall course aims:**
   - By the end of the course the candidate will be able to understand the fundamental information and general principle underlying the use of different pharmacological agents.
   - Perfect large scale of professional skills in his specialty.
   - Adopt positive attitude towards the development of new modalities and methods of professional practice in pharmacology.
   - Effectively manage available resources, planning to increase it, and develop new resources.
   - Oriented with his role in community development, and environmental safety.

2. **Intended learning outcomes (ILOs):**

   a. **Knowledge and understanding:**
      - By the end of the course, the candidate should be able to:
        a.1- Describe different trial designs and principles of research ethics.
        a.2- Discuss important drug adverse reactions and pharmacovigilance.
        a.3- Describe common statistical tests and principles of qualification.
        a.4- Mention the principles of quality assurance in therapy.
b-Intellectual skills:
   The postgraduate degree provides opportunities for candidates to achieve and demonstrate the following intellectual qualities:
b.1- Apply the appropriate statistical methods for clinical trials and proper design of clinical trial.
b.2- Plan medical research to add new to his specialty.
b.3- Plan to develop progress in his career practice.
c-Professional and Practical Skills:
   By the end of the course, candidate should be able to:
c.1- Design experimental work on isolated animal tissues and living animals to understand principles of biological responses.
c.2- Practice perfectly basic and recent professional medical skills in clinical pharmacology.
c.6- Perform the different methods of drug evaluation.
d-General and transferable skills:
   By the end of the course, candidate should be able to:
d.1- Communicate effectively with his colleagues.
d.2- Practice team working and lead teams in specified professional jobs.
d.3- Use current internet for appropriate drug database to reach information about a specific medications.

3-Course Content:
Second part covered in (3 month, 2 credit hours). - Include: Optional courses, 2 credit hours
<table>
<thead>
<tr>
<th>Topic Title</th>
<th>Lectures</th>
<th>Seminar</th>
<th>Lab.</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td>B- Second Part : 1- Optional Course</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- drugs induced electrolyte disturbances</td>
<td>5</td>
<td>2</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>- aging with diseases</td>
<td>4</td>
<td>2</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>- cognitive enhancers</td>
<td>4</td>
<td>1</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>- K-channel openers</td>
<td>4</td>
<td>2</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>- the channelopathies</td>
<td>4</td>
<td>2</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>- biological response modifiers</td>
<td>4</td>
<td>1</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
<td>10</td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>Total credit hours</td>
<td>1.5</td>
<td>0.5</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

1 credit hour = 15 hours theoretical
1 credit hour = 30 hours practical

4- Teaching And Learning Methods :
4.1- Lectures.
4.2- Seminars.

5- Student assessment methods
5.1- attendance criteria : minimum acceptance attendance is 75 %.
5.2- log book should be fulfilled and signed by head of department
5.3- final written and oral exams
- Assessment schedule
Final exams
6- Weighting of assessments

<table>
<thead>
<tr>
<th>Tools</th>
<th>Marks</th>
<th>% of Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- Optional course :</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- written exam</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>- oral exam</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>\ldots</td>
</tr>
</tbody>
</table>

6-List of References:

6.1- Essential Books:
- Goodman and Gelmans, the pharmacological basis of therapeutics
- Rang and Dale of pharmacology
- Lippincott Illustrated Pharmacology Review
- Essential of medical pharmacology by Tripathi
- Laurence Clinical Pharmacology
- Principles of Clinical Pharmacology by Arther Atkinson and Others
- Practical pharmacology

6.2- Periodical
6.3- Web Sites:

We certified that all of the information required to deliver this course is contained in the above specification and will be implemented.

* Head of department: Prof. Dr/ Adel Hussein Omar
* Course Coordinator: Dr/ Mohamed Farouk Ahmed
Annex 1: The academic reference standards for Clinical Pharmacology Doctorate Program

Attributes of the graduate

1. Perfect the bases and methods of medical research in clinical pharmacology.
2. Enrich pharmacology field through original medical researchers.
3. Apply analytical and critical methods when dealing with medical problems.
4. Deeply oriented with the current medical problems, and up to date hypothesis in pharmacology.
5. Detect professional problems and suggest innovative solutions.
6. Perfect large scale of professional skills in clinical pharmacology.
7. Adopt positive attitude towards the development of new modalities and methods of professional practice in clinical pharmacology.
8. Perfect use of technological tools needed in clinical pharmacology.
9. Communicate and lead team in systematic professional manner.
10. Effectively manage available resources, planning to increase it, and develop new resources.
11. Oriented with his role in community development, and environmental safety.
12. React in professional manner reflecting his commitment towards impartiality, credibility, medical ethics, and responsibilities.
13. Commit to continuous self development and transfer of his medical experience to others.
15. Merge medical knowledge to hypothesize new relations and explain pathogenesis.
**a- Knowledge and understanding:**

By the end of the programs, the graduate should be able to understand the following:

a.1- The theories and principles and up to date of clinical pharmacology and related sciences in his career.

a.2- The effect of medical practice on surrounding environment and how to develop and protect environment.

a.3- The ethical and legal principles of medical and professional practice.

a.4- The principles of quality assurance of clinical pharmacology practice.

a.5- The principles, methods, ethics and various tools of medical research.

**b- Intellectual skills:**

By the end of the programs, the graduate should be able to:

b.1- Solve medical problems related to clinical pharmacology.

b.2- Plan to develop progress in clinical pharmacology practice.

b.3- Evaluate risk in medical practice.

b.4- Analyze and evaluate medical information to elicit new conclusion.

b.5- Make professional medical decisions according to different situations when facing medical problems.

b.6- Formulate medical research paper.

b.7- Perform medical research to add new in clinical pharmacology.

b.8- Innovate solutions to medical problems in clinical pharmacology.

b.9- Argue and discuss medical issue on evidence based manner.

**c- Professional and Practical Skills:**

By the end of the programs, the graduate should be able to:

C.1- Perfect basic and recent professional medical skills in clinical pharmacology.

C.2- Write and evaluate a professional medical report related to clinical pharmacology.

C.3- Evaluate medical methods and tools used in clinical pharmacology and shares in its development and progress.
c.4- Plan to develop his career and improve other performance.
c.5- use recent technological tools to serve his career.

d- General and transferable skills:

By the end of the programs, the graduate should be able to:
d.1- Teach other and evaluate them.
d.2- Communicate effectively with his colleagues.
d.3- Perfect basics of information technology using skills which serve his career development.
d.4- Apply self evaluation and specify his medical educational needs and perform continuous medical education.
d.5- Use different learning resources to get knowledge and information.
d.6- Practice team working and lead a team in specified professional job.
d.7- Manage scientific seminars, with good time management.
## Annex 2: Comparison between ARS & program ILOs

<table>
<thead>
<tr>
<th>ILOs</th>
<th>ARS</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.1 - Describe updates of drug-receptors interactions, pharmacodynamics and pharmacokinetics in depth understanding equations used.</td>
<td>a.1 - The theories and principles and up to date of clinical pharmacology and related sciences in his career.</td>
</tr>
<tr>
<td>a.8 - Mention the effect of medical practice on surrounding environment, and how to develop and protect environment.</td>
<td>a.2 - The effect of medical practice on surrounding environment and how to develop and protect environment.</td>
</tr>
<tr>
<td>a9 - Apply ethics of medical research and of professional practice.</td>
<td>a.3 - The ethical and legal principles of medical and professional practice.</td>
</tr>
<tr>
<td>a.7 - Mention the principles of quality assurance in therapy.</td>
<td>a.4 - The principles of quality assurance of clinical pharmacology practice.</td>
</tr>
<tr>
<td>a.3 - Assess different research trial designs. a9 - Apply ethics of medical research and of professional practice.</td>
<td>a.5 - The principles, methods, ethics and various tools of medical research.</td>
</tr>
<tr>
<td>b.4 - Innovate solutions to medical problems in clinical pharmacology.</td>
<td>b.1 - Solve medical problems related to clinical pharmacology.</td>
</tr>
<tr>
<td>b.5 - Plan medical research to add new to his specialty.</td>
<td>b.2 - Plan to develop progress in clinical pharmacology practice.</td>
</tr>
<tr>
<td>b.3 - Evaluate risk in medical practice</td>
<td>b.3 - Evaluate risk in medical practice.</td>
</tr>
<tr>
<td>b.1 - Interpret phase studies of drug action in human.</td>
<td>b.4 - Analyze and evaluate medical information to elicit new conclusion.</td>
</tr>
<tr>
<td></td>
<td>b.7- Judge the need for individualization of therapy when necessary.</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>b.5- Plan medical research to add new to his specialty.</td>
</tr>
<tr>
<td></td>
<td>b.5- Plan medical research to add new to his specialty.</td>
</tr>
<tr>
<td></td>
<td>b.7- Judge the need for individualization of therapy when necessary.</td>
</tr>
<tr>
<td></td>
<td>b.2- Discuss on evidence bases manner the applications of pharmacokinetic principles that optimize drug administration and effect.</td>
</tr>
<tr>
<td></td>
<td>c.1-Practice perfectly basic and recent professional medical skills in clinical pharmacology.</td>
</tr>
<tr>
<td></td>
<td>c.5-Write and evaluate a professional medical report related to clinical pharmacology.</td>
</tr>
<tr>
<td></td>
<td>c.4 - Perform the different methods of drug evaluation</td>
</tr>
<tr>
<td></td>
<td>c.3- Use updated equipments related to the field of clinical pharmacology appropriately.</td>
</tr>
<tr>
<td></td>
<td>c.1-Practice perfectly basic and recent professional medical skills in clinical</td>
</tr>
<tr>
<td>Pharmacology</td>
<td>d.3- Set parameters for evaluations of junior staff, students and lab technicians.</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>c.2- Perform laboratory experiments safely.</td>
<td>d.1- Teach other and evaluate them.</td>
</tr>
<tr>
<td>d.1- Communicate effectively with his colleagues, patients, students and laboratory technicians.</td>
<td>d.2- Communicate effectively with his colleagues.</td>
</tr>
<tr>
<td>d.2- Use proficiently different learning resources to develop professional practice and education.</td>
<td>d.3- Perfect basics of information technology using skills which serve his career development.</td>
</tr>
<tr>
<td>d.7- Apply self evaluation and specify his medical educational needs, and perform continuous medical education.</td>
<td>d.4- Apply self evaluation and specify his medical educational needs and perform continuous medical education.</td>
</tr>
<tr>
<td>d.2- Use proficiently different learning resources to develop professional practice and education.</td>
<td>d.5- Use different learning resources to get knowledge and information.</td>
</tr>
<tr>
<td>d.6- Lead properly health care and academic medical educational and research teams.</td>
<td>d.6- Practice team working and lead a team in specified professional job.</td>
</tr>
<tr>
<td>d.5- Manage scientific seminars, with good time management.</td>
<td>d.7- Manage scientific seminars, with good time management.</td>
</tr>
</tbody>
</table>
### Annex 3: Program – Course ILOs Matrix

| Course title                                      | a1 | a2 | a3 | a4 | a5 | a6 | A8 | A9 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | B8 | C1 | C2 | C3 | C4 | C5 | D1 | D2 | D3 | D4 | D5 | D6 | D7 |
|--------------------------------------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Basic Pharmacology (PHAR 811)                    | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  |
| Optional Course (PHAR 812)                       | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  |
| PHAR 817                                         | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  |
| PHAR 818                                         | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  | X  |