Program Specification For Doctor of Philosophy

In Engineering Physics

**Introduction:**

This Program specification provides a concise summary of the main features of the Ph. D Engineering Physics at Benha University. The Program Intended Learning Outcomes ILO’s are those that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. This specification provides a source of information for students seeking an understanding of the nature of the program, and to all other interested parties.

1. **Basic Information**
2. **Awarding Institution : Benha University**
3. **Teaching Institution : Faculty of Engineering at Shoubra**
4. **Name of the Final Award: Doctor of Philosophy (Ph. D)**
5. **Name of Department: Engineering Mathematics and Physics**
6. **Coordinators: Prof. Dr. Fatma metawee and Prof. Dr. Soher negem**
7. **Language of study: English**
8. **Date of production of Program Specification : September 2012**
9. **Relevant Benchmarks**: National Academic Standards NARS (for Ph. D degree programs), March 2009, and Descriptor for qualifications at doctoral (D) level of QAA (Quality Assurance Agency for Higher Education, UK) as outlined in “The framework for higher education qualifications in England, Wales and Northern Ireland - January 2001”**.**

**B. Professional Information**

**1. Program Mission and Aims**

**1.1** **Program Mission**

The mission of Faculty of Engineering, Benha University, Ph. D Engineering Physics Program provided by the department is to:

Undertake research for the purpose of adding to the knowledge and understanding in the various fields of Physics.

**1.2 Program Aims:**

In pursuit of this mission, the educational objectives of the Ph. D Engineering Physics Program are:

**(I)**Develop the students’ research skills and techniques in order to be able to demonstrate:

1. The ability to recognize and validate problems and to formulate and test hypotheses.
2. Original, independent and critical thinking.
3. The ability to develop theoretical concepts.
4. Acknowledge of recent advances within one's field and in related areas.
5. An understanding of relevant research methodologies and techniques and their appropriate application within one's research field.
6. The ability to analyze critically and evaluate one's findings and those of others.
7. The ability to summarize, document, report and reflect on progress.

**(II)** Set up a reasonable research environment for the students to be able to:

1. Show a broad understanding of the context, at the national and international level, in which research takes place.
2. Demonstrate awareness of issues relating to the rights of other researchers, of research subjects, and of others who may be affected by the research, e.g., confidentiality, ethical issues, attribution, copyright, malpractice, and ownership of data and the requirements of the Data Protection Act.
3. Demonstrate appreciation of standards of good research practice in their institution and/or discipline.
4. Understand relevant health and safety issues and demonstrate responsible working practices.
5. Understand the processes for finding and evaluation of research.
6. Justify the principles and experimental techniques used in one's own research.
7. Understand the process of academic or commercial exploitation of research results.

**(III)** Apply supervised research management for the students to be able to:

1. Apply effective project management through the setting of research goals, intermediate milestones and prioritization of activities.
2. Design and execute systems for the acquisition and collation of information through the effective use of appropriate resources.
3. Identify and access appropriate bibliographical resources, archives, and other sources of relevant information.
4. Use information technology appropriately for database management, recording and presenting information.

**(IV)** Support student’s personal effectiveness for the students to be able to:

1. Demonstrate a willingness and ability to learn and acquire knowledge.
2. Demonstrate flexibility and open-mindedness.
3. Demonstrate self-awareness and the ability to identify own training needs.
4. Demonstrate self-discipline, motivation, and thoroughness.
5. Show initiative, work independently and be self-reliant.

**(V)** Nourish Communication skills for the students to be able to:

1. Write clearly and in a style appropriate to purpose, e.g. progress reports, published documents, and thesis.
2. Construct coherent arguments and articulate ideas clearly to a range of audiences, formally and informally through a variety of techniques.
3. Constructively defend research outcomes at seminars and viva examination.
4. Contribute to promoting the public understanding of one's research field.
5. Effectively support the learning of others when involved in teaching, mentoring or demonstrating activities.

**(VI)** Encourage networking and team working for the students to be able to:

1. Develop and maintain co-operative networks and working relationships with supervisors, colleagues and peers, within the institution and the wider research community.
2. Understand one's behaviors and impact on others when working in and contributing to the success of formal and informal teams.
3. Listen, give and receive feedback and respond perceptively to others.

**(VII)** Exercise career management for the students to be able to:

1. Appreciate the need for and show commitment to continued professional development.
2. Take ownership for and manage one's career progression, set realistic and achievable career goals, and identify and develop ways to improve employability.
3. Demonstrate an insight into the transferable nature of research skills to other work environments and the range of career opportunities within and outside academia.
4. Present one's skills, personal attributes and experiences through effective CVs, applications and interviews.

**According to the NEQAA, the Ph. D program must satisfy the following Intended Learning Outcomes:**

**2. Intended Learning Outcomes (ILOs)**

Upon completion of the program the students should be able to:

**2.1 Knowledge and Understanding**

2.1.1 Identify theories, fundamentals and specialized knowledge in the area of study as well as in related disciplines.

2.1.2 Define the basics, methodologies and the ethics of scientific research.

2.1.3 Summarize the moral and legal principles of professional practice in the area of specialization.

2.1.4 List the principles and fundamentals of quality in professional practice related to the area of specialization.

2.1.5 Explain the effect of professional practice on the environment and work towards its conservation and maintenance.

**2-2 Intellectual Skills**

2.2.1 Analyze and assess information in the field of specialization, draw analogies and conclusions.

2.2.2 Solve problems based on a given set of parameters.

2.2.3 Conduct research studies to add to knowledge.

2.2.4 Write and formulate scientific papers.

2.2.5 Plan for performance development in the area of specialization.

2.2.6 Make professional decisions in various professional contexts.

2.2.7 Participate in a dialogue or discussion based on evidence and proofs.

**2-3 Professional and Practical Skills**

2.3.1 Master basic professional and modern skills in the area of specialization.

2.3.2 Write and evaluate professional reports.

2.3.3 Assess methods and current tools in the area of specialization.

2.3.4 Use technological tools to serve professional practice.

2.3.5 Plan for the progress in professional practice and develop the performance of others.

**2-4 General and Transferable Skills**

2.4.1 Communicate effectively using different means.

2.4.2 Use information technology in order to serve the development of professional practice.

2.4.3 Teach others and assess their performance.

2.4.4 Assess him/her self and continue to learn.

2.4.5 Use different sources for obtaining information and knowledge.

2.4.6 Work in a group and lead work teams.

2.4.7 Manage scientific meetings and time effectively.

1. **Academic Standards**

**3 a- External References for Standards (Benchmarks)**

National Academic Reference Standards for Ph. D Degree Programs, **in general,** were prepared by the National Authority for Quality Assurance and Accreditation of Education, Egypt. **These standards were translated for preparing these program specifications.** Inaddition, a comparison was made with descriptor for qualifications at doctoral level of QAA (Quality Assurance Agency for Higher Education, UK) as outlined in “The framework for higher education qualifications in England, Wales and Northern Ireland - January 2001”**.**

