



Mansoura University  
Faculty of Pharmacy  
Quality Assurance Unit  
**Academic Reference Standards for  
Postgraduate Programs**



**Academic Reference Standards (ARS)**  
for  
**Master in Pharmaceutical Sciences**  
**(Analytical Chemistry)**

**Pharmaceutical Analytical Chemistry Department**

**ARS**

**Academic Year: 2021/2022**

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**Mansoura University**  
**Faculty of Pharmacy**  
**Quality Assurance Unit**  
**Academic Reference Standards for**  
**Postgraduate Programs**



Master Degree of Pharmaceutical Sciences (Analytical Chemistry)

The academic reference standard (ARS) for the Master Degree of Pharmaceutical Sciences program regarding attributes and capabilities of the graduates were based essentially on the General Academic Reference Standard of graduate studies published by National Authority for Quality Assurance and Accreditation of Education (NAQAA 2009) The following specific (ARS) for this program were approved by the faculty council (2017).

**I. Attributes of the graduate:**

The graduates of the Master Degree of Pharmaceutical Sciences (Analytical Chemistry) should be capable of:

- Applying the basics and methodologies of scientific research and manipulating its various tools in the field of analytical chemistry.
- Mastering of advanced knowledge, professional research skills, attitudes and values in the field of analytical chemistry and integrating with the relevant subjects in his/her professional practice.
- Recognizing the current issues in new techniques used for drug analysis.
- Adopting the scientific thinking approaches in subjects relevant to drug analysis in pharmaceutical preparation as well as biological fluids or drug quality control.
- Identifying and solving problems in the field of analytical chemistry.
- Mastering adequate range of specialized professional skills and using appropriate technology to improve his/her professional practice.
- Communicating effectively and having ability to participate and lead team works.
- Taking appropriate professional and scientific decisions in light of the available information.
- Providing the ability to critically analyze the impact and outcomes of research results.
- Training in ethical and legal aspects of scientific research.
- Employing the available resources to achieve and preserve the maximum benefit.
- Exhibiting awareness of his/her role in the community development and preservation of environment in response to regional global changes.



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- Reflecting commitment to integrity, credibility and rules of the pharmacy profession.
- Developing continuous self-academic and professional learning.

## **II. General Standards**

### **1. Knowledge and Understanding:**

Upon successful completion of the Program, graduates should be able to:

- 1.1 Identify the theories and fundamentals of analytical chemistry and other related fields.
- 1.2 Recognize the recent and advanced scientific developments in the field of analytical chemistry.
- 1.3 Detect all basic and new techniques used in the field of drug analysis and/or drug quality control.
- 1.4 Distinguish the value of ethics and legal issues of research and professional practice in analytical chemistry.
- 1.5 Identify principles and fundamentals of quality in professional practice in the field of drug analysis and/or drug quality control.
- 1.6 Illustrate the mutual interaction between the pharmaceutical professional practice and the surrounding environment.

### **2. Intellectual Skills**

Upon successful completion of the Program, graduates should be qualified to:

- 2.1 Analyze and evaluate information in the field of analytical chemistry
- 2.2 Deduce solutions for specialized problems in absence of some information
- 2.3 Integrate information to solve professional problems.
- 2.4 Develop methodological scientific studies on certain research problems.
- 2.5 Assess risk assessment of professional practice analytical chemistry.
- 2.6 Plan for development in pharmaceutical and analytical chemistry.
- 2.7 Generate professional decision in response to various professional contexts.

### **3. Professional and Practical Skills**

Upon completion of the program, graduates should be able to

- 3.1 Master basic and professional skills in analytical chemistry and related fields.
- 3.2 Assess methods and techniques used in drug analysis and drug quality control.
- 3.3 Write and evaluate professional research reports in analytical chemistry.



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#### **4. General and transferable skills:**

Upon completion of the program, graduates should be able to:

- 4.1 Communicate effectively by various methods
- 4.2 Utilize effectively information technology in professional practice development.
- 4.3 Perform self-assessment, continuous learning and identifying personal educational needs.
- 4.4 Use different resources to acquire knowledge and information.
- 4.5 Anticipate needs and risks in the research fields.
- 4.6 Work in a team and lead others in various professional contexts.
- 4.7 Manage time effectively.
- 4.8 Interpret and evaluate data available from scientific research.
- 4.9 Show awareness of ethics and legal issues of research and professional practice in analytical chemistry.

**Program Coordinator: Head of Department**

**Head of Department: Prof. Dr. Jenny Jehan Nasr**



**Program: Master in Pharmaceutical Sciences**  
*(Pharmaceutical Analytical Chemistry)*

**Department of Pharmaceutical Analytical Chemistry.**

**Program Specification**

**Academic Year: 2021/2022**

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## A-Basic Information

|   |   |  |
|---|---|--|
| 1 | Faculty                                 | Pharmacy   |
| 2 | Program Title:                          | Master in Pharmaceutical Sciences<br>( <i>Pharmaceutical Analytical Chemistry</i> )        |
| 3 | Program Type:                           | Single   |
| 4 | Department (s):                         | Department of <i>Pharmaceutical Analytical Chemistry</i>                                   |
| 5 | Final award:                            | Master degree in Pharmaceutical Sciences<br>( <b>Pharmaceutical Analytical Chemistry</b> ) |
| 6 | Coordinator:                            | Head of Department   |
| 7 | External Evaluator(s):                  | Prof. Dr. Shereen Hamad  |
| 8 | Date of Program Specification Approval: | Department council: 11/May /2022   |

## B-Professional Information

### 1-Program Aims

Upon successful completion of the program, graduates should demonstrate comprehensive knowledge, clear understanding and outstanding skills in pharmaceutical sciences and pharmaceutical analytical chemistry.

- 1.1 Mastering of advanced knowledge, professional research skills, attitudes and values in the field of analytical chemistry and integrating with the relevant subjects in his/her professional practice.
- 1.2 Applying the basics and methodologies of scientific research and manipulating its various tools in the field of analytical chemistry.
- 1.3 Master practical research procedures according to the good laboratory practice (GLP) basics in chemistry labs and perform experiments with safety guidelines.
- 1.4 Mastering of all traditional and new techniques used in drug quality control field, electrochemical methods and separation techniques.
- 1.5 Applying the scientific thinking approaches and problem-based learning in subjects relevant to development of new methods of drug analysis.
- 1.6 Formulating hypotheses based on current concepts in analytical chemistry field.



- 1.7 Designing and conducting research projects.
- 1.8 Analyze and interpret results and information acquired from primary literature sources.
- 1.9 Manipulate computer program, online database, software and other IT skills to get information and analyze the obtained research data.
- 1.10 Attaining communication skills, research ethics, time management, decision-making, and team-working.

## 2-Intended Learning Outcomes (ILOs)

### A. Knowledge and Understanding:

*By the end of this program the graduate should be able to:*

|    |   |
|----|---|
| A1 | Explain the theories and fundamentals of instrumental analysis, statistics and biostatistics, physical chemistry and bioinformatics.  |
| A2 | Explain the theories and fundamentals of quality control of drugs, electrochemical analysis and separation techniques.  |
| A3 | Recognize the current problems, the recent and advanced scientific development of drug analysis and/or drug quality control.  |
| A4 | Utilize effectively all basic and recent techniques and technological tools used in the field of electrochemical analysis as well as separation techniques in biological fluids and/or in different dosage forms. |
| A5 | Identify the legal and ethical issues of research and professional practice in analytical chemistry.  |
| A6 | Define the principles and the basics of quality in professional practice in the fields of analytical chemistry.   |
| A7 | Identify appropriate types of data needed to tackle a certain research problem.   |

### B. Intellectual Skills

*By the end of this program the graduate should be able to:*

|    |  |
|----|--|
| B1 | Analyze and evaluate the gained information in the field of instrumental analysis, biostatistics, physical chemistry, bioinformatics and drug development.                       |
| B2 | Demonstrate logic and critical way of thinking to suggest solutions for scientific and professional problems in the field of quality control and quantitative analysis of drugs. |
| B3 | Demonstrate creativity and innovative scientific and professional approaches regarding analysis of drugs by electrochemical methods and separation techniques.                   |
| B4 | Utilize the available professional and scientific resources and research skills to solve problems.   |
| B5 | Assess professional and scientific risks in practicing of drug analysis.   |





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|    |   |
|----|---|
| B6 | Plan to improve performance and research in the field of analytical chemistry.  |
| B7 | Interpret and validate the obtained research data.  |
| B8 | Recommend professional and scientific decisions based on proofs, evidences and available data.                                    |
| B9 | Participate in comprehensive scientific and professional discussions and communications based on scientific evidences and proofs. |

### C. Professional and Practical Skills

*By the end of this program the graduate should be able to:*

|    |   |
|----|---|
| C1 | Apply different statistical methods for data analysis and validation.   |
| C2 | Develop different research methodologies and good experimental and reporting skills in the quality control of drugs, electrochemical analysis and separation techniques.              |
| C3 | Manage safely and efficiently advanced technological research tools and equipments relevant to quality control of drugs, electrochemical analysis and separation techniques research. |
| C4 | Outline and illustrate suggested methods for quantitative analysis of drugs by electrochemical methods or separation techniques.  |
| C5 | Carry out scientific research and contribute to the knowledge in the field of analytical chemistry.   |
| C6 | Write accurately, evaluate professional reports and publish scientific research papers in scientific journals and conferences.  |
| C7 | Write thesis in a scientific and precise way.   |
| C8 | Illustrate the effect of his/her professional practice on the community in addition to different methods of environmental development and maintenance                                 |

### D. General and Transferable Skills

*By the end of this program the graduate should be able to:*

|    |  |
|----|--|
| D1 | Communicate clearly by verbal and written means.   |
| D2 | Manipulate computer program, online database, software and other IT to get information and analyze the obtained research data. |
| D3 | Practice self- assessment and learning needed for continuous professional development.   |
| D4 | Utilize different available information resources relevant to analytical chemistry.  |
| D5 | Promote critical thinking, problem-solving and decision-making capabilities.   |
| D6 | Deal with obstacles and problems.  |
| D7 | Work effectively in a team and offer expertise and advice to others  |
| D8 | Develop creativity and time management abilities.  |





|     |  |
|-----|--|
| D9  | Evaluate and criticize scientific work, literature and research data.      |
| D10 | Adopt ethical, legal, professional responsibilities and safety guidelines. |
| D11 | Develop presentation skills, give seminars and defend thesis in public.    |

### 3-Academic Reference Standards (ARS):

Approved by both the department and faculty councils

Department Council Approval Date: 17/9/2017

Faculty Council Approval Date: 9/2017

#### 3a- Academic References Standards: (Attached)

#### 3b-Comparison of provision to External References

**Achievement of academic reference standards via program Intended Learning Outcomes.**

| ILOs                                 | ARS | Program    |
|--------------------------------------|-----|------------|
| 1. Knowledge and Understanding       | 1.1 | A1, A2     |
|                                      | 1.2 | A3         |
|                                      | 1.3 | A4         |
|                                      | 1.4 | A5         |
|                                      | 1.5 | A6         |
|                                      | 1.6 | A6, A7     |
| 2. Intellectual Skills               | 2.1 | B1         |
|                                      | 2.2 | B2         |
|                                      | 2.3 | B2, B3,B   |
|                                      | 2.4 | B4         |
|                                      | 2.5 | B5         |
|                                      | 2.6 | B3, B6     |
|                                      | 2.7 | B8,B9      |
| 3. Professional and Practical Skills | 3.1 | C2,C3,C4   |
|                                      | 3.2 | C8         |
|                                      | 3.3 | C6, C7, C8 |
| 4. General and Transferable Skills   | 4.1 | D1         |
|                                      | 4.2 | D2         |
|                                      | 4.3 | D3         |
|                                      | 4.4 | D4         |
|                                      | 4.5 | D5, D6     |
|                                      | 4.6 | D7         |
|                                      | 4.7 | D8         |
|                                      | 4.8 | D9         |

### 4-Curriculum Structure and Contents

**4A. Program duration: 18 months from the date of registration -5 years.**

**4B. Program structure:**



- a- The program consists of 46 credit hours of study (16 credit hours of courses and 30 credit hours for thesis).
- b. The program includes 16 credit hours graduate courses. These courses include 8 credit hours of general required courses of the faculty requirement, in addition to 8 credit hours of special required (6 credit hours) and special elective (2 credit hours) courses. The courses will possess the code [200] according to Faculty By-Law.
- c. A scientific research thesis of 30 credit hours represent a main component of the program. It is achieved in a subject assigned by the supervision committee, endorsed by the Department Council, the committee of graduate studies & research and the Faculty Council.
- d. The student should publish at least one scientific research paper in scientific journals before the public defense of the Thesis..

#### 4c. Program Components

##### 1- Courses according to the By-law

| Code number     | Name of the course                       | Type                      | Credit Hours | Semester |
|-----------------|--|---------------------------|--------------|----------|
| (GCM-201)       | <i>Instrumental Analysis</i>             | <b>General</b> Compulsory | 2            | Fall     |
| (GCM-202)       | <i>Statistics and biostatistics</i>      | <b>General</b> Compulsory | 2            | Fall     |
| (GCM-203)       | <i>Physical chemistry</i>                | <b>General</b> Compulsory | 1            | Fall     |
| (GCM-204)       | <i>Bioinformatics</i>                    | <b>General</b> Compulsory | 1            | Fall     |
| (GCM-205)       | <i>Research Methodology &amp; Ethics</i> | <b>General</b> Compulsory | 1            | Fall     |
| (GCM-206)       | <i>Scientific writing and Seminar</i>    | <b>General</b> Compulsory | 1            | Fall     |
| (PAM-201)       | <i>Quality Control of Drugs</i>          | <b>Special</b> Compulsory | 2            | Spring   |
| (PAM-202)       | <i>Electrochemical Analysis</i>          | <b>Special</b> Compulsory | 2            | Spring   |
| (PAM-203)       | <i>Separation Techniques</i>             | <b>Special</b> Compulsory | 2            | Spring   |
| (PAM-204)       | <i>Therapeutic Drug Monitoring</i>       | elective                  | 2            | Spring   |
| (PAM-205)       | <i>Chemometrics</i>                      | elective                  | 2            | Spring   |
| (PAM-206)       | <i>Environmental Analysis</i>            | elective                  | 2            | Spring   |
| Total (Courses) |  |                           | 16           |          |
|                 | Thesis                                   |                           | 30           |          |
| Total           |  |                           | 46           |          |



## 5- Program Courses

### 1- Achievement of Program Intended Learning Outcomes via the courses

| Course  | C.H/<br>week | Program ILOs (by No.) |                                |                                |  |
|---|--------------|-----------------------|--------------------------------|--------------------------------|--|
|   |              | K.U*                  | IS**                           | P.P.S***                       | G.T.S****                                    |
| <b>First Semester - General Courses (8 C.H.)</b>        |              |                       |                                |                                |  |
| <i>Instrumental Analysis (GCM-201)</i>                  | 2            | A1, A4                | B1, B2                         | C2, C3                         | D1, D3, D5                                   |
| <i>Statistics and biostatistics (GCM-202)</i>           | 2            | A1                    | B1, B2, B7                     | C1                             | D1, D2, D3, D5                               |
| <i>Physical chemistry (GCM-203)</i>                     | 1            | A1                    | B1, B2                         | C4                             | D1, D3, D5                                   |
| <i>Bioinformatics (GCM-204)</i>                         | 1            | A1                    | B1, B2, B4                     | C5                             | D1, D3, D5, D9                               |
| <i>Research Methodology &amp; Ethics (GCM-205)</i>      | 1            | A5                    | B5                             | C2, C3, C8                     | D1, D3, D5, D10                              |
| <i>Scientific writing and Seminar (GCM-206)</i>         | 1            | A7                    | B6, B7, B8, B9                 | C6, C7                         | D1, D3, D5, D9, D11                          |
| <b>Total</b>  | <b>8</b>     |                       |                                |                                |  |
| <b>Second Semester - Special Courses (8 C.H.)</b>       |              |                       |                                |                                |  |
| <i>Quality Control of Drugs (PAM-201)</i>               | <b>2</b>     | A1, A2, A3            | B1, B2, B4, B5, B6, B8         | C1, C2, C3                     | D3, D4, D5, D8, D9, D10                      |
| <i>Electrochemical Analysis (PAM-202)</i>               | <b>2</b>     | A1, A2, A3, A4, A7    | B1, B2, B3, B4, B6, B7, B8     | C2, C3, C4, C6                 | D1, D2, D4, D5                               |
| <i>Separation Techniques (PAM-203)</i>                  | <b>2</b>     | A1, A2, A3, A4, A7    | B1, B2, B3, B4, B6, B7, B8     | C2, C3, C4, C6                 | D1, D2, D4, D5                               |
| <i>Therapeutic Drug Monitoring (PAM-204) (elective)</i> | <b>2(E)</b>  | A1, A6                | B1, B2, B7, B9                 | C1, C5, C8                     | D1, D2, D4, D7                               |
| <i>Chemometrics (PAM-205) (elective)</i>                | <b>2(E)</b>  | A1, A3, A7            | B1, B2, B4, B6, B7, B9         | C1, C5                         | D1, D2, D3, D4                               |
| <i>Environmental Analysis (PAM-206) (elective)</i>      | <b>2(E)</b>  | A5, A6, A7            | B2, B4, B7, B8, B9             | C1, C8                         | D2, D3, D9                                   |
| <b>Total</b>  | <b>8</b>     |                       |                                |                                |  |
| <i>Thesis</i>   | <b>30</b>    | A4, A5, A6            | B2, B3, B4, B5, B6, B7, B8, B9 | C1, C2, C3, C4, C5, C6, C7, C8 | D1, D2, D3, D4, D5, D6, D7, D8, D9, D10, D11 |
| <b>Total</b>  | <b>46</b>    |                       |                                |                                |  |

\* Knowledge and Understanding

\*\* Intellectual Skills



Mansoura University  
Faculty of Pharmacy  
Quality Assurance Unit  
**M. Sc. Program Specification**  
2021/2022  
Postgraduate Studies



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\*\*\* *Professional and Practical Skills*  
\*\*\*\* *General and Transferable Skills*



| Code      | Course title                    | K.U* |    |    |    |    |    |    | IS** |    |    |    |    |    |    |    |    |
|-----------|---------------------------------|------|----|----|----|----|----|----|------|----|----|----|----|----|----|----|----|
|           |                                 | A1   | A2 | A3 | A4 | A5 | A6 | A7 | B1   | B2 | B3 | B4 | B5 | B6 | B7 | B8 | B9 |
| 201       | Instrumental Analysis (GCM)     | √    |    |    | √  |    |    |    | √    |    |    | √  |    |    |    |    |    |
| 203       | Physical chemistry (GCM)        | √    |    |    |    |    |    |    | √    | √  |    |    |    |    |    |    |    |
| (PAM-201) | Quality Control of Drugs        | √    | √  | √  |    |    |    |    | √    | √  |    | √  | √  | √  |    | √  |    |
| (PAM-202) | Electrochemical Analysis        | √    | √  | √  | √  |    |    | √  | √    | √  | √  | √  |    | √  | √  | √  |    |
| (PAM-203) | Separation Techniques           | √    | √  | √  | √  |    |    | √  | √    | √  | √  |    |    | √  | √  | √  |    |
| (PAM-204) | Therapeutic Drug Monitoring (E) | √    |    |    |    |    | √  |    | √    | √  |    |    |    |    | √  |    | √  |
| (PAM-205) | Chemometrics (E)                | √    |    | √  |    |    |    | √  | √    | √  |    | √  |    | √  | √  |    | √  |
| (PAM-206) | Environmental Analysis (E)      |      |    |    |    | √  | √  | √  |      | √  |    | √  |    |    | √  | √  | √  |
|           |                                 |      |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |
|           |                                 |      |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |
|           |                                 |      |    |    |    |    |    |    |      |    |    |    |    |    |    |    |    |

\* Knowledge and Understanding

\*\* Intellectual Skills



| Code      | Course title                    | P.P.S*** |    |    |    |    |    |    |    | G.T.S**** |    |    |    |    |    |    |    |    |     |     |  |
|-----------|---------------------------------|----------|----|----|----|----|----|----|----|-----------|----|----|----|----|----|----|----|----|-----|-----|--|
|           |                                 | C1       | C2 | C3 | C4 | C5 | C6 | C7 | C8 | D1        | D2 | D3 | D4 | D5 | D6 | D7 | D8 | D9 | D10 | D11 |  |
| 201       | Instrumental Analysis (GCM)     |          | √  | √  |    |    |    |    |    | √         |    | √  |    | √  |    |    |    |    |     |     |  |
| 203       | Physical chemistry (GCM)        |          |    |    | √  |    |    |    |    | √         |    | √  |    | √  |    |    |    |    |     |     |  |
| (PAM-201) | Quality Control of Drugs        | √        | √  | √  |    |    |    |    |    |           |    | √  | √  | √  |    |    | √  | √  | √   |     |  |
| (PAM-202) | Electrochemical Analysis        |          | √  | √  | √  |    | √  |    |    |           |    |    |    |    |    |    |    |    |     |     |  |
| (PAM-203) | Separation Techniques           |          | √  | √  | √  |    | √  |    |    | √         | √  |    | √  | √  |    |    |    |    |     |     |  |
| (PAM-204) | Therapeutic Drug Monitoring (E) | √        |    |    |    | √  |    |    | √  | √         | √  |    | √  |    |    | √  |    |    |     |     |  |
| (PAM-205) | Chemometrics (E)                | √        |    |    |    | √  |    |    |    | √         | √  | √  | √  |    |    |    |    |    |     |     |  |
| (PAM-206) | Environmental Analysis (E)      | √        |    |    |    |    |    |    | √  |           | √  | √  |    |    |    |    |    | √  |     |     |  |
|           |                                 |          |    |    |    |    |    |    |    |           |    |    |    |    |    |    |    |    |     |     |  |

\*\*\* Professional and Practical Skills  
 \*\*\*\* General and Transferable Skills  
 E Elective course



## 6- Program Admission Requirements

- 7.1- The candidate should hold a bachelor degree in pharmacy from any faculty of pharmacy from Egypt or Arabian countries or foreign universities recognized by the Supreme Council of Universities recognized by the Supreme Council of Universities with minimum general grade of "**Good**". Candidates having Diploma in the area of specialty are preferred. It is possible to enroll foreign students with general grade "**Good**".
- 7.2- The candidate should be available for study at least two days per week throughout the duration of study.
- 7.3- The candidate should possess at least grade "**Good**" in the subject of the specialty.
- 7.4- The department council starts the registration process for the candidate after his/her successful passing of the general courses of the first semester.
- 7.5- The candidate should follow postgraduate rules of by-law (2014) and its modified by-law (2017) of Faculty of Pharmacy-Mansoura University.

## 8- Regulations for progression and program completion

- 8.1- The minimum duration of time to gain the master degree is two years from the date of enrollment or 18 months from the date of registration of the master thesis.
- 8.2- The maximum duration of time to gain the master degree is 5 years from the date of registration, putting in consideration the periods of enrollment suspension. It is possible to extend this period up to two years (one year at a time) based on a request from the candidate's major supervisor, a suggestion from the department council and the committee of graduate studies & research and the approval of the faculty council. The final decision should be endorsed by the university council of graduate studies & research.
- 8.3- The student has to pass the assigned courses, and to practically do a scientific research thesis for complete fulfilment of the master degree.
- 8.4- An annual progress report is presented by the supervisors of thesis to the Dept Council by December.
- 8.5- The candidate should follow postgraduate rules of by-law (2014) and its modified by-law (2017) of Faculty of Pharmacy-Mansoura University.

## 9- Facilities Required for Search:

- 9.1- Computers.
- 9.2- Library and digital library supplied by recent scientific books and journals.
- 9.3- Laboratories with enough chemicals, apparatus and advanced instruments.





9.4- Access to research engines for scientific periodicals in the field of *Pharmaceutical Analytical Chemistry*

### 10-Thesis

A thesis should be prepared by the student for complete fulfillment of the master degree.

### 11- Evaluation of program

| Evaluator             | Method                                   | Sample   |
|-----------------------|--|--|
| Internal evaluator    | Program evaluation<br>Courses evaluation | Program report<br>Courses report                             |
| External evaluator    | Program evaluation<br>Courses evaluation | Program report<br>Courses report                             |
| Stakeholders          | Questionnaires                           | To be Attached   |
| Postgraduates         | Questionnaires                           | To be Attached   |
| Self-evaluation       | Matrices                                 | To be Attached   |
| Supervisors of Thesis | Reports                                  | Reports of staff members of committee to evaluate the thesis |

**Program Coordinator:** Head of Department

**Head of Department:** Prof. Dr. Prof. Dr. Jenny Jehan Nasr

**Signatuer:**

**Date:**



**Program: Master in Pharmaceutical Sciences**  
*(Pharmaceutical Analytical Chemistry)*

**Department of Pharmaceutical Analytical Chemistry.**

**Master Thesis Specification**

**Academic Year: 2021/2022**

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signature



## A-Basic Information

|   |  |   |
|---|--|---|
| 1 | Faculty                                    | Pharmacy  |
| 2 | Program Title:                             | Master in Pharmaceutical Sciences<br>(Pharmaceutical Analytical Chemistry)        |
| 3 | Program Type:                              | Single  |
| 4 | Department (s):                            | Department of Pharmaceutical Analytical<br>Chemistry.                             |
|   | Total credits of the<br>Thesis             | 42 C. H.  |
|   | Total credits of the<br>Program            | 50 C.H.   |
| 5 | Final award of the<br>Program:             | Master degree in Pharmaceutical Sciences<br>(Pharmaceutical Analytical Chemistry) |
| 6 | Coordinator:                               | Head of Department  |
| 7 | External Evaluator(s):                     | Prof. Dr. Shereen Hamad   |
| 8 | Date of Program<br>Specification Approval: | <i>Department council: 11/May 2022,</i><br><i>Faculty council: May/2022</i>       |

## B-Professional Information

### 1-Aims

#### The overall aims of the thesis:

- 1.1 Mastering of advanced knowledge, professional research skills, attitudes and values in the field of analytical chemistry and integrating with the relevant subjects in his/her professional practice.
- 1.2 Applying the basics and methodologies of scientific research and manipulating its various tools in the field of analytical chemistry.
- 1.3 Master practical research procedures according to the good laboratory practice (GLP) basics in chemistry labs and perform experiments with safety guidelines.
- 1.4 Mastering of all traditional and new techniques used in drug quality control field, electrochemical methods and separation techniques.
- 1.5 Applying the scientific thinking approaches and problem-based learning in subjects relevant to development of new methods of drug analysis.



## 2-Intended Learning Outcomes (ILOs)

### a. Knowledge and Understanding:

*Upon successful completion of the thesis, the graduate should be able to efficiently demonstrate the essential knowledge and understanding of:*

|    |    |   |
|----|----|---|
| A4 | a1 | Utilize effectively all basic and recent techniques and technological tools used in the field of electrochemical analysis as well as separation techniques in biological fluids and/or in different dosage forms. |
| A5 | a2 | Identify the legal and ethical issues of research and professional practice in analytical chemistry.  |
| A6 | a3 | Define the principles and the basics of quality in professional practice in the fields of analytical chemistry.   |

### b. Intellectual Skills

*By the end of this thesis, the graduate should be able to:*

|    |    |  |
|----|----|--|
| B2 | b1 | Demonstrate logic and critical way of thinking to suggest solutions for scientific and professional problems in the field of quality control and quantitative analysis of drugs. |
| b3 | b2 | Demonstrate creativity and innovative scientific and professional approaches regarding analysis of drugs by electrochemical methods and separation techniques.                   |
| B4 | b3 | Utilize the available professional and scientific resources and research skills to solve problems  |
| B5 | b4 | Assess professional and scientific risks in practicing of drug analysis.   |
| B6 | b5 | Plan to improve performance and research in the field of analytical chemistry.   |
| B7 | b6 | Interpret and validate the obtained research data.   |
| B8 | b7 | Recommend professional and scientific decisions based on proofs, evidences and available data.   |
| B9 | b8 | Participate in comprehensive scientific and professional discussions and communications based on scientific evidences and proofs.  |

### c. Professional and Practical Skills

*By the end of this thesis, the graduate should be able to:*

|    |    |   |
|----|----|---|
| C1 | c1 | Apply different statistical methods for data analysis and validation.   |
| C2 | c2 | Develop different research methodologies and good experimental and reporting skills in the quality control of drugs, electrochemical analysis and separation techniques.              |
| C3 | c3 | Manage safely and efficiently advanced technological research tools and equipments relevant to quality control of drugs, electrochemical analysis and separation techniques research. |



|    |    |   |
|----|----|---|
| C4 | c4 | Outline and illustrate suggested methods for quantitative analysis of drugs by electrochemical methods or separation techniques.                      |
| C5 | c5 | Carry out scientific research and contribute to the knowledge in the field of analytical chemistry.   |
| C6 | c6 | Write accurately, evaluate professional reports and publish scientific research papers in scientific journals and conferences.                        |
| C7 | c7 | Write thesis in a scientific and precise way.   |
| C8 | c8 | Illustrate the effect of his/her professional practice on the community in addition to different methods of environmental development and maintenance |

#### d. General and Transferable Skills

*By the end of this thesis, the graduate should be able to:*

|     |     |  |
|-----|-----|--|
| D1  | d1  | Communicate clearly by verbal and written means.   |
| D2  | d2  | Manipulate computer program, online database, software and other IT to get information and analyze the obtained research data. |
| D3  | d3  | Practice self- assessment and learning needed for continuous professional development.   |
| D4  | d4  | Utilize different available information resources relevant to analytical chemistry.  |
| D5  | d5  | Promote critical thinking, problem-solving and decision-making capabilities.   |
| D6  | d6  | Deal with obstacles and problems.  |
| D7  | d7  | Work effectively in a team and offer expertise and advice to others  |
| D8  | d8  | Develop creativity and time management abilities.  |
| D9  | d9  | Evaluate and criticize scientific work, literature and research data.  |
| D10 | d10 | Adopt ethical, legal, professional responsibilities and safety guidelines.   |
| D11 | d11 | Develop presentation skills, give seminars and defend thesis in public.  |

### 3- Thesis Contents:

| Part | Topics  |
|------|---|
| 1    | Abstract (Arabic and English)                   |
| 2    | Introduction                                    |
| 3    | Aims, Objectives and Rational of the work       |
| 4    | Results and Discussion, covering all fields     |
| 5    | Methodology and Experimental Work of all fields |
| 6    | Conclusion                                      |
| 7    | References                                      |



#### 4- Matrix of knowledge and skills of the Thesis:

| Part | Topics                 | Course ILOs |            |          |            |
|------|------------------------|-------------|------------|----------|------------|
|      |                        | K.U*        | IS**       | P.P.S*** | G.T.S****  |
| 2    | Introduction           | a1          |            | c1, c7   | d1, d2, d3 |
| 3    | Objectives/Rational    | a2          | b1, b2, b5 | c2, c3   | d5, d6, d7 |
| 4    | Results and Discussion |             | b8, b6     | c6, c7   | d8, d9     |
| 5    | Experimental Work      | a1          | b3         | c5       | d4         |
| 6    | Conclusion             |             | b7         | c8       | d10, d11   |

\* Knowledge and Understanding    \*\*Intellectual Skills    \*\*\*Professional and Practical Skills    \*\*\*\*General and Transferable Skills

#### 5. Student Assessment:

|                             |   |
|-----------------------------|---|
| A written Thesis            | √ |
| Published Research Paper(s) | √ |
| Public Defense              | √ |
| Committee-in-Charge Report  | √ |
| Dept Council Approval       | √ |

#### Guidelines of the Thesis (according to By-Law).

- 1- The minimum period for obtaining a PhD is two years from the date of approval of the University's Graduate Studies Council for registration.
- 2- The maximum limit for obtaining a doctoral degree is five years from the date of registration, taking into account cases of suspension of registration, and registration may be extended upon the request of supervisors and the approval of the relevant department council, the Graduate Studies and Research Committee, and the College Board for an academic year with a maximum of two years.
- 3- The student must pass the English Language Examination with the minimum score specified by the University Studies Board to approve the PhD defense date.
- 4- The total number of credit hours for obtaining a doctoral degree is 50 credit hours (8 course hours, 42 credit hours per thesis).
- 5- The student conducts a research on a topic determined by the supervisory committee and approved by the relevant department council and the college, graduate studies and research councils.
- 6- The researcher submits, before registering for the academic degree, the research plan in a public discussion in the department to discuss the topic of the thesis, determine the objectives of the research, the extent of its application, potential problems and how to overcome them.
- 7- After the approval of the Graduate Studies and Research Committee and the College Board, the scientific departments develop specialized courses from code (300) whose number of credit hours does not exceed 8 hours, and their average points are not less than 2.00, and these hours are calculated within the hours prescribed for the program.
- 8- The scientific thesis is the responsibility of the relevant department council and is accomplished scientifically and technically under the responsibility of the supervisory committee. Scientific,





**Mansoura University**  
**Faculty of Pharmacy**  
**Quality Assurance Unit**  
**Master Thesis Specification**  
**2021/2022**  
**Postgraduate Studies**



technical and administrative support must be provided to the researcher for its completion, and the supervision committee is formed as follows:

9- The College Council, upon the proposal of the relevant Department Council, appoints a professor who supervises the thesis (principal supervisor). The council may entrust the supervision of the thesis to one of the assistant professors.

10- It is permissible for the supervisors to be many professors or assistant professors, and teachers may participate with a maximum of one in the same specialty.

11- A member from abroad who has experience in the specialty to which the dissertation belongs may be joined to the supervision committee.

12- The student should meet his main supervisor at least once monthly and a semi-annual report must be provided by the supervisor(s) on the progress of student to the department council and the Graduate Studies Committee and the graduate should be given a copy of the report. The annual report must be submitted to the college council in October each year.

13- A postgraduate student registered to obtain a master's degree or a doctorate degree, after completing the thesis preparation, holds a public discussion session on the thesis summary and the results he reached, during which the supervisors determine the extent to which the student fulfills the research point before submitting the thesis to the department council.

14- The principal supervisor submits an application that includes a proposal to form a discussion committee and judge the thesis after preparing it and preparing it for discussion in preparation for presentation to the Postgraduate Studies and Research Committee and then the College Board for approval and is supported by the following:

15- The report on the validity of the dissertation for discussion, signed by the majority of the members of the supervisory committee, one of whom is the main supervisor.

16- A copy of the thesis prepared according to the instructions for writing scientific theses in the faculty.

17- At least one research published in a scientific refereed journal.

18- The committee for discussion and judgment on the dissertation is formed of three members based on the proposal of the relevant department council, the graduate studies and research committee, and the approval of the college council, one of whom is the main supervisor or two members with one vote. And two other members from among the professors or assistant professors, at least one of them is from outside the college for master's theses, and at least one of them is from outside the university for doctoral theses (the two are from outside the college) according to the text of Article 153 of the Universities Organization Law.

19- The department council approves the individual reports, the group report, and what indicates that the student has made the proposed amendments from the discussion and judgment committee and submitted them to the Graduate Studies and Research Committee and the College Board in preparation for presentation to the University Council.

20- The date of awarding the academic degree is the date on which the University Council approved the College Board's recommendation for grants.

21- The college council, based on the proposal of the discussion and judgment committee, may return the message to the student to correct the errors and complete what the committee deems short of or submit another message in case the thesis is rejected.





## 6 – Facilities Required:

|                   |   |
|-------------------|---|
| <b>Laboratory</b> | Library and digital library supplied by recent scientific books and journals.                             |
| <b>Library</b>    | Laboratories with enough chemicals, apparatus and advanced instruments.                                   |
| <b>Others</b>     | Access to research engines for scientific periodicals in the field of pharmaceutical analytical chemistry |

| <b>Thesis Coordinator</b>           | <b>Head of Department</b>         | <b>Date</b>       |
|-------------------------------------|-----------------------------------|-------------------|
| <b>Prof. Dr. Head of Department</b> | <b>Prof. Dr. Jenny Jehan Nasr</b> | <b>May / 2022</b> |

\* Date of Dept. Council Approval May/2022



**Program: Master in Pharmaceutical Sciences  
(Pharmaceutical Analytical Chemistry)**

**Pharmaceutical Analytical Chemistry Department**

**Program Report**

**Academic Year:**

**2021/2022**

رئيس القسم  
أ.د/ جيني جيهان محمد نصر

signature



## A-Basic Information

|    |                                    |  |
|----|------------------------------------|--|
| 1. | <b>Faculty</b>                     | Pharmacy   |
| 2. | <b>Program Title:</b>              | Master in Pharmaceutical Sciences (Pharmaceutical Analytical Chemistry)        |
| 3. | <b>Program Type:</b>               | Single - Graduate  |
| 4. | <b>Department responsible:</b>     | Pharmaceutical Analytical Chemistry  |
| 5. | <b>Final award of the Program:</b> | Master degree of Pharmaceutical Sciences (Pharmaceutical Analytical Chemistry) |
| 6. | <b>External Evaluator(s):</b>      | Professor Dr. Tarek Belal  |
| 7. | <b>Year of operation:</b>          | 2021/2022  |

## B-Statistical Information

1. **Number of students started the program 2021/2022:** 8 students.

| Item   | Number of students |
|--|--------------------|
| Started the program                                      | 8                  |
| Withdrawn  | 1                  |
| Absence  | 0                  |
| Attending the exam                                       | 7                  |
| Pass   | 3                  |
| Failed   | 4                  |
| % Pass (with respect to those attending the examination) | 37.5%              |

2. **Percentage of students starting the program this year (relative to the previous year):**

| No. of students this year<br>(2021/2022) | No. of students last year<br>(2019/2020) | No. of students last year<br>(2018/2019) |
|--|--|--|
| 8  | 7  | 10                                       |



### 3. Number of students completing the program:

| No. students completed the program 2021/2022 | Starting year of these students  |
|--|--|
| 7  | Name of Student A: 2012/2013<br>Name of Student A: 2013/2014<br>Name of Student A: 2014/2015 |

### 4. Grades of students completed the program in the academic year 2021/2022:

|                                  | Course title                                       | Grade     |           |           |
|----------------------------------|--|-----------|-----------|-----------|
|                                  |  | Student A | Student B | Student C |
| First Semester General courses:  | <i>Instrumental Analysis (GCM-201)</i>             |           |           |           |
|                                  | <i>Statistics and biostatistics (GCM-202)</i>      |           |           |           |
|                                  | <i>Physical chemistry (GCM-203)</i>                | (A+)      |           |           |
|                                  | <i>Bioinformatics (GCM-204)</i>                    |           |           |           |
|                                  | <i>Research Methodology &amp; Ethics (GCM-205)</i> |           |           |           |
|                                  | <i>Scientific writing and Seminar (GCM-206)</i>    |           |           |           |
| Second semester Special courses: |  |           |           |           |
|                                  |  |           |           |           |
|                                  |  |           |           |           |
|                                  |  |           |           |           |
|                                  |  |           |           |           |
| General University requirements  | TOEFL/IELTS  | √         | √         | √         |
|                                  | Thesis Eligibility report                          | √         | √         | √         |
|                                  | One published manuscript                           | √         | √         | √         |

✚ Grades: no. and percentage of each grade: Non applicable



## C. Professional information

### Academic standards

- Reference academic standards:** Academic reference standards (ARS) for graduate studies.
- Achievement of program Intended Learning Outcomes (ILOs):**

| Course Title                                       | ILOs covered        |
|--|---------------------|
| <i>Instrumental Analysis (GCM-201)</i>             | A4, B8, D2, D9, D10 |
| <i>Statistics and biostatistics (GCM-202)</i>      |                     |
| <i>Physical chemistry (GCM-203)</i>                |                     |
| <i>Bioinformatics (GCM-204)</i>                    |                     |
| <i>Research Methodology &amp; Ethics (GCM-205)</i> |                     |
| <i>Scientific writing and Seminar (GCM-206)</i>    |                     |
|  |                     |
|  |                     |
|  |                     |
|  |                     |
| <b>Thesis</b>                                      |                     |

### 3. Assessment methods:

| Assessment Method  | Item assessed  | ILOs assessed       |
|--|--|---------------------|
| <b>Written Assessment</b><br>(written exam, Thesis writing ) | <b>1- Courses</b><br><br><b>General 8 Credit Hours</b><br><b>Special 8 (6+2) Cr. Hours</b> | aA1, A3, B2, C5, c6 |
| <b>Oral Assessment</b><br>(Oral exam,)                       |  | A7, B1, C4, D9      |
| <b>Activity</b>  |  |                     |
| <b>Seminars</b>  | <b>2- Thesis 30 Cr Hours</b>   | A7, B1, C4, D9      |
| <b>Supervisors follow up reports</b>                         |  |                     |



|   |   |                |
|---|---|----------------|
| <b>Practical Assessment</b><br>(practical work of thesis) |   | A5, B2, C4     |
| <b>One published manuscript</b>                           |   |                |
| <b>Oral presentation of thesis.</b>                       |   | A7, B1, C4, D9 |
| <b>Pass</b>   | <b>3- General University Requirements:</b> including:<br>a- TOEFL / IELTS<br>b- Computer course |                |

#### 4. Learning resources:

**Adequacy of the number and specialty of the faculty members to the requirements of the program:**

-Number of department staff: 22

-Number of master students: 8

-Students/ staff ratio: 11:4

•**Regarding teaching general courses:** staffs from different departments are participating in courses delivery

•**Regarding teaching of special courses & thesis supervision:** Pharmaceutical Analytical Chemistry staffs are responsible for courses delivery

•**Adequacy of facilities for thesis completion:**

-research laboratories in the department supported with different instruments in addition to central laboratory in the faculty.

Resources are available for the students such as:

- **Books: Text books as**

*"Introduction to Spectroscopy: A Guide For Students of Organic Chemistry",  
"Spectrometric Identification of Organic Compounds ", "Fundamentals of Analytical  
Chemistry", " Braithwaite and F.J. Smith "Chromatographic Methods" Fifth edition, "  
Dewick, P. M. Medicinal Natural Products, A biosynthetic approach. 2002", and  
.....*



- **References:** Scientific papers taken from international journals in the field of analytical chemistry, chemistry and structure elucidation of natural products.

**Others: web sites:**

- www.biomed central.com
- www.science direct.com
- www. medscape.com.
- www.Pubmed.com

## 5. The basis of formation of committees' examiners:

**For courses and seminars:** Teaching members and the head of department.

**For thesis:** The examiner committee is composed of:

- The principal supervisor with or without one supervisor from the co-supervision committee plus two evaluators at least one from outside the faculty.

## 6. System of external examiners: Available Not available

### Department response to student and external evaluation system:

Department staff members usually respond to the interests of postgraduate students if they prefer to go deep in specific fields.

The system of external evaluation of the program has been established by Dr. Mohamed Mansour Ahmed Salem, Faculty of pharmacy, Hourus University. The comments of external evaluator will be taken into consideration in the next action plan.

## 7. Proposals for program development

### a- Program stucture

- **Program duration:** At least 2 years from the date of enrollment or 18 months from the date of registration of the master thesis.
- **Program level:** Graduate
- **Structure of program hours:**





|                        | Code    | Course Title   | Lecture | Total Credit Hours |
|------------------------|---------|--|---------|--------------------|
| <b>Semester 1</b>      | GCM-201 | Instrumental Analysis                                    | 2       | 2                  |
|                        | GCM-202 | Biostatistics  | 2       | 2                  |
|                        | GCM-203 | Physical Chemistry                                       | 1       | 1                  |
|                        | GCM-204 | Bioinformatics   | 1       | 1                  |
|                        | GCM-205 | Research Methodology & Ethics                            | 1       | 1                  |
|                        | GCM-206 | Scientific writing and Seminar                           | 1       | 1                  |
| <b>Semester 2</b>      |         |  | 2       |                    |
|                        |         |  | 2       |                    |
|                        |         |  | 2       |                    |
|                        |         | مقرر واحد اختياري من المقررات التالية<br><b>Elective</b> | 2       |                    |
|                        |         |  | 2       |                    |
|                        |         |  | 2       |                    |
| <b>Total (courses)</b> |         |  | 16      | 16                 |
|                        |         | <b>Thesis</b>  | 30      | 30                 |
| <b>Total</b>           |         |  | 46      | 46                 |

**b. Distribution of program courses:**

|                   | Course title                   | Credit hours | Degree  |      |       |           |
|-------------------|--------------------------------|--------------|---------|------|-------|-----------|
|                   |                                |              | Written | Oral | Total | Exam time |
| <b>Semester 1</b> | Instrumental Analysis          | 2            | 80      | 20   | 100   | 2         |
|                   | Biostatistics                  | 2            | 80      | 20   | 100   | 2         |
|                   | Physical Chemistry             | 1            | 80      | 20   | 100   | 2         |
|                   | Bioinformatics                 | 1            | 80      | 20   | 100   | 2         |
|                   | Research Methodology & Ethics  | 1            | 80      | 20   | 100   | 2         |
|                   | Scientific writing and Seminar | 1            | 80      | 20   | 100   | 2         |
| <b>Semester 2</b> |                                | 2            |         |      | 100   |           |
|                   |                                | 2            |         |      | 100   |           |
|                   |                                | 2            |         |      | 100   |           |
|                   |                                | 2            |         |      | 100   |           |



### c. Completed Thesis details

| Title | Name of candidate | Supervised by | Date of master degree |
|-------|-------------------|---------------|-----------------------|
|       |                   |               |                       |
|       |                   |               |                       |

### d. Course, deletions, additions and modifications

\*More advanced techniques in pharmaceutical analysis will be added to the course.

#### e. Staff development requirements:

- More advanced text books are needed.
- Improvement of IT facilities.

## 8. Action plan

The following action plan will be acted upon throughout year (2021/2022)

| Action  | Completion date | Responsible party               |
|---|-----------------|---------------------------------|
| Updating the course according to the most up-to-date scientific research. |                 | All members of the course team. |

### 9. Action plan for improvement:

| Action   | Person responsible                                | Completion date |
|--|---|-----------------|
| Revision of program ILOs and make required changes                   | • Program coordinator                             | 2019-2020       |
| Arrange at least one journal club per year                           | • Program coordinator                             | 2019 - 2020     |
| Improve research facilities  | • Vice dean for postgraduate studies and research | 2019-2020       |
| Update course contents   | • Program coordinator                             | 2019-2020       |
| Organize different workshops to build up students research abilities | • FLDP center<br>• Faculty training unit          | 2019-2020       |

action plan مقترح لبعض عناصر للاسترشاد



**Mansoura University  
Faculty of Pharmacy  
Quality Assurance Unit  
Master Program Report  
2021/2022  
Postgraduate Studies**



---

**Program coordinator / Head of the department:**

**Head of Department: Prof. Dr. Jenny Jehan Mohamed**

**Vice dean of graduate studies and research**

**Prof. Dr. Khaled B. Selim**



## Department of Pharmaceutical Analytical Chemistry

Program: MS.D in Pharmaceutical Sciences  
(*General Course*)

Course: Physical Chemistry  
Code: (GCM-203)

Academic year: 2021/2022  
First Semester

البرنامج

ماجستير

تقرير مقرر

كيمياء فيزيائية

رئيس القسم

أ.د. جيني جيهان محمد نصر

منسق المقرر

ا.د. فتح الله فتح الله بلال



**University: Mansoura University**

**Faculty: Pharmacy**

**Department: Pharmaceutical Analytical Chemistry**

### **A. Basic Information**

|  |   |
|--|---|
| Course Title and code:                                       | Physical chemistry - GCM-203                              |
| Program on which this course is given:                       | Master  |
| Total Credit hours:  | 1   |
| Lectures: 1  | Tutorial/Practical: -----                                 |
| Academic Level   | Postgraduate  |
| Academic year  | 2021/2022 - First semester                                |
| Name of lecturers contributed to the delivery of this course | 1.Prof. Dr. Fathalla Belal<br>2.Prof. Dr. Amina El-Brashy |
| Course co-coordinator:                                       | Prof. Dr. Fathalla Belal                                  |
| External evaluator:  | Dr. Moktar Mabrouk  |
| Date of Department Council Approval                          | 11/5/2022   |
| Date of Faculty Council Approval                             | 5/2022  |

### **B. Statistical Information:**

|  |   |                   |  |    |  |
|--|---|-------------------|--|----|--|
| No. of students attending the course: 8  |   |                   |  |    |  |
| No. of students completing the course: 7 |   |                   |  |    |  |
| <b>Exam Results</b>                      |   |                   |  |    |  |
| Passed No.:3                             |   | percentage: 37.5% |  |    |  |
| Failed No.:4                             |   | percentage:50.0%  |  |    |  |
| Grading of successful students (%):      |   |                   |  |    |  |
| A+                                       | 3 | A                 |  | A- |  |
| B+                                       |   | B                 |  | B- |  |
| C+                                       |   | C                 |  | C- |  |
| D+                                       |   | D                 |  | D- |  |



### C. Professional Information:

#### 1. Course teaching:

| No. | Topics actually taught |
|-----|------------------------|
| 1.  | Reaction kinetics      |
| 2.  | Catalysis              |
| 3.  | Photochemistry         |
| 4.  | Polymers               |

Topics taught as a percentage of the content specified:

|          |           |        |
|----------|-----------|--------|
| √ > 90 % | 70 - 90 % | < 70 % |
|----------|-----------|--------|

Lecturers commitment of the course content:

|          |           |        |
|----------|-----------|--------|
| √ > 90 % | 70 - 90 % | < 70 % |
|----------|-----------|--------|

Coverage of exam topics to course content:

|          |           |        |
|----------|-----------|--------|
| √ > 90 % | 70 - 90 % | < 70 % |
|----------|-----------|--------|

#### 2. Used teaching and Learning Methods:

|                                 |   |
|---------------------------------|---|
| Lectures:                       | √ |
| Practical Training/ Laboratory: | - |
| Seminar / Work shop:            | - |
| Class Activity:                 | - |
| Case Study:                     | - |
| Other assignments / home work:  | - |

#### 3. Student Assessment:

| a. Method of Assessment     | Percentage of total |
|-----------------------------|---------------------|
| Written examination         | 80%                 |
| Oral examination            | 20%                 |
| Practical / laboratory work |                     |
| Semester Work               |                     |



**b. Members of examination committee:**

- 1.Prof. Dr. Fathalla Belal
- 2.Prof. Dr. Amina El-Brashy

**c. Role of external evaluator (If any):**

---

**4. Facilities and Teaching Materials**

|                         |   |
|-------------------------|---|
| Totally adequate        | √ |
| Adequate to some extent |   |
| Inadequate              |   |
| List any inadequacies:  |   |

**5. Administrative constraints**

List any difficulties encountered:---

**6. Student evaluation of the course: ....**

List any criticisms and response of course team

| criticisms | response of course team |
|------------|-------------------------|
| --         |                         |

**7. Comments from external evaluator(s) (if exists) and response of course team:**

| Comment | Response |
|---------|----------|
| ---     |          |

**8. Course enhancement suggestions:**

Progress on actions identified in the previous year's action plan:

| Action | Completed | Not completed | Why not completed? |
|--------|-----------|---------------|--------------------|
| -      | -         |               |                    |



### 9. Action plan for academic year 2021 - 2022:

| Action Required     | Person responsible | Completion Date |
|---------------------|--------------------|-----------------|
| Upgrade course note | Prof. Dr. Fathalla | 2021-2022       |
|                     |                    |                 |

|                    | Name                                  | Signature |
|--------------------|---------------------------------------|-----------|
| Course Coordinator | Prof. Dr. Fathalla Belal              |           |
| Head of Department | Prof. Dr. Jenny Jehan<br>Mohamed Nasr |           |





Mansoura University  
Faculty of Pharmacy  
Postgraduate Studies  
Master in Pharmaceutical Sciences (Analytical Chemistry)  
**Physical Chemistry Course Specification**  
(2021/2022)



|                          |                      |                               |
|--------------------------|----------------------|-------------------------------|
| Pharm. Anal. Chem. Dept. | Course Specification | MS .D. (Analytical Chemistry) |
|--------------------------|----------------------|-------------------------------|



**Master in Pharmaceutical Sciences (Analytical Chemistry)**

**Course Specification**

**Academic year: 2021/2022**

البرنامج  
ماجستير العلوم الصيدلانية (كيمياء  
تحليلية)

توصيف المقرر  
قواعد الكيمياء الفيزيائية  
**Physical Chemistry**

رئيس القسم  
أ.د. جيني جيهان محمد نصر

منسق المقرر  
أ.د. فتح الله فتح الله بلال



Mansoura University  
Faculty of Pharmacy  
Postgraduate Studies  
Master in Pharmaceutical Sciences (Analytical Chemistry)  
**Physical Chemistry Course Specification**  
(2021/2022)



## General

|                                       |  |
|---------------------------------------|--|
| University                            | Mansoura   |
| Faculty                               | Pharmacy   |
| Department offering the course        | Pharmaceutical Analytical Chemistry                      |
| Department supervising the course     | Prof. Dr. Fathalla Fathalla Belal                        |
| Program on which the course is given  | Master in Pharmaceutical Sciences (Analytical Chemistry) |
| Academic Level                        | Postgraduate   |
| Academic year                         | 2021/2022 - First semester                               |
| Date of course specification approval | 11/5/2022  |

## A. Basic Information : Course data :

|                         |                        |
|-------------------------|------------------------|
| Course Title            | Physical Chemistry     |
| Course Code             | GCM-200                |
| Prerequisite            | -----                  |
| Teaching Hours: Lecture | 1 عدد الساعات الزمنية  |
| Practical:              | -- عدد الساعات الزمنية |
| Total Credit Hours      | 1                      |

## B. Professional Information

### 1- Overall Aims of Course:

This course is aimed to give the principle of chemical reaction kinetics, catalysis, photochemistry and polymerization

### 2- Intended Learning Outcomes (ILOs)

#### a. Knowledge and Understanding

After completion of the course, graduates will be able to

|      |    |   |
|------|----|---|
| (A1) | a1 | Identify the basic principles of physical chemistry including; chemical reaction kinetics |
| (A1) | a2 | Explanation of the criteria of catalysis  |
| (A1) | a3 | Recognize types of photochemical reactions  |
| (A1) | a4 | Application of different types of polymers in pharmacy:                                   |



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**b. Intellectual Skills**

After completion of the course, graduates will be able to

|      |    |   |
|------|----|---|
| (B1) | b1 | Study of parallel reactions, consecutive reactions and chain reactions                    |
| (B1) | b2 | Differentiate between homogeneous catalysis, enzyme catalysis and heterogeneous catalysis |
| (B1) | b3 | Evaluate of different theories of photochemical reactions                                 |
|      | b4 |   |

**c. Professional and Practical Skills**

After completion of the course, graduates will be able to

|      |    |  |
|------|----|--|
| (C1) | c1 | Apply the the principles of photochemical reactions laws and allow data analysis |
| (C1) | c2 | Show pH- rate profile of drugs   |
| (C1) | c3 | Calculate and predict the expiration date of the drug                            |

**d. General and Transferable Skills**

After completion of the course, graduates will be able to

|      |    |   |
|------|----|---|
| (D5) | d1 | Solve problems                          |
| (D9) | d2 | Retrieve and evaluate information       |
| (D9) | d3 | Define the order of a chemical reaction |
|      | d4 |   |

**3. Course Contents**

| Week No.                   | Topics            | Lecture Hours | Practical / Tutorial hr. |
|----------------------------|-------------------|---------------|--------------------------|
| 1-3                        | Reaction kinetics | 3             | -                        |
| 4-6                        | Catalysis         | 3             | -                        |
| 7-9                        | Photochemistry    | 3             | -                        |
| 10-12                      | Polymers          | 3             | -                        |
| <b>Total:<br/>12 weeks</b> |                   | <b>12</b>     | <b>-</b>                 |



#### 4- Matrix of knowledge and skills of the course (contents versus ILOs of the course)

| Week  | Topics            | Course ILOs |      |          |           |
|-------|-------------------|-------------|------|----------|-----------|
|       |                   | K.U*        | IS** | P.P.S*** | G.T.S**** |
| 1-3   | Reaction kinetics | a1          | b1   | c1       | d1,d2     |
| 4-6   | Catalysis         | a2          | b2   | c2       | d1,d2     |
| 7-9   | Photochemistry    | a3          | b2   | c1       | d1,d2     |
| 10-12 | Polymers          | a3          | b1   | c2       | d1,d2     |

\* Knowledge and Understanding

\*\*Intellectual Skills

\*\*\*Professional and Practical Skills

\*\*\*\*General and Transferable Skills

#### 5- Teaching and Learning Methods:

|     |  |
|-----|--|
| 5.1 | Lectures using Power Point (PPT) presentations                                 |
| 5.2 | Lectures using whiteboard  |
|     | Video-recorded lectures, uploaded to the University Portal for Online learning |
|     | Activities and tasks required to develop students' self-learning skills.       |

