# Course Syllabus

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|---|---|---|
| **1** | **Course title** | Scientific Research Methodologies |
| **2** | **Course number** | 0302490 |
| **3** | **Credit hours** | 1 |
| | **Contact hours (theory, practical)** | Theory 1, Practical 3 |
| **4** | **Prerequisites/corequisites** | Department approval / over 90 Credit hours |
| **5** | **Program title** | BSs |
| **6** | **Program code** | 0302 |
| **7** | **Awarding institution** | The University of Jordan |
| **8** | **School** | Science |
| **9** | **Department** | Physics |
| **10** | **Course level** | 400-Fourth year level |
| **11** | **Year of study and semester(s)** | Second Semester 2023/2024 |
| **12** | **Other department(s) involved in teaching the course** | - |
| **13** | **Main teaching language** | English |
| **14** | **Delivery method** | ☒Face to face learning ☐Blended ☐Fully online |
| **15** | **Online platforms(s)** | ☐Moodle ☒Microsoft Teams ☐Skype ☐Zoom ☐Others…… |
| **16** | **Issuing/Revision Date** | 15-2-2024 |

**17 Course Coordinator:**

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|---|---|
| Name: Dr. Walaa Al Tamimi | Contact hours: Sunday-Thursday 10-11 |
| Office number: Dean of science building-Ground Floor | Phone number:065355000-Ext.22047 |
| Email: w.tamimi@ju.edu.jo | |

**18 Other instructors:**

Each project is supervised by a different faculty member according to his specialization and research interests

**19 Course Description:**

This course provides an in-depth exploration of foundational physics concepts and principles, enabling students to apply their academic experience to real-world physics problems. Students will gain proficiency in using a variety of instrumentation and measurement techniques, as well as computer software and computer-interfaced equipment for data collection and analysis. The course emphasizes the use of statistics and curve-fitting for experimental data analysis, preparing students for professional careers by providing hands-on experience. It also covers contemporary issues in physics and fosters a commitment to lifelong learning. Students will develop skills in writing scientific reports and theses, including proper formatting of equations, plots, and diagrams. Additionally, the course focuses on effective communication through oral presentations and instills an understanding of professional and ethical responsibilities.

**20 Course aims and outcomes:**

**A- Aims:**

After successfully completing this course, the student will be able to:

(a) Demonstrate acquired depth of knowledge about foundational physics concepts and principles.

(b) Have an opportunity to apply his/her academic experience to physics related problems.

(c) Use a variety of instrumentation and measurement techniques.

(d) Use computer software and computer-interfaced equipment to collect and analyze data.

(e) Use statistics and curve-fitting to analyze experimental data.

(f) Gain hands-on experience necessary for the senior student's transition to professional status upon graduation.

(g) Develop a knowledge of contemporary issues and a recognition of the need for engaging in a life-long learning

(h) Write scientific reports and thesis with proper use and formatting of equations, plots, and diagrams.

(i) Deliver an oral presentation of scientific work and communicate effectively.

(j) Develop an understanding of professional and ethical responsibility.

**B- Students Learning Outcomes (SLOs):**

For purposes of mapping the course SLOs to the physics program SLOs, at the successful completion of the physics program, graduates are expected to be able to:

**SLO (1)** Master professionally a broad set of knowledge concerning the fundamentals in the basic areas of physics: Quantum Mechanics, Classical Mechanics, Electrostatics and Magnetism, Thermal Physics, Optics, Theory of Special Relativity, Mathematical Physics, Electronics.

**SLO (2)** Apply knowledge of mathematics and fundamental concepts in the basic areas of physics to identify and solve physics related problems.

**SLO (3)** Utilize computers and available software in both data collections and data analysis.

**SLO (4)** Utilize standard laboratory equipment, modern instrumentation, and classical techniques to design and conduct experiments as well as to analyze and interpret data.

**SLO (5)** Develop a recognition of the need and ability to engage in life-long learning.

**SLO (6)** Demonstrate ability to use techniques, skills, and modern scientific tools necessary for professional practice.

**SLO (7)** Communicate clearly and effectively in both written and oral forms.

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**SLO (8)** Apply proficiently team-work skills and employ team-based learning strategies.

**SLO (9)** Apply professional and ethical responsibility to society.

Upon successful completion of this course, students will be able to:

| Program SLOs / Course SLOs | SLO (1) | SLO (2) | SLO (3) | SLO (4) | SLO (5) | SLO (6) | SLO (7) | SLO (8) | SLO (9) |
|---|---|---|---|---|---|---|---|---|---|
| 1. Demonstrate acquired depth of knowledge about foundational physics concepts and principles. | ✓ | | | | | | | | |
| 2. Have an opportunity to apply his/her academic experience to physics related problems. | | ✓ | | | | | | | ✓ |
| 3. Use a variety of instrumentation and measurement techniques. | | | | ✓ | | | | | |
| 4. Use statistics and curve-fitting to analyze experimental data. | | | ✓ | | | | | | |
| 5. Gain hands-on experience necessary for the senior student's transition to professional status upon graduation. | | | ✓ | | | | | ✓ | ✓ |
| 6. Develop a knowledge of contemporary issues and a recognition of the need for engaging in a life-long learning. | | | | | | ✓ | | | ✓ |
| 7. Write scientific reports and thesis with proper use and formatting of equations, plots, and diagrams. | | | | | ✓ | | | | |
| 8. Deliver an oral presentation of scientific work and communicate effectively. | | | | | | | ✓ | | |
| Develop an understanding of professional and ethical responsibility.<br>9. | | | | | | | ✓ | | |

## 21. Topic Outline and Schedule:

| Week | Lecture | Topic | Intended Learning Outcome | Learning Methods (Face to Face/Blended/ Fully Online) | Platform | Synchronous / Asynchronous Lecturing | Evaluation Methods | Resources |
|---|---|---|---|---|---|---|---|---|
| 1 | 1.1 | Literature Review + Scientific research writing | 1,2,6 | F to F | teams | | | |
| | 1.2 | | | | | | | |
| | 1.3 | | | | | | | |
| 2 | 2.1 | | | | | | | |
| | 2.2 | | | | | | | |
| | 2.3 | | | | | | | |
| **Week** | **Lecture** | **Topic** | **Intended Learning Outcome** | **Learning Methods (Face to Face/Blended/ Fully Online)** | **Platform** | **Synchronous / Asynchronous Lecturing** | **Evaluation Methods** | **Resources** |
| 3 | 3.1 | Experiment, Results and discussions | | | | | | |
| | 3.2 | | | | | | | |
| | 3.3 | | | | | | | |
| 4 | 4.1 | | | | | | | |
| | 4.2 | | | | | | | |
| | 4.3 | | | | | | | |
| 5 | 5.1 | | | | | | | |
| | 5.2 | | | | | | | |
| | 5.3 | | | | | | | |
| 6 | 6.1 | | | | | | | |
| | 6.2 | | | | | | | |
| | 6.3 | | | | | | | |
| 7 | 7.1 | | | | | | | |
| | 7.2 | | | | | | | |
| | 7.3 | | | | | | | |

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|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| 8 | 8.1 | Scientific writing and discussions | | | | | | |
| | 8.2 | | | | | | | |
| | 8.3 | | | | | | | |
| 9 | 9.1 | | | | | | | |
| | 9.2 | | | | | | | |
| | 9.3 | | | | | | | |
| 10 | 10.1 | | | | | | | |
| | 10.2 | | | | | | | |
| | 10.3 | | | | | | | |
| 11 | 11.1 | | | | | | | |
| | 11.2 | | | | | | | |
| | 11.3 | | | | | | | |
| 12 | 12.1 | | | | | | | |
| | 12.2 | | | | | | | |
| | 12.3 | | | | | | | |
| 13 | 13.1 | Presentation+ oral presentation | | | | | | |
| | 13.2 | | | | | | | |
| | 13.3 | | | | | | | |
| 14 | 14.1 | | | | | | | |
| | 14.2 | | | | | | | |
| | 14.3 | | | | | | | |
| 15 | 15.1 | Report | | | | | | |
| | 15.2 | | | | | | | |
| | 15.3 | | | | | | | |

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**22 Evaluation Methods:**

Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:

| Evaluation Activity | Mark | Topic(s) | SLOs | Period (Week) | Platform |
|---|---|---|---|---|---|
| Literature Review | 10 | Research Topic | 1,2,6,9 | 2 weeks | Face to Face |
| Weekly tasks commitment | 20 | Research Topic | 1,2,3,4,5,6 | 16 weeks | Face to Face |
| Data analysis and results | 20 | Research Topic | 3,4,5 | 4 weeks | Face to Face |
| Oral Presentation | 15 | Research Topic | 8 | 3 weeks before the end of the semester | Face to Face |
| Report | 35 | Research Topic | 7 | Last week | Face to Face+ Elearning |
| | | | | | |

**23 Course Requirements**

**(e.g: students should have a computer, internet connection, webcam, account on a specific software/platform…etc):**

**Internet , computer.**

**24 Course Policies:**

A- Attendance policies: Regular attendance at all learning activities is expected, and unsatisfactory attendance maylead to disciplinary action according to the University of Jordan regulations.

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B- Absences from exams and submitting assignments on time: Students may be permitted to make up an exammissed due to illness or other legitimate absence. A doctor's certification before allowing a student to make up an exam due to illness is required.

C- Health and safety procedures:

D- Honesty policy regarding cheating, plagiarism, misbehavior: The University Of Jordan policy will be implemented

E- Grading policy: according to the table above.

F- Available university services that support achievement in the course:

**25 References:**

A- Required book(s), assigned reading and audio-visuals:

Depends on the research project.

B- Recommended books, materials, and media:

**26 Additional information:**

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| Name of Course Coordinator: ----------Signature: ---------- Date: ---------- |
| Head of Curriculum Committee/Department: ---------- Signature: ---------- |
| Head of Department: ---------- Signature: ---------- |
| Head of Curriculum Committee/Faculty: ---------- Signature: ---------- |
| Dean: ---------- Signature: ---------- |