



Course specification  
2020-2021  
Faculty of Pharmacy  
Mansoura University



Second Level

Course Specification Pharmaceutical  
Analytical Chemistry 1

**University:** Mansoura University (MU)  
**Faculty:** Pharmacy  
**Department:** Pharmaceutical Analytical Chemistry  
**Course title:** Pharmaceutical Analytical Chemistry 1

**Course code:** PA213

|  |   |
|--|---|
| <b>Program on which the course is given</b>  | B. Pharm                                |
| <b>Academic Level</b>                        | Second Level, First semester, 2020-2021 |
| <b>Date of course specification approval</b> |   |

1. Basic Information: Course data:

|  |  |                    |
|--|--|--------------------|
| <b>Course title:</b>                       | <b>Pharmaceutical Analytical Chemistry 1</b> | <b>Code: PA213</b> |
| <b>Specialization:</b>                     | <b>Pharmaceutical</b>                        |                    |
| <b>Prerequisite:</b>                       | <b>Registration</b>                          |                    |
| <b>Teaching Hours:</b>                     | <b>Lecture:2</b>                             | <b>Practical:1</b> |
| <b>Number of units:<br/>(credit hours)</b> | <b>3</b>                                     |                    |

2. Course Aims:

2.1. Recall the basic principles of quantitative chemical methods of analysis including; acid-base, precipitometric and complexometric methods of analysis.

3. Intended learning outcomes (ILO<sub>s</sub>):

a- Knowledge and understanding

At the end of this course the student will be able to:

|           |  |
|-----------|--|
| <b>a1</b> | Recognize the different analytical techniques used for determination of chemical substances. |
| <b>a2</b> | Distinguish the standardization methods of chemical substances.                              |

b- Intellectual skills

At the end of this course the student will be able to:



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|----|--|
| b1 | Propose suitable methods of chemical analysis.                                       |
| b2 | Interpret experimental data based on relevant chemical and pharmaceutical principles |

### c- Professional and practical skills

At the end of this course the student will be able to:

|    |  |
|----|--|
| c1 | Apply proper handling and disposal of chemicals.   |
| c2 | Show ability to conduct experimental studies and apply different quantitative methods of analysis of pharmaceutical compounds. |

### d- General and transferable skills

At the end of this course the student will be able to:

|    |   |
|----|---|
| d1 | Interact effectively in team working.   |
| d2 | Apply calculations for chemical analysis.   |
| d3 | Acquire the ability to learn independently.   |
| d4 | Present information clearly in written, electronic and oral forms.  |
| d5 | Show the ability for critical thinking, problem-solving, decision-making, and time managing capabilities. |

## 4. Contents:

| Week No | Topics  | No.of hours | Lecture credit hours | Practical credit hours |
|---------|---|-------------|----------------------|------------------------|
| 1.      | Acid- Base titrations; introduction, theory of acids and bases,   | 2           | 2 hours              |                        |
| 2.      | pH value and its significance, pH of different solutions, buffers,  | 2           | 2 hours              |                        |
| 3.      | Acid- base indicators, problems, types of acid- base titrations   | 2           | 2 hours              |                        |
| 4.      | Acid-base titration curves  | 2           | 2 hours              |                        |
| 5.      | Applications of acid- Base titration.   | 2           | 2 hours              |                        |
| 6.      | Non aqueous titrations.   | 2           | 2 hours              |                        |
| 7.      | <b>Mid-term Exam</b>  |             |                      |                        |
| 8.      | Precipitation titration; introduction, solubility product constant ( $K_{sp}$ ), factors affecting solubility of PPT, precipitation titration curve | 2           | 2 hours              |                        |



