# COURSE SPECIFICATIONS

## Form

Course Title: **Experimental techniques II spectroscopies**

Course Code: **23066103-2**

| | |
|---|---|
| **Date**: 2018 – 12 – 28 | **Institution**: Umm Al-Qura University |
| **College**: Al-Jamoum University College | **Department**: Physics |

## A. Course Identification and General Information

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|---|---|---|---|
| 1. Course title and code: **Experimental techniques II spectroscopies (23066103-2)** | | | |
| 2. Credit hours: **2 credit hours (1 credit for lectures and 1 credit for practical part).** | | | |
| 3. Program(s) in which the course is offered: **Nano physics Program, Al-Jamoum University College.** (If general elective available in many programs indicate this rather than list programs) | | | |
| 4. Name of faculty member responsible for the course: | | | |
| 5. Level/year at which this course is offered: **1st Level.** | | | |
| 6. Pre-requisites for this course (if any): **-** | | | |
| 7. Co-requisites for this course (if any): **-** | | | |
| 8. Location if not on main campus: **Al-Jamoum University College.** | | | |
| 9. Mode of Instruction (mark all that apply): | | | |
| a. Traditional classroom | ✓ | percentage? | 35% |
| b. Blended (traditional and online) | | percentage? | |
| c. E-learning | ✓ | percentage? | 15% |
| d. Correspondence | | percentage? | |
| e. Other: **Lab** | ✓ | percentage? | 50% |
| Comments: | | | |

## B. Objectives

1. The main objective of this course

**The main goal of the course is to introduce the spectroscopic experimental techniques in the nanoscience and nanotechnology context. two main groups are considered, techniques involving electron spectroscopy and those focus on molecular spectroscopy.**

2. Describe briefly any plans for developing and improving the course that are being implemented. (e.g. increased use of the IT or online reference material, changes in content as a result of new research in the field)

**Improving Course content using course report and references text book.**
**Using recent scientific research for improving course content.**

## C. Course Description (Note: General description in the form used in the program's bulletin or handbook)

**Course Description:**

**The course must be thought after basic scientific subjects, such as quantum physics and mathematics.**

**1. Topics to be Covered**

| List of Topics | No. of Weeks | Contact hours |
|---|---|---|
| Introduction: measuring electronic states in nanostructures | 1 | 1 |
| Surface approach ultra-high vacuum atomically clean surfaces | 2 | 2 |

| | | |
|---|---|---|
| Evaporation of materials thin film growth quantum dots, stripes and wires | 4 | 4 |
| Practical evaporation of materials thin film growth. | 2 | 6 |
| Practical surface sensitive techniques, particle sources and particle analyzers | 4 | 12 |
| Low energy electron diffraction. | 4 | 4 |
| Practical Scanning tunneling microscopy and atomic force microscopy | 4 | 12 |
| photoemission | 4 | 4 |
| Practical Surface science | 4 | 12 |

**2. Course components (total contact and credit hours per semester):**

| | | Lecture | Tutorial | Laboratory/ Studio | Practical | Other | Total |
|---|---|---|---|---|---|---|---|
| Contact Hours | Planned | 15 | | 42 | | | 57 |
| | Actual | 15 | | 42 | | | 57 |
| Credit | Planned | 1 | | 1 | | | 2 |
| | Actual | 1 | | 1 | | | 2 |

**3. Individual study/learning hours expected for students per week.** ☐

**4. Course Learning Outcomes in NQF Domains of Learning and Alignment with Assessment Methods and Teaching Strategies**

**On the table below are the five NQF Learning Domains, numbered in the left column.**
**First**, insert the suitable and measurable course learning outcomes required in the appropriate learning domains (see suggestions below the table). **Second**, insert supporting teaching strategies that fit and align with the assessment methods and targeted learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each course learning outcomes, assessment method, and teaching strategy should fit in together with the rest to form an integrated learning and teaching process. (Courses are not required to include learning outcomes from each domain.)