**3b-** **Comparison of Provision to External References**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | Attributes of program graduates as per NAQAAE Requirements for PhD programs, in general | | Attributes of program graduates as per QAA Requirements for PhD in Engineering Programs, in general | Corresponding ILO's in Current Program which satisfy the NAQAAE Requirements for PhD programs, in general |
|  | | 1.1 Master the fundamentals and methodologies of scientific research. | | **Demonstrate**  i) creation and interpretation of new knowledge, through original research or other advanced scholarship, of a quality to satisfy peer review, extend the forefront of the discipline, and merit publication  iv) a detailed understanding of applicable techniques for research and advanced academic enquiry. | 2.1.2  2.4.5 |
|  | | 1.2 Continue work towards adding to the knowledge in the area of specialization. | | **Demonstrate**  i) creation and interpretation of new knowledge, through original research or other advanced scholarship, of a quality to satisfy peer review, extend the forefront of the discipline, and merit publication  iii) the general ability to conceptualize, design and implement a project for the generation of new knowledge, applications or understanding at the forefront of the discipline, and to adjust the project design in the light of unforeseen problems  **Able to**  b) continue to undertake pure and/or applied research and development at an advanced level, contributing substantially to the development of new techniques, ideas, or approaches | 2.2.3  2.2.4  2.3.2 |
|  | | 1.3 Apply the analytic and critical approach in the area of specialization and related fields. | | **Able to**  b) continue to undertake pure and/or applied research and development at an advanced level, contributing substantially to the development of new techniques, ideas, or approaches | 2.2.1  2.3.2 |
|  | | 1.4 Integrate specialized knowledge with the related knowledge to develop and conclude the bilateral ties between them. | | **Demonstrate:**  ii) a systematic acquisition and understanding of a substantial body of knowledge which is at the forefront of an academic discipline or area of professional practice  **Able to**  b) continue to undertake pure and/or applied research and development at an advanced level, contributing substantially to the development of new techniques, ideas, or approaches | 2.1.1  2.2.3 |
|  | | 1.5 Show deep awareness of current problems and modern theories in the area of specialization. | | **Demonstrate**  ii) a systematic acquisition and understanding of a substantial body of knowledge which is at the forefront of an academic discipline or area of professional practice. | 2.1.1  2.4.5 |
|  | | 1.6 Identify professional problems and find innovative solutions for them. | | **Demonstrate**  iii) the general ability to conceptualize, design and implement a project for the generation of new knowledge, applications or understanding at the forefront of the discipline, and to adjust the project design in the light of unforeseen problems  **Able to**  b) continue to undertake pure and/or applied research and development at an advanced level, contributing substantially to the development of new techniques, ideas, or approaches | 2.2.3  2.2.5 |
|  | | 1.7 Master a wide range of professional skills in the area of specialization | | **Demonstrate**  ii) a systematic acquisition and understanding of a substantial body of knowledge which is at the forefront of an academic discipline or area of professional practice;  iv) a detailed understanding of applicable techniques for research and advanced academic enquiry.  **Able to**  a) make informed judgments on complex issues in specialist fields, often in the absence of complete data, and be able to communicate their ideas and conclusions clearly and effectively to specialist and non-specialist audiences | 2.2.5  2.3.1 |
|  | | 1.8 Lead the way towards the developments of new methods and tools for professional practice. | | **Demonstrate**  i) creation and interpretation of new knowledge, through original research or other advanced scholarship, of a quality to satisfy peer review, extend the forefront of the discipline, and merit publication  iii) the general ability to conceptualise, design and implement a project for the generation of new knowledge, applications or understanding at the forefront of the discipline, and to adjust the project design in the light of unforeseen problems  **Able to**  b) continue to undertake pure and/or applied research and development at an advanced level, contributing substantially to the development of new techniques, ideas, or approaches | 2.2.3  2.2.6  2.3.3  2.3.5 |
|  | | 1.9 Utilize the suitable technological means to serve professional practice. | | **Demonstrate**  iv) a detailed understanding of applicable techniques for research and advanced academic enquiry.  **Able to**  b) continue to undertake pure and/or applied research and development at an advanced level, contributing substantially to the development of new techniques, ideas, or approaches | 2.3.4  2.4.2 |
|  | | 1.10 Communicate effectively and lead a work team in various professional contexts. | | **Able to**  a) make informed judgments on complex issues in specialist fields, often in the absence of complete data, and be able to communicate their ideas and conclusions clearly and effectively to specialist and non-specialist audiences  **Has**  c) the qualities and transferable skills necessary for employment requiring the exercise of personal responsibility and largely autonomous initiative in complex and unpredictable situations, in professional or equivalent environments | 2.2.4  2.3.2  2.4.1  2.4.6 |
|  | | 1.11 Make decisions using available data. | | **Demonstrate**  iii the general ability to conceptualize, design and implement a project for the generation of new knowledge, applications or understanding at the forefront of the discipline, and to adjust the project design in the light of unforeseen problems  **Able to**  a) make informed judgments on complex issues in specialist fields, often in the absence of complete data, and be able to communicate their ideas and conclusions clearly and effectively to specialist and non-specialist audiences  **Has**  c) the qualities and transferable skills necessary for employment requiring the exercise of personal responsibility and largely autonomous initiative in complex and unpredictable situations, in professional or equivalent environments | 2.2.2  2.2.5  2.2.7 |
|  | | 1.12 Effectively employ and develop available resources and work towards finding new resources. | | **Has**  c) the qualities and transferable skills necessary for employment requiring the exercise of personal responsibility and largely autonomous initiative in complex and unpredictable situations, in professional or equivalent environments. | 2.1.4  2.1.5  2.4.5 |
|  | | 1.13 Display awareness of his/her role in community development and environmental conservation. | |  | 2.1.4  2.1.5 |
|  | | 1.14 Act in a way that reflects the commitment to integrity, credibility and in accordance with the rules of the profession. | | **Has**  c) the qualities and transferable skills necessary for employment requiring the exercise of personal responsibility and largely autonomous initiative in complex and unpredictable situations, in professional or equivalent environments | 2.1.3 |
|  | | 1.15 Show commitment to self development and transfer his knowledge and experiences to others. | **Demonstrate**  i the creation and interpretation of new knowledge, through original research or other advanced scholarship, of a quality to satisfy peer review, extend the forefront of the discipline, and merit publication  **Able to**  a) make informed judgments on complex issues in specialist fields, often in the absence of complete data, and be able to communicate their ideas and conclusions clearly and effectively to specialist and non-specialist audiences  b) continue to undertake pure and/or applied research and development at an advanced level, contributing substantially to the development of new techniques, ideas, or approaches  **Has**  c) The qualities and transferable skills necessary for employment requiring the exercise of personal responsibility and largely autonomous initiative in complex and unpredictable situations, in professional or equivalent environments. | 2.2.6  2.3.5  2.4.1  2.4.3  2.4.4  2.4.6  2.4.7 |

