Faculty of Science
Fayoum University

CONTINUOUS IMPROVEMENT
AND QUALITY ACCREDITATION PROJECT
(CIQAP)

NATIONAL ACADEMIC REFERENCE
STANDARDS
(NARS)
**Faculty Vision**

The Faculty of *science* at Fayoum University aims to increase the intellectual knowledge and skills of students as well as the staff members via a package of advanced intellectual programmes that provide the educational and research requirements as well as the society needs taking into consideration the ecological advantage of Fayoum province. This concerns the graduation of students able to complete in the labor market and to follow the continuous development in the fields of research skills and innovation in the fields of basic and applied sciences. This will render our faculty to fulfill the requirements of the academic accreditation.

**Faculty Mission**

The faculty seeks the preparation and rendering fit graduates which are distinguished in various basic and applied sciences and qualified up to high scientific and practical standards. This objective is done via distinguished and well prepared educational programmes as well as providing the facilities and required powers to prepare graduate capable to satisfy the requisites of labor market.

This mission is further extended to provide programmers for post graduate studies to offer professional diplomas as well as master and Ph.D degrees in which research works of high originality in basic and applied sciences are carried out. These studies will share in the development of our natural resources.

The faculty also shares in society services and environment development via research projects and professional consultation for providing the suitable and practical solutions for the existing problems.
National Academic Reference Standards for honors degree
(Biochemistry)

Contents
1- Introduction.
2- Subject knowledge and understanding.
3- Essential skills.
4- Academic standards of Bachelors degree attainment
5- Performance Criteria

1- Introduction

These academic standards references characterize the skills and achievements that graduates of biochemistry-based degrees should have dual honors degrees where Biochemistry forms a significant proportion.

Biochemistry addresses the chemical principles that underlie biological processes. Biochemistry seeks to describe the structure, the organization, and function of living matter in molecular terms. Biochemistry can be divided into 3 principal areas:

- Structural Chemistry; i.e., the study of the components of living matter and the relationships between biological function and chemical structure.
- Study of Metabolism, i.e., the totality of chemical reactions occurring in living matter.
- Molecular Biology, i.e., the chemistry of processes and substances that store and transmit biological information.

Biochemistry draws its major themes from many disciplines:

- Organic Chemistry, which describes the properties of biomolecules.
- Physiology, which provided understanding of life processes at cell and tissue levels.
- Cell Biology, which describes the biochemical division of labour within a cell.
- Nutrition, which has illuminated metabolism by describing the dietary requirements for maintenance of health.
- Microbiology, which showed that micro organisms are ideally suited for the elucidation of many metabolic pathways and regulatory mechanisms
- Biophysics, which uses the techniques of physics to help understand life at the molecular level.
- Genetics, which describes mechanisms that give a particular cell or organism its biochemical identity.
- Medical Research, which seeks to understand diseased states in molecular terms

Biochemistry distinctively emphasizes following topics:

- The structures of Biomolecules.
- The reactions that they undergo.
- Enzymes.
- The nature of biological catalysts.
- Elucidation of metabolic pathways and their control.
- The principle that life processes can be understood through the laws of chemistry.
2-Subject knowledge and understanding

B.Sc (Honors) degree programs in Biