Undergraduate Research Project (URP) Handbook

For

Students, Supervisors and Referees

Jazan University
College of Science - Physics Department

Academic Year 2018/2019
Preface

The undergraduate research project (URP) integrates physics students into the research community through mentored experiences in various disciplines. It aims to provide students with hands-on opportunities to participate in research projects in different topics under the supervision of experienced faculty members.

This handbook has been designed to provide the student with general information about the undergraduate research project (URP) in the Physics department - College of Science at Jazan University, as well as the general guidelines for conducting research across disciplines. This information is basic and geared toward physics undergraduate students of Jazan University.

You are strongly encouraged to use this handbook and use the Department facilities, advice and support services during your studies to enhance your period of study as a research project student.

I wish you the very best success with your studies.
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1. **Overview:**

The mandatory Undergraduate Research Project (URP) course (PHYS491) provides the student with first-hand involvement in the process of research after completing the courses of the first six semesters.

Graduation project constitutes an important phase of the student’s future career. In choosing a topic that he/she is interested in, preparing and defending the results, the student tries to apply their knowledge comprehensively in solving a complex and realistic problem. He/she proves that he/she has gained essential skills of research as well as the ability to effectively communicate the results to an audience.

By the end of every academic semester, the department of physics organizes the Undergraduate Research Projects Conference. This conference is a formal event that involves presentation sessions, honoring ceremonies, speeches, social events, and attendance of some distinguished guests. The conference holds in the departmental meeting room.

2. **Course Description:**

The undergraduate research project can be carried out using one or a variety of methods. It might involve carrying out a small experimental using the physics department laboratory facilities. The project could be a computational programming work, consisting of a small numerical simulation of special physics phenomena. In this case the attention should focus on the computational technique and its effectiveness of describing the phenomena. It could be a theoretical analysis where the student tackles and solves some theoretical problem or it could even consist on a detailed literature review in a particular subject, but it would need to be critical and theoretical in its approach, and involve much more research than a long essay.

3. **Objectives:**

This course is designed to:

1. Develop the students' research work experience supervised by a faculty member
2. Provide the possibility to expand students' knowledge in a specific area
3. Develop or implement experimental, computational or theoretical work to enhance students scientific abilities
4. Prepare students for effective writing and presentation skills
5. Train the students with opportunities of self-confidence effectively communicate the results to an audience.
4. **Course Contents:**
   - Literature review
   - Analysis and discussion of the problem
   - New approaches to the problem (Theoretical or Experimental)
   - Application of the approaches
   - Results analysis and discussion
   - Writing report - Preparation of the defending presentation

5. **Requirements**
   To enroll in an undergraduate research project the students should complete the courses in the first six semesters such as Solid State Physics, Nuclear Physics and Quantum Mechanics.
   Special exceptions could be granted to students who have less than 18 credit hours to complete their B.Sc. Degree.

6. **Subject Areas**
   A Graduation project challenges the student to go beyond those learnings that occur as the result of his/her prescribed educational program; it intends to provide the student with a venue to express or demonstrate his/her intellectual, physical and creative abilities based upon research and knowledge of the chosen subject area.
   The subject areas of an undergraduate project might be in one or more of the following forms:
   i. Designing an experiment and/or implementing some experimental research.
   ii. Developing a computer program to simulate or solve a physical problem.
   iii. Tackling and solving some theoretical problem.
   iv. A detailed literature review in a particular subject,

7. **Steps toward the project**

   1. **Registration**
   Senior students who have completed their requirements for sixth level and succeeded in specialized basic courses such as Solid State Physics, Nuclear Physics, Quantum Mechanics, have to register for the projects course in the first week of the semester and are invited to immediately contact the supervisor personally to request more details about the project and to agree with him about the weekly meeting schedule. The student should then fill the online form to complete his/her registration.
2. **Briefing Meeting**

At the beginning of the semester, a briefing meeting is organized by the URP coordinator for the enrolled students. At the initial briefing meeting, the students will be given an introduction to the URP. This meeting is a good opportunity for student to get answers about all his/her questions concerning the URP.

3. **Expectations**

During the undergraduate research project, the student will be working in a small research group or individually under the supervision of a faculty member. It is students’ graduation project and students must do the real work. He/She is expected to spend at least three hours per week for approximately 12-14 weeks. During the research period, student should take the initiative to keep his/her project progressing and to strive to answer to the supervisor expectations and what is required for his/her specific research project. It also expected from the student to actively contribute to the writing of the final project report as well as to the presentation material.

8. **Responsibilities of the Graduation Project**

1. **Student**

The student is responsible for the successful completion of the Graduation Project under the guidelines established by the department.

   The student should:
   - Complete the registration in the URP as required by the undergraduate program.
   - Develop an appropriate research plan.
   - Establish an appropriate schedule to maintain his/her progress. Students must balance coursework, research, and other academic activities to successfully complete their URP.
   - Attend the formal supervisor meetings as scheduled in the time table and making appropriate arrangements if it is not possible to attend a scheduled supervisory meeting.
   - Follow all rules in this handbook and meet all requirements and deadlines.
   - The student is responsible for preparing a graduation project report and a presentation.
   - Provide the supervisor with a complete final draft of the report by an acceptable date.
   - Respond to feedback and guidance provided by the supervisor regarding to the final draft of the report.
   - Prepare the appropriate material for the examination.
2. **Supervisor**

The undergraduate research project (PHYS491) is a course as other courses in the undergraduate program. The role of the supervisor is to monitor, manage and facilitating the research project. The supervisor should,

- Support students in the experimental or computer lab.
- Monitor the progress of the project, and should provide advice and assistance as necessary.
- Provide adequate training in the methodology of the student’s research.
- Establish and maintain a satisfactory timetable for the research, and ensure that the research project is fully completed, including preparation of the report, within the time available, and advice the student accordingly.
- Ensure that the student understands the procedures for the submission of the report and should assist the student in preparing for the oral examination, including offering a mock viva.
- Report any complaints or difficulties raised by students involved in the research to the coordinator.

3. **Referee**

The referee is expected to:

- Read carefully the report
- Fairly grade the report strictly following the referee form provided by the coordinator
- Fairly ask each student the same number of questions within the same level of difficulty.
- Fairly grade the student based on his/her performances. The marking should take into account the following points:
  - The difficulty of the project;
  - The original contribution the student has made to the project; The structure, content and presentation of the report.
  - The student’s understanding of the project and the results, based on the reports and oral examinations.

4. **Coordinator**

The coordinator is a staff member nominated by the department to serve as a Graduation Project Coordinator, who is responsible for the overall mechanics, scheduling, and will provide support to the academic advisors and students. Graduation Project Coordinator, in cooperation with the department head, has the following tasks:

- The coordinator should ensure that all students are registered with supervisors
- To follow up the normal process of the graduation projects
- Develop and update the project evaluation forms, and any related documents.
- Organize the presentation sessions.
- The department appoints a committee of two faculty members to review each project.
- Collect the evaluation forms from the supervisors and examiners, and work out the final grades.
- Maintain a project database, which may include hard and soft copies of the project’s reports and presentations.
- Administer the Best Graduation Project Award.
- Writing the course report

9. Workshops
Regular workshops will be provided for the students by the department of physics. A useful, although not exhaustive, includes the following workshops:
- Text editing using Word editor
- Text editing using LaTeX
- How to write a scientific dissertation
- Graphic tools
- Scientific computational methods

10. The research laboratory
The department of physics makes the upper level laboratories available for the research projects. The students with their supervisors could use these laboratories for their experimental work after informing the labs committee or the responsible of the lab.

11. The Individual Report
The individual report will be written up according to the following.


and will not be greater than 3000 words.

12. Format and Guidelines

The written report should have the following sections:
(1). Front Page Title
Description of the content of each of these sections is as follows.

1. Front Page Title: The front page should include the project title, students and supervisor's names and the date of report. This is important as it will be what attracts or otherwise in first place. It should be accurate and brief, but indicate the content of the project.

2. Acknowledgments: Include a paragraph acknowledging those who have contributed substantially to the research described in your report.

3. A Table of Contents.

4. List of Tables and Figures: Each table and figure must be referred to in the text of the paper, and must be numbered consecutively according to their occurrence in the body of the paper.

5. Abstract: The ABSTRACT is not a part of the body of the report itself. Rather it should briefly state the problem you have studied, the technique used to carry out the study (e.g. what kind of experimental method was used), if appropriate, and the primary results and conclusions presented in the paper. The abstract should be self-contained – do not use technical jargon and do not include references. The abstract should consist of one paragraph that is at most fifteen lines long.

6. Introduction: The purposes of the study are clearly stated in this section. A brief outline is given including some references to set the scene of other works in this or related area. General expectations about the outcome of the study should be given with reasons on which they are based. It states the problem and reasons for the investigation.

7. Methodology: Student who conducts a theoretical work, the basic equations/mathematical considerations of his/her problem should be introduced.
Instated, if he/she is doing an experimental project, the equipment and experimental procedures used in this research should be discussed in details.

8. Results and discussion: This section addresses the results from your research analysis ONLY. Figures with legends, Tables, and any other graphical materials (charts, pictures, etc.) have to be presented here.

9. Conclusions: The conclusion section summarizes in a few paragraphs (at most 3) the main results of your research. This is also a good place to mention the impact of your research and what problems remain to be answered, etc.

10. References: References appear in a separate section right after the conclusion. The references are for recognizing previous research that has been performed in your field, for citing scientific ideas, hypotheses, and conjectures made by. References should be numbered in order of their occurrence and to appear within brackets [1] in the text of the proposal. The references should be written according to the style of Physical Review Letters (https://journals.aps.org/prl/info/infoL.html#ref).

[1] Authors’ names, Journal or Book title, Volume number (in bold), page number and (year).

11. Appendix (optional)

13. Submission of the Report
Student should submit a written report for evaluation and a presentation file for oral examination. The report submission should be before one week before the examination day and in accord with the determined deadlines. The student is asked to provide three hard copies of the final report to the URP coordinator which distribute them to the referees. In the presentation file submission, the student must ensure that the complete file size is less 10 MB. Supplementary material such as audio, video, or spreadsheet, should be supplied in the final file-format when submitted.

14. Presentation Format
Presentation must be supported by slides which will be reflected by data show projectors. The presentation should include, but is not restricted to, the following basic topics:
1. Project problem statement
2. Project objective(s)
3. Literature review/background
4. Methodology
5. Results and discussion
6. Summary
15. Deadlines

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Report submission</td>
<td>7 days before the examination day</td>
</tr>
<tr>
<td>File submission</td>
<td>2 days before the examination day</td>
</tr>
</tbody>
</table>

PS: If any of the above deadlines is not respected, the student will be prevented from taking part of the best presentation competition.

16. Project Defending

All students enrolled in the URP course (PHYS491) have to present their work in English in front of an examination board.
The board is appointed by the URP coordinator and is composed of two members with research interest the closest possible to the project topic.
Each Student is allowed 10 minutes to talk about his/her work and results, followed by 5 minutes reserved to the questions by the referee.

**It is very important that the student should be in a formal outfit during the presentation and all along the URP conference.**

The following points should be borne in the mind of the student when performing his/her talk.
The most important thing to do is to be relaxed. You will be giving your talk in front of the friendly audience of the physics department, so try not to be nervous.
Speak clearly, and loudly enough to be heard in the back of the room. Be enthusiastic about your project, and confident in your presentation

17. Assessment Criteria

Both the supervisor and the referees are taking part of this process.
The grading of the student is based on the quality of his/her project report and performance at the final presentation.

- **Supervisor:** 50%
- **Referees:** 50%

1. **Supervisor marking**

Grade marks awarded by the project supervisor represent 50% of the final grade.
The focus of the supervisor while grading should be on the performance of the student all through the project.
### Performance factors

<table>
<thead>
<tr>
<th>Performance factors</th>
<th>marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demonstrated initiative and ability to learn</td>
<td>5</td>
</tr>
<tr>
<td>Demonstrated necessary writing and speaking skills</td>
<td>5</td>
</tr>
<tr>
<td>Was able to apply classroom knowledge to solve problems effectively</td>
<td>10</td>
</tr>
<tr>
<td>Responded well to supervision and constructive criticism</td>
<td>5</td>
</tr>
<tr>
<td>Exhibited a sense of responsibility and dependability</td>
<td>5</td>
</tr>
<tr>
<td>Completion of assigned experimental/theoretical/computational/literature review tasks</td>
<td>10</td>
</tr>
<tr>
<td>Report write-up Contribution</td>
<td>5</td>
</tr>
<tr>
<td>Contribution in power point preparation</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
</tr>
</tbody>
</table>

### 2. Referee marking

Grade marks awarded by the project examining board represent the other 50% of the final grade. The scoring used would be based on:

- ✓ Quality of report content
- ✓ Clarity of presentation.
- ✓ Understanding of topic and its relevance.
- ✓ Justification and methodology.
- ✓ Discussion of the results including analysis.

#### A. Report content

<table>
<thead>
<tr>
<th>Abstract and Introduction: Concise abstract and introduction, background of the study, main finding including.</th>
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<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods: Clear aims and objectives</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Results: Accurate results</td>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Discussion and conclusion:</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
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<tr>
<td>- Interpretation of results</td>
<td>0</td>
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<td>- Understanding of the significance of the subject</td>
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<td>5</td>
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<tr>
<td>- Indications of further work</td>
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<td>5</td>
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<tr>
<td>Literature review: Literature relevant to the study</td>
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<td>5</td>
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#### B. Presentation

<table>
<thead>
<tr>
<th>Overall appearance of slides and easy to follow</th>
<th>0</th>
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<th>2</th>
<th>3</th>
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<th>5</th>
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</thead>
<tbody>
<tr>
<td>Had a clear understanding of the project</td>
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<td>2</td>
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<td>5</td>
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<tr>
<td>Answering Question 1</td>
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<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>Answering Question 2</td>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>Answering Question 3</td>
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<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
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18. The Best student Presentation Awards

The URP head of the physics department established “The Best Presentation Awards” to spread the spirit of competition among students and to recognize outstanding presentation performance and skills. The best presentations are selected by the “Evaluation Committee” which is a committee composed by two staff members who have neither supervision nor jury duties.

A selection criterion is based on student's presentation performance, communication skills, presentation content, and defending. Selected students are awarded with the best presentation awards.