1. **Program Structure and Award Requirements**
2. **Criteria for Admission**

The student should hold a M. Sc. degree with a grade point average of at least (C+) from a faculty of engineering of an Egyptian university in Engineering Physics in order to join the program. Alternatively, holders of a master’s degree from an institution recognized by the supreme council of universities are allowed admission to the program. Further details of the admission criteria are outlined in the internal postgraduate prospectus for the Faculty of Engineering at Shoubra, issued 2012.

**2. Study Program**

**a) Supervisory Panel**

The student is assigned a supervisory panel as soon as he joins the program. The supervisory panel should have at least one member of the department (professor or associate professor) and may have up to four members in total either from the department or from other Egyptian or International Universities approved by the supreme council of universities.

**b) Comprehensive Exam**

The student should sit for a comprehensive exam **(equivalent to 6 credit hours)** given by a panel consists of 5 professors, who specialize in the general area of the students’ research topic. The panel should include 2 members from other universities. The exam should include a written section and an oral section to examine the general skills of the student. The student can re-sit the comprehensive exam only once if he/she fails. Further details about the comprehensive exam can be found in the internal postgraduate prospectus for the Faculty of Engineering at Shoubra, issued 2012.

**c) Compulsory Courses**

The student should study courses with 12 credit hours. The studied subjects should have code 700 or code 600 from the subjects offered by the department and not studied before by the student. The student should pass all subjects with at least C score in order to receive the degree.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test time** | **Total** | **Written exam** | **Oral / Practical** | **course work** | **Credit hours** | **Pre-requisites** | **Course Name** | **Course Code** | **Serial** |
| **Compulsory Courses** | | | | | | | | | |
| -- | -- | -- | -- | -- | 30 | -- | Ph. D Thesis |  | 1 |
| **Elective Courses** | | | | | | | | | |
| 3 | 300 | 180 | 60 | 60 | 3 | EMP 604 | Standard Model For Nuclear Forces | EMP 701 | 1 |
| 3 | 300 | 180 | 60 | 60 | 3 | -- | Quantum Lattice Theory For Nuclear Forces | EMP 702 | 2 |
| 3 | 300 | 180 | 60 | 60 | 3 | -- | Metal Science | EMP 703 | 3 |
| 3 | 300 | 180 | 60 | 60 | 3 | -- | Advanced Accurate Measurements | EMP 704 | 4 |
| 3 | 300 | 180 | 60 | 60 | 3 | -- | Selected Topics in New Energy | EMP 705 | 5 |
| 3 | 300 | 180 | 60 | 60 | 3 | -- | Nuclear reaction physics | EMP 604 | 6 |

**d) Study Plan**

The study plan of the student is drawn up by the supervisory panel. The title of study should be approved by the department. The study should contribute to the current knowledge in the area of specialization. The title of the study may be changed once during the course of the program.