**Curriculum Map**

| Code # | NQF Learning Domains And Course Learning Outcomes | Course Teaching Strategies | Course Assessment Methods |
|---|---|---|---|
| **1.0** | **Knowledge** | | |
| 1.1 | Understanding the nature of observation and scientific knowledge in the field of study. | | |
| 1.2 | Relevant theories and their applications. | | |
| 1.5 | Related terminology, numbering and classification systems. | | |
| 1.7 | Related terminology, numbering and classification systems. | | |
| **2.0** | **Cognitive Skills** | | |
| 2.1 | Distinguish the relevant theories and evaluate its concepts and principles. | | |

| | | | |
|---|---|---|---|
| 2.2 | Analyzing, evaluating and interpreting relevant qualitative and quantitative scientific data. | | |
| 2.4 | Develop and develop mechanisms to deal with scientific problems. | | |
| **3.0** | **Interpersonal Skills & Responsibility** | | |
| 3.1 | Design plans and method of treatment and report based on data that has been investigated, using appropriate techniques and consideration of scientific guidance. | | |
| 3.3 | Solve scientific problems using a range of formats and approaches. | | |
| **4.0** | **Communication, Information Technology, Numerical** | | |
| 4.2 | Define roles, responsibilities and performance methods | | |
| 4.4 | Work in groups effectively; manage time, collaborate and communicate with others positively. | | |
| **5.0** | **Psychomotor(if any)** | | |
| 5.1 | Conduct relevant scientific experiments. | | |
| 5.2 | Developing scientific experiments and establishing techniques related to the experiments under study. | | |

**5. Assessment Task Schedule for Students During the Semester**

| | Assessment task (i.e., essay, test, quizzes, group project, examination, speech, oral presentation, etc.) | Week Due | Proportion of Total Assessment |
|---|---|---|---|
| 1 | 1st Quiz. | 7 | 5 |
| 2 | 2nd Quiz. | 12 | 5 |
| 3 | 1st Homework (E-Learning). | 5 | 5 |
| 4 | 2nd Homework (E-Learning). | 11 | 5 |
| 5 | 1st Quiz (Practical). | 6 | 5 |
| 6 | 2nd Quiz (Practical). | 10 | 5 |
| 7 | 1st Homework (Practical E-Learning). | 4 | 5 |
| 8 | 2nd Homework (Practical E-Learning). | 9 | 5 |
| 9 | Research. | 13 | 5 |
| 01 | Final Practical Examination. | 14 | 15 |
| 11 | Final written Examination. | 16 | 40 |

## D. Student Academic Counseling and Support

1. Arrangements for availability of faculty and teaching staff for individual student consultations and academic counseling. (include the time teaching staff are expected to be available per week)

**Academic advising hours for guidance are included in the faculty member schedule of 4 hours per week**

## E. Learning Resources

1. List Required Textbooks

**Physics at surfaces, A. Zangwill, cambridge university press (1996)**
**Very high resolution photoelectron spectroscopy, ed. S. Hüfner, lect. notes in physics 715, Springer, Berlin, Heidelberg 2007.**

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| **Scanning Probe Microscopy and Spectroscopy: Methods and Applications. Roland Wiesendanger, Cambridge University Press (1994)**<br>**Broadband dielectric spectroscopy. F. Kremer, A. Schönhals, Springer-Verlag, Berlin 2003.**<br>**Exploring matter with Neutrons - 2nd edition, 2nd volume of the NANOPOLIS™ encyclopedia series. Multimedia distributed knowledge network in nanotechnology . www.nanopolis.net**<br>**Modern Raman Spectroscopy: A Practical Approach, Ewen Smith y Geoffrey Dent., Wiley (2005).** |
| 2. List Essential References Materials (Journals, Reports, etc.) |
| 3. List Electronic Materials, Web Sites, Facebook, Twitter, etc. |
| 4. Other learning material such as computer-based programs/CD, professional standards or regulations and software. |

## F. Facilities Required

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| Indicate requirements for the course including size of classrooms and laboratories (i.e. number of seats in classrooms and laboratories, extent of computer access, etc.) |
| 1. Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)<br>**Class room for 10 students.** |
| 2. Technology resources (AV, data show, Smart Board, software, etc.)<br>**The class room should be equipped with a pc and data-show.** |
| 3. Other resources (specify, e.g. if specific laboratory equipment is required, list requirements or attach list) |

## G. Course Evaluation and Improvement Procedures

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| 1. Strategies for Obtaining Student's Feedback on Effectiveness of Teaching<br>**Questioners.** |
| 2. Other Strategies for Evaluation of Teaching by the Instructor or the Department<br>**Using course report.** |
| 3. Procedures for Teaching Development<br>**Using course report.** |
| 4. Procedures for Verifying Standards of Student's Achievement (e.g. check marking by an independent member teaching staff of a sample of student's work, periodic exchange and remarking of tests or a sample of assignments with staff members at another institution)<br>**A random sample of students' assessments is corrected through the committee formed by the department** |
| 5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for developing it.<br>**Review stakeholders and conduct periodic questioners.** |

**Name of Course Instructor: _____**

**Signature: _____ Date Completed: _____**

**Program Coordinator: _____**

**Signature: _____ Date Received: _____**