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| 9.                                   | Methods of precipitation titration and application.  | 2            | 2 hours              |                        |
|--------------------------------------|--|--------------|----------------------|------------------------|
| 10.                                  | Complexometric titration; introduction, EDTA titration, metallochromic indicators.   | 2            | 2 hours              |                        |
| 11.                                  | EDTA titration curve, types of EDTA titrations, EDTA selectivity, analysis of mixtures of metal ions.  | 2            | 2 hours              |                        |
| <b>Final written &amp; oral exam</b> |  |              |                      |                        |
| <b>Practical topics</b>              |  |              |                      |                        |
| Week No                              | Topics   | No. of hours | Lecture credit hours | Practical credit hours |
| 2.                                   | -Handling rules.<br>-Determination of HCl.   | 2            |                      | 1 hour                 |
| 3.                                   | -Assay of NH <sub>4</sub> Cl (Back titration).<br>- Assay of (NH <sub>4</sub> Cl & HCl) mixture.   | 2            |                      | 1 hour                 |
| 4.                                   | 1-Assay of HCl/HAC mix.<br>2- Assay of borax.  | 2            |                      | 1 hour                 |
| 5.                                   | 1- Determination of Na <sub>2</sub> CO <sub>3</sub> / NaOH mixture.<br>2- Determination of Na <sub>2</sub> CO <sub>3</sub> / NaHCO <sub>3</sub> mixture. | 2            |                      | 1 hour                 |
| 6.                                   | 1-Determination of NaCl (Mohr's method).<br>2-Determination of NaBr (Volhard's method).  | 2            |                      | 1 hour                 |
| 7.                                   | <b>Mid-term Exam.</b>  |              |                      |                        |
| 8.                                   | 1-Determination of NaCl (Volhard's method).  | 2            |                      | 1 hour                 |
| 9.                                   | 1-Determination of 1-Ca <sup>2+</sup> /Mg <sup>2+</sup> mixture.<br>2-Determination of potash alum Al <sup>3+</sup> .                                    | 2            |                      | 1 hour                 |
| 10.                                  | 1- Complexometric determination of Ca <sup>2+</sup> , Mg <sup>2+</sup> .   | 2            |                      | 1 hour                 |
| 11.                                  | Final practical exam 1st group.  | 2            |                      | 1 hour                 |

**5. Teaching and learning Methods:**



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|     |   |
|-----|---|
| 5.1 | Lectures using whiteboard                           |
| 5.2 | Lectures using Datashow, PowerPoint presentations   |
| 5.3 | Laboratory with equipments, chemicals and reagents. |

## 6. Student Assessment:

### a- Assessment methods

|                   |  |
|-------------------|--|
| 1. Written exam   | To assess understanding, intellectual and professional skills                          |
| 2. Practical exam | To assess professional and practical skills  |
| 3. Oral           | To assess knowledge, understanding, intellectual skills, general skills and confidence |
| 4. Quizzes.       | To assess the skills of problem-solving.   |

### b- Assessment schedule

|              |           |                       |
|--------------|-----------|-----------------------|
| Assessment 1 | Practical | 11 <sup>th</sup> week |
| Assessment 2 | Mid-term  | 7 <sup>th</sup> week  |
| Assessment 3 | Oral      | 14 <sup>th</sup> week |
| Assessment 4 | Written   | 4 <sup>th</sup> week  |

### c- Weighting of assessments

|       |   |      |
|-------|---|------|
| 1.    | Mid-term examination                    | 10%  |
| 2.    | Final-term examination                  | 50%  |
| 3.    | Oral examination                        | 15%  |
| 4.    | Practical examination and Semester work | 25%  |
| Total |   | 100% |

## 7. List of References

| No | Reference   | Type         |
|----|---|--------------|
| 1. | Practical course notes prepared by the department staff members   | Course notes |
| 2. | Lecture notes and practical course notes prepared by the department staff members.  | Course notes |
| 3. | Fundamentals of Analytical Chemistry , Douglas A.; Skoog; Donald M., West, F. James Holler, Stanley, R. Crouch Thomson, Australia 8th ed. (2004). | Book         |



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|----|---|------|
| 4. | Quantitative Chemical Analysis, Daniel C. Harris, 6th ed., W.H. Freeman and Company, New York (2003).             | Book |
| 5. | Vogel's Textbook of Quantitative chemical Analysis, J. Mendham, M.A, MSc, C. Chem, M. RSC, 6th ed., India (2004). | Book |
| 6. | Pharmaceutical Analytical Chemistry, Quantitative Analysis, Amer, M.M. Faculty of Pharmacy, Cairo University.     | Book |

### 8. Matrix of knowledge and skills of the course

| No | Course contents                             | Study Week                           | ILOS                      |                     |                                   |                               |
|----|---|--------------------------------------|---------------------------|---------------------|-----------------------------------|-------------------------------|
|    |   |                                      | Knowledge & understanding | Intellectual skills | Professional and practical skills | General & transferable skills |
| 1. | Acid base titration and applications.       | 1 <sup>st</sup> - 4 <sup>th</sup>    | a1, a2                    | b1, b2              | c1, c2                            | d2 , d5                       |
| 2. | Non aqueous titration and its applications. | 5,6 <sup>th</sup>                    | a1, a2                    | b1, b2              | c1 and c2                         | d1, d4                        |
| 3. | Precipitation titration.                    | 8 <sup>th</sup> and 10 <sup>th</sup> | a1                        | b1, b2              | c1 and c2                         | d1, d4                        |
| 4. | Complexometric titration.                   | 11 <sup>th</sup>                     | a1                        | b1, b2              | c1 , c2                           | d3 , d4                       |

|                     |                        |
|---------------------|------------------------|
| Course Coordinator: | Fawzia Ahmed Ibrahim   |
| Head of Department: | Nahed Mahmoud El-Enany |