**3. Thesis Preparation**

The student should undertake a research project leading to the preparation of a thesis having the previously agreed title. The thesis **(equivalent to 30 credit hours)** should be presented having a format in accordance with the faculty requirements. The thesis should include the following sections:

Introduction

Literature Review

Theorems and methods

Results and discussion

Conclusion and recommendations

References

* The thesis preparation should be carried over at least 4 study semesters.
* Upon the completion of thesis and revision by supervisors, an examining panel is set up for the student including an internal and an external examiner.

**4. Regulation for Progression and Program Completion**

1. The studentshould prepare and present an annual seminar to show the progress in his research project. The student is allowed to continue his work only if the departmental panel attending the seminar acknowledges the student progress.
2. The student should write at least one scientific paper, which can be proven to be acceptable for publication in a local specialized journal or international conference.
3. The student is issued the degree if the thesis is approved by the panel of examiners and the student is able to defend it in a public viva-voce examination.
4. Different rules pertaining to the progression and completion of the degree are outlined in the internal postgraduate prospectus for the Faculty of Engineering at Shoubra, issued 2012.

**5. English Language Requirement**

The English language proficiency of all students shall be tested in accordance with the university requirements.

**6. Role of Examiners**

An internal examiner (from within the department) and an external examiner (from other universities and research institutes) are nominated by the main supervisor of the student and approved by the department. Their duties include revising the final manuscript of the student thesis and indicating if the reported work is original and contributes to the current knowledge in the field. Subsequently a viva-voce examination is held where the examiners get the opportunity to question the student regarding his/her work**.**

**7. Support for Students and their Learning:**

* The postgraduate office staff-help the students with any inquiries regarding faculty regulations related to postgraduate programs.
* An open door policy is exercised whereby students can inform head of department of any complaints or requests either verbally or in writing.

1. **Map**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Course Code** | **Knowledge & Understanding** | | | | | **Intellectual Skills** | | | | | | | **Professional Skills** | | | | | **General and Transferable Skills** | | | | | | |
|  | 2.1.1 | 2.1.2 | 2.1.3 | 2.1.4 | 2.1.5 | 2.2.1 | 2.2.2 | 2.2.3 | 2.2.4 | 2.2.5 | 2.2.6 | 2.2.7 | 2.3.1 | 2.3.2 | 2.3.3 | 2.3.4 | 2.3.5 | 2.4.1 | 2.4.2 | 2.4.3 | 2.4.4 | 2.4.5 | 2.4.6 | 2.4.7 |
| EMP 701 | √ |  | √ | √ |  |  |  |  |  |  | √ | √ |  | √ | √ |  |  | √ | √ | √ |  |  |  |  |
| EMP 702 |  | √ | √ |  |  | √ | √ | √ |  |  |  |  |  |  |  | √ | √ |  |  |  | √ | √ | √ |  |
| EMP 703 | √ | √ |  |  | √ |  |  |  | √ | √ | √ |  | √ | √ |  |  |  |  | √ |  | √ |  |  | √ |
| EMP 704 |  |  |  | √ | √ | √ | √ |  | √ |  | √ |  |  |  | √ | √ | √ |  |  |  |  | √ | √ | √ |
| EMP 705 | √ | √ |  |  |  |  |  | √ |  |  |  | √ |  | √ |  |  |  | √ |  | √ |  |  |  |  |
| EMP 604 | √ |  | √ | √ |  |  |  |  |  | √ |  |  | √ |  |  |  |  | √ |  |  |  | √ | √ |  |

**Program coordinator:**  **Prof. Dr. Fatma metawee and Prof. Dr. Soher negem**

**Head of department:** Associate Prof. Dr. Ahmed Abd-AllahDate: 15 / 9 / 2012