



Jordan University of Science and Technology
Faculty of Science & Arts
Physics Department

PHY474 Solar Cells - JNQF Level: 7

First Semester 2024-2025

Course Catalog

3 Credit Hours. In this course, you will learn about the fundamentals of photoelectric conversion: Band theory, Generation, transport, and recombination of charge carriers. Reflection and absorption of light. Theoretical limits on solar cell efficiencies. Solar cell modeling. Fabrication of silicon for solar cells. Fabrication of silicon-based solar cells. Solar cell characterization. Simulation of solar cells and solar PV systems.

Teaching Method: Blended

Text Book

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|--------------------------|-------------------------|
| Title | PVEducation website |
| Author(s) | Univ of New South Wales |
| Edition | 2nd Edition |
| Short Name | 1 |
| Other Information | |

Course References

| Short name | Book name | Author(s) | Edition | Other Information |
|------------|--|---------------------------------|-------------|-------------------|
| 2 | Photovoltaic Systems Engineering | Roger A. Messenger Jerry Ventre | 2nd Edition | |
| 3 | Solar Cell Device Physics | Stephen J. Fonash | 2nd Edition | |
| 4 | Solar Cell Technology and Applications | A.R. Jha, | 1st Edition | |
| 5 | solar cells | Miro Zeman | 2nd Edition | |

Instructor

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| Name | Dr. Adnan Shariah |
| Office Location | PH3 L1 |
| Office Hours | |
| Email | shariah@just.edu.jo |

| Class Schedule & Room |
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| Section 1: Lecture Time: Mon, Wed : 13:00 - 14:00 Room: M3306 |

| Prerequisites | | |
|----------------------|------------------------|---------------------|
| Line Number | Course Name | Prerequisite Type |
| 922310 | PHY231 Electronics (1) | Prerequisite / Pass |

| Tentative List of Topics Covered | | |
|---|---|------------------------------|
| Weeks | Topic | References |
| Weeks 1, 2 | Solar Radiation | From 1 |
| Weeks 3, 4 | P-N Junction | From 1, From 3, From 5 |
| Weeks 5, 6 | Solar Cell Operation | From 1, From 3, From 5 |
| Weeks 7, 8 | Solar Cell Design | From 1, From 2, From 4 |
| Weeks 9, 10 | Solar Cell Fabrication | From 1, From 2, From 5 |
| Weeks 11, 12 | Solar Modules and Arrays | From 1, From 2, From 4 |
| Weeks 13, 14 | Solar Cell Testing and Characterization | From 1, From 2, From 4 |
| Weeks 15, 16 | Solar Cell Simulation | From 1 |

| Mapping of Course Outcomes to Program Outcomes and NQF Outcomes | Course Outcome Weight (Out of 100%) | Assessment method |
|---|-------------------------------------|-------------------|
| | | |

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|---|-----|--|
| Understanding the nature of solar radiation and the design and operational principles of solar cells [1SLO1(K1S1)] [1L7K1, 1L7S1] | 60% | |
| Learn how to test and characterize the performance of solar cells' performance and simulate solar cells and solar PV systems. [1SLO5(C4)] [1L7C4] | 40% | |

| Relationship to Program Student Outcomes (Out of 100%) | | | | | |
|--|-------------|-----------|----------|----------|------------|
| SLO1(K1S1) | SLO2(S23C1) | SLO3(C24) | SLO4(C3) | SLO5(C4) | SLO6(S2C3) |
| 60 | | | | 40 | |

| Relationship to NQF Outcomes (Out of 100%) | | |
|--|------|------|
| L7K1 | L7S1 | L7C4 |
| 30 | 30 | 40 |

| Evaluation | |
|-----------------|--------|
| Assessment Tool | Weight |
| Midterm exam 1 | 30% |
| Midterm exam 2 | 30% |
| Final Exam | 40% |

| Policy | |
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| student behavior | <p>Student Behavior: As students in a technical program are preparing for a professional career, all students are expected to conduct themselves, in both manner and dress, as professionals. Eating, drinking, or the consumption of any tobacco products is prohibited during class meetings (lecture hall, classroom, laboratory, or field). Doing so may result in the student's dismissal from that class period and will count as an unexcused absence.</p> <p>Cell phones, pagers, and similar devices must be turned off during the instruction time. Use of or disruption of class by these devices will result in the confiscation of the device by the instructor, and may result in the student's dismissal from that class period which will count as an unexcused absence. The confiscated device may be retrieved at University Police.</p> |
| Attendance | <p>Students are required to attend scheduled lectures, labs, and field trips; and to work on class and lab/field assignments as scheduled by the professor. Students are required to attend their scheduled sections for labs, lectures, and examinations (unless authorized by the professor). Since class sessions start on the hour, students are expected to be punctual. There will be no late entries once a class has begun. In this case, student's absence will be counted as unexcused and will receive a zero for any assignments due. If a student must leave class early during a regularly scheduled meeting, he/she must discuss reasons with the professor. If a student must miss a scheduled class meeting due to an acceptable, verifiable time conflict, he/she must resolve the time conflict prior to class.</p> <p>If a student is unable to attend class because of an emergency, the professor or School of Agriculture and Natural Resources office must be contacted prior to the scheduled class meeting. Students failing to call ahead or discuss absences prior to the class will be unexcused. If a student accumulates four unexcused absences, he/she will be given the option of dropping the course or receiving a failing grade for the semester.</p> |

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| <p>Honesty Policy & Discipline (Due Process)</p> | <p>Honesty and integrity are major elements in professional behavior and are expected of each student. Any assignment (including those in electronic media) submitted by a student must be of the student's original authorship. Representation of another's work as his/her own shall constitute plagiarism. Cheating, in any form, is considered unacceptable behavior within all University courses. Students having academic problems should consult with their advisor or a college counselor. Instances of cheating will be dealt with in accordance to University policy. Standards of academic honesty and due process procedures for JUST are located in the Rules, Regulations & Expectations section of the student handbook.</p> |
| <p>Safety Guidelines</p> | <p>Certain class assignments may require the student to be absent from the professor's immediate supervision. Whether the student is under immediate supervision or not, safe conduct and safe use of equipment shall be the ultimate rule. Failure to comply with prudent safety practice and/or willful disregard for class participants and/or equipment may be cause for immediate dismissal from that particular class session by the professor.</p> |
| <p>Safety Guidelines</p> | <p>Certain class assignments may require the student to be absent from the professor's immediate supervision. Whether the student is under immediate supervision or not, safe conduct and safe use of equipment shall be the ultimate rule. Failure to comply with prudent safety practice and/or willful disregard for class participants and/or equipment may be cause for immediate dismissal from that particular class session by the professor.</p> |
| <p>Office hours</p> | <p>You may visit me during office hours for any reason without an appointment. You can come at other times also, but make an appointment so that you can be sure to catch me. You can contact us by email</p> |
| <p>Students with- Disabilities</p> | <p>If you have a disability, (physical or psychological) and require reasonable accommodations to enable you to participate in this course, such as note-takers, readers, or extended time on exams and assignments, please contact the Physics Department Office, and also see me during the first two weeks of class to provide you with information and review appropriate arrangements for reasonable accommodations.</p> |

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