#### 6- Student Assessment:

|              | Assessment Methods   |   | Assessment Schedule | Weighing of Assessments |
|--------------|--|---|---------------------|-------------------------|
| Assessment 1 | <b>Written Exam (Final)</b>                                  | Paper exams that are corrected electronically and/or manually. To assess understanding, intellectual, professional skills | Week 15             | 90 %                    |
| Assessment 2 | <b>Tutorial / or Practical assignments and Semester work</b> | Assignments prepared by students and sent to the supervisor electronically for evaluation. To assess professional skills  | -                   | -                       |
| Assessment 3 | <b>Oral Exam</b>   | To assess understanding, intellectual skills, General and Transferable skills   | Week 15             | 10 %                    |
|              |  |   |                     | 100 %                   |

#### 7- List of References

|    | Reference  | Type                        |
|----|--|-----------------------------|
| 1. | Raymond Chang , Editor, "Physical Chemistry for the Biosciences" University Science Books, Sausalito, California (2005). | Essential Book (Text Books) |



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|    |   |                                |
|----|---|--------------------------------|
| 2. | Essentials of Physical Chemistry, B.S. Bahl; G.D. Tuli and Arun Bahl, New Delhi 110055, India (1994). | Essential Book<br>(Text Books) |
|----|---|--------------------------------|

### 8- Facilities required for teaching and learning

|                         |                                      |
|-------------------------|--------------------------------------|
| -Class room             | Data show- Computers, Internet. .... |
| - Laboratory facilities | Microscopes, equipment, tools .....  |

### 9. Signature

| Course Coordinator                   | Head of Department              | Date |
|--------------------------------------|---------------------------------|------|
| Prof. Dr.<br>Fathalla Fathalla Belal | Prof Dr.<br>Jenny Jehan Mohamed | 2022 |

\* Date of Dept. Council Approval 11/5/2022



Mansoura University  
Faculty of Pharmacy  
Postgraduate Studies  
M. Sc. Degree Program  
**Instrumental Analysis Course Specification**



|                                |                      |               |
|--------------------------------|----------------------|---------------|
| Dept. of Pharm. Anal.<br>Chem. | Course Specification | M. Sc. Degree |
|--------------------------------|----------------------|---------------|



MS .D. Courses (General Courses)

**Course Specification**

Academic year: 2021/2022

البرنامج  
درجة الماجستير العامة

توصيف مقرر  
التحليل الآلي  
**Instrumental Analysis**

رئيس القسم  
أ.د. جيني جيهان نصر

منسق المقرر  
أ.د. محمد السيد متولى



## General

|                                       |                                     |
|---------------------------------------|-------------------------------------|
| University                            | Mansoura                            |
| Faculty                               | Pharmacy                            |
| Department offering the course        | Pharmaceutical Analytical Chemistry |
| Department supervising the course     | Pharmaceutical Analytical Chemistry |
| Program on which the course is given  | M. Sc. Degree                       |
| Academic Level                        | Postgraduate                        |
| Academic year                         | 2021/2022 - First semester          |
| Date of course specification approval | 11/5/2022                           |

### A. Basic Information : Course data :

|                         |                       |
|-------------------------|-----------------------|
| Course Title            | Instrumental Analysis |
| Course Code             | GCM-201               |
| Prerequisite            | -----                 |
| Teaching Hours: Lecture | 2                     |
| Practical:              | ---                   |
| Total Credit Hours      | 2                     |

### B. Professional Information

#### 1- Overall Aims of Course:

The course concerns with the study of the principles and techniques of spectroscopic and chromatographic methods of analysis. The spectroscopic methods include ultraviolet-visible spectroscopy, luminescence spectroscopy (fluorescence, phosphorescence and chemiluminescence), IR spectroscopy, FT-IR, NMR, mass spectrometry (MS) and atomic spectroscopy. The chromatographic methods include liquid chromatography with a special focus on HPLC and GC. In addition, the course includes the pharmaceutical applications of the studied methods.

#### 2- Intended Learning Outcomes (ILOs)

##### a. Knowledge and Understanding

*After completion of the course, graduates will be able to*

|      |    |  |
|------|----|--|
| (A1) | a1 | Explain the theories and fundamentals of instrumental analysis                                     |
| (A1) | a2 | Recall different types of spectroscopic and chromatographic analysis.                              |
| (A3) | a3 | Understand the suitable analytical spectroscopic and chromatographic method for a certain analyte. |
| (A7) | a4 | Identify appropriate types of data needed to inspect a certain research problem.                   |





### ***b. Intellectual Skills***

*After completion of the course, graduates will be able to*

|             |    |  |
|-------------|----|--|
| <b>(B2)</b> | b1 | Select the proper analytical method for the determination of a given compound. |
| <b>(B7)</b> | b2 | Interpret the results obtained after the analysis of pharmaceutical compounds. |

### ***c. Professional and Practical Skills***

*After completion of the course, graduates will be able to*

|             |    |  |
|-------------|----|--|
| <b>(C2)</b> | c1 | Develop different research methodologies and good experimental and reporting skills in the analysis and separation of drugs. |
| <b>(C4)</b> | c2 | Outline and illustrate suggested methods for quantitative analysis of drugs  |

### ***d. General and Transferable Skills***

*After completion of the course, graduates will be able to*

|              |    |  |
|--------------|----|--|
| <b>(D1)</b>  | d1 | Communicate effectively by verbal and written means  |
| <b>(D2)</b>  | d2 | Manipulate computer program, online database, software and other IT to get information and analyze the obtained research data. |
| <b>(D11)</b> | d3 | Implement writing and presentation skills  |

## **3. Course Contents**

| <b>Week No.</b> | <b>Topics</b>   | <b>Lecture Hours</b> | <b>Practical / Tutorial hr.</b> |
|-----------------|---|----------------------|---------------------------------|
| 1               | Principle of chromatography: retention parameters and control of separation in liquid chromatography.   | 2                    | --                              |
| 2               | Sources of band broadening, methods for reducing band broadening.   | 2                    | --                              |
| 3               | Optimization technique: control of injection volume, controlling of resolution, optimizing the capacity factor, optimization of column efficiency, optimizing selectivity term.               | 2                    | --                              |
| 4               | Solvents in hplc: selecting hplc mobile phase, physical properties, intermolecular interactions between sample and mobile phase, solvent strength and "polarity", solvent selectivity.        | 2                    | --                              |
| 5               | High-performance liquid chromatography, method development, instrumentation, applications, common hplc techniques.  | 2                    | --                              |
| 6               | Gas chromatography: instrumentation, method development, instrumentation, applications.   | 2                    | --                              |
| 7               | Ultraviolet and Visible Spectrophotometry: introduction, qualitative and quantitative applications, Steps of scientific spectrophotometric research, determination of reaction stoichiometry. | 2                    | --                              |



**Mansoura University**  
**Faculty of Pharmacy**  
**Postgraduate Studies**  
**M. Sc. Degree Program**  
**Instrumental Analysis Course Specification**



|                            |  |           |           |
|----------------------------|--|-----------|-----------|
| <b>8</b>                   | Application of spectrophotometry in pharmaceutical quantitative analysis, multicomponent analysis using uv-visible spectroscopy.                       | 2         | --        |
| <b>9</b>                   | Molecular Luminescence spectroscopy: Spectrofluorimetry; introduction, Applications of Spectrofluorimetry to the analysis of Pharmaceutical Compounds. | 2         | --        |
| <b>10</b>                  | Phosphorimetry: introduction, applications<br>Chemiluminescence; introduction  | 2         | --        |
| <b>11</b>                  | Chemiluminescence; applications  | 2         | --        |
| <b>Total:<br/>11 weeks</b> |  | <b>22</b> | <b>--</b> |

**4- Matrix of knowledge and skills of the course (contents versus ILOs of the course)**

| Week | Topics   | Course ILOs |       |          |           |
|------|--|-------------|-------|----------|-----------|
|      |  | K.U*        | IS**  | P.P.S*** | G.T.S**** |
| 1    | Principle of chromatography: retention parameters and control of separation in liquid chromatography.  | a1, a2      | b2    |          | d1        |
| 2    | Sources of band broadening, methods for reducing band broadening.  | a1,a4       | b2    | c1       | d1        |
| 3    | Optimization technique: control of injection volume, controlling of resolution, optimizing the capacity factor, optimization of column efficiency, optimizing selectivity term.        | a1,a4       | b2    | c1       | d1        |
| 4    | Solvents in hplc: selecting hplc mobile phase, physical properties, intermolecular interactions between sample and mobile phase, solvent strength and "polarity", solvent selectivity. | a1,a4       | b2    | c1       | d1        |
| 5    | High-performance liquid chromatography, method development, instrumentation, applications, common hplc techniques.   | a3,a4       | b1,b2 | c1,c2    | d1,d2,d3  |



**Mansoura University**  
**Faculty of Pharmacy**  
**Postgraduate Studies**  
**M. Sc. Degree Program**  
**Instrumental Analysis Course Specification**



|    |   |               |       |       |          |
|----|---|---------------|-------|-------|----------|
| 6  | Gas chromatography: instrumentation, method development, instrumentation, applications.   | a1,a2,a3,a4   | b1    | c1,c2 | d1,d2,d3 |
| 7  | Ultraviolet and Visible Spectrophotometry: introduction, qualitative and quantitative applications, Steps of scientific spectrophotometric research, determination of reaction stoichiometry. | a1, a2,a4     | b1,b2 | c1    | d1,d2,d3 |
| 8  | Application of spectrophotometry in pharmaceutical quantitative analysis, multicomponent analysis using uv-visible spectroscopy.  | a3,a4         | b1    | c1,c2 | d1,d2,d3 |
| 9  | Molecular Luminescence spectroscopy: Spectrofluorimetry; introduction, Applications of Spectrofluorimetry to the analysis of Pharmaceutical Compounds.  | a1, a2, a3,a4 | b1    | c1,c2 | d1,d2,d3 |
| 10 | Phosphorimetry: introduction, applications<br><br>Chemiluminescence; introduction   | a1, a2, a3,a4 | b1    | c1,c2 | d1       |
| 11 | Chemiluminescence; applications   | a3,a4         | b1    | c1,c2 | d1       |

\* Knowledge and Understanding

\*\*Intellectual Skills

\*\*\*Professional and Practical Skills

\*\*\*\*General and Transferable Skills

### 5- Teaching and Learning Methods:

|     |  |
|-----|--|
| 5.1 | <b>Lectures using Power Point (PPT) presentations</b>                                  |
| 5.2 | <b>Lectures using whiteboard</b>   |
| 5.3 | <b>Video-recorded lectures</b> , uploaded to the University Portal for Online learning |
| 5.4 | Activities and <b>tasks required to develop students' self-learning skills.</b>        |
| 5.5 | <b>Interactive Sessions</b> using Microsoft Teams                                      |
| 5.6 | Internet search and Research Assignments to design <b>Formative Assignments</b>        |
| 5.7 | <b>Seminar / Workshop</b>  |



## 6- Student Assessment:

|              | Assessment Methods          |   | Assessment Schedule   | Weighing of Assessments |
|--------------|-----------------------------|---|-----------------------|-------------------------|
| Assessment 1 | <b>Written Exam (Final)</b> | Paper exams that are corrected electronically and/or manually. To assess understanding, intellectual, professional skills | 15 <sup>th</sup> week | 80%                     |
| Assessment 2 | <b>Oral Exam</b>            | To assess understanding, intellectual skills, General and Transferable skills   | 15th week             | 20%                     |
|              |                             |   |                       | 100 %                   |

## 7- List of References

|    | Reference  | Type                        |
|----|--|-----------------------------|
| 1. | L. R. SNYDER and J. J. KIRKLAND "Introduction to Modern Liquid Chromatography"   | Essential Book (Text Books) |
| 2. | D. A. Skoog, et al. "Principles of Instrumental Analysis" 6th Edition, Thomson Brooks/Cole. 2007   | Essential Book (Text Books) |
| 3. | D. C. Harris and M.D. Bertolucci "Symmetry and Spectroscopy, An Introduction to Vibrational and Electronic Spectroscopy" Dover Publications, Inc., New York. 1989.                                   | Essential Book (Text Books) |
| 4. | H. Beckett, J. B. Stenlake, Practical pharmaceutical chemistry: fourth edition, Part two, . Athlone Press University of London, 1988   | Essential Book (Text Books) |
| 5. | A´ urea Andrade-Eiroa, Graciela de-Armas, Jose´-Manuel Estela, V1 ´ctor Cerda, Critical approach to synchronous spectrofluorimetry. I, Trends in Analytical Chemistry, Vol. 29, No. 8, 2010, 855-901 | Review article              |

## 8- Facilities required for teaching and learning

|             |  |
|-------------|--|
| -Class room | Large smart lecture room, data Show and Computers. Software, Internet. |
| - Library   | ...  |

## 9. Signature

| Course Coordinator               | Head of Department           | Date      |
|----------------------------------|------------------------------|-----------|
| Prof. Dr.<br>Mohamed E. Metwally | Prof Dr.<br>Jenny Jehan Nasr | 2022/5/11 |



## Department of Pharmaceutical Analytical Chemistry

Program: M. Sc. D in Pharmaceutical Sciences  
(*General courses*) (GCM-200)

**Course:** Instrumental Analysis  
**Code:** (GCM-201)

**Academic year: 2021/2022**  
**First Semester**

### البرنامج

درجة الماجستير (مقررات  
الماجستير العامة)

### تقرير مقرر

التحليل الآلي

### رئيس القسم

أ.د. جيني جيهان نصر

### منسق المقرر

أ.د. محمد السيد متولي



**University: Mansoura**

**Faculty: Pharmacy**

**Department: Pharmaceutical Analytical Chemistry**

### **A. Basic Information**

|  |   |
|--|---|
| Course Title and code:                                       | Instrumental analysis   |
| Program on which this course is given:                       | M. Sc. Degree Courses (General Courses)<br>(GCM-200)                        |
| Total Credit hours:  | 2   |
| Lectures: 2  | Tutorial/Practical: --  |
| Academic Level   | Postgraduate  |
| Academic year  | 2021/2022 - First semester  |
| Name of lecturers contributed to the delivery of this course | 1. Prof. Dr. Mohammed El-Sayed Metwally<br>2. Ass.Prof. Mona Fathy Fathalla |
| Course co-coordinator:                                       | 1. Prof. Dr. Mohammed El-Sayed Metwally                                     |
| External evaluator:  | Prof. Dr. Tarek Belal   |
| Date of Department Council Approval                          | 11/5/2022   |
| Date of Faculty Council Approval                             | 5/2022  |

### **B. Statistical Information:**

|  |   |                    |   |    |  |
|--|---|--------------------|---|----|--|
| No. of students attending the course : 8 |   |                    |   |    |  |
| No. of students completing the course: 7 |   |                    |   |    |  |
| <b>Exam Results</b>                      |   |                    |   |    |  |
| Passed No.: 6                            |   | percentage: 87.5 % |   |    |  |
| Failed No.: 1                            |   | percentage: 12.5 % |   |    |  |
| Grading of successful students (%):      |   |                    |   |    |  |
| A+                                       | 1 | A                  | 2 | A- |  |
| B+                                       |   | B                  |   | B- |  |
| C+                                       |   | C                  | 3 | C- |  |
| D+                                       |   | D                  |   | D- |  |



## C. Professional Information:

### 1. Course teaching:

| No. | Topics actually taught                          |
|-----|---|
| 1.  | Advanced UV-visible method.                     |
| 2.  | Advanced spectrofluorimetric method             |
| 3.  | Validation of analytical methods                |
| 4.  | Atomic absorption and emission methods          |
| 5.  | Near infra-red and FTIR methods                 |
| 6.  | Spectroscopic application to different matrices |
| 7.  | Concept of chromatography processes             |
| 8.  | Factors affecting separation                    |
| 9.  | Factors affecting band broadening               |
| 10. | Instrumentation used in HPLC,GC,...             |
| 11. | Appl. techniques used in chromatography         |
| 12. | Method development and validation               |

#### Topics taught as a percentage of the content specified:

|          |           |        |
|----------|-----------|--------|
| √ > 90 % | 70 - 90 % | < 70 % |
|----------|-----------|--------|

#### Lecturers commitment of the course content:

|          |           |        |
|----------|-----------|--------|
| √ > 90 % | 70 - 90 % | < 70 % |
|----------|-----------|--------|

#### Coverage of exam topics to course content:

|          |           |        |
|----------|-----------|--------|
| √ > 90 % | 70 - 90 % | < 70 % |
|----------|-----------|--------|

### 2. Used teaching and Learning Methods:

|                                 |  |
|---------------------------------|--|
| Lectures:                       | White board , power point presentation |
| Practical Training/ Laboratory: | --                                     |
| Seminar / Work shop:            | --                                     |
| Class Activity:                 | --                                     |
| Case Study:                     | --                                     |
| Other assignments / home work:  |  |





### 3. Student Assessment:

| <b>a. Method of Assessment</b> | <b>Percentage of total: 100%</b> |
|--------------------------------|----------------------------------|
| Written examination            | 80%                              |
| Oral examination               | 20%                              |
| Practical / laboratory work    | --                               |
| Semester Work                  | --                               |

#### **b. Members of examination committee:**

1. Prof. Dr. Mohammed El-Sayed Metwally
2. Ass.Prof. Mona Fathy Fathalla

#### **c. Role of external evaluator (If any):**

1. Revision of course contents, and suggest new topics.
2. Revision of teaching and learning strategy.
3. Revision of course notes and suggest enhancement plan
4. Revision of Exam and related assignments

### 4. Facilities and Teaching Materials

|                         |   |
|-------------------------|---|
| Totally adequate        | √ |
| Adequate to some extent |   |
| Inadequate              |   |
| List any inadequacies:  |   |

### 5. Administrative constraints

List any difficulties encountered: --

### 6. Student evaluation of the course: ....

List any criticisms and response of course team

| <b>criticisms</b> | <b>response of course team</b> |
|-------------------|--------------------------------|
|                   |                                |



### 7. Comments from external evaluator(s) (if exists) and response of course team:

| Comment | Response |
|---------|----------|
|         |          |

### 8. Course enhancement suggestions:

Progress on actions identified in the previous year's action plan:

| Action              | Completed | Not completed | Why not completed? |
|---------------------|-----------|---------------|--------------------|
| Upgrade course note | √         |               |                    |

### 9. Action plan for academic year 2021 - 2022:

| Action Required   | Person responsible                          | Completion Date |
|---|---|-----------------|
| <b>Improvement of interaction with students through workshops and seminars.</b> | <b>Prof. Dr. Mohammed El-Sayed Metwally</b> |                 |

|                           | Name                                 | Signature |
|---------------------------|--------------------------------------|-----------|
| <b>Course Coordinator</b> | Prof. Dr. Mohammed El-Sayed Metwally |           |
| <b>Head of Department</b> | Prof. Dr. Jenny Jeehan Nasr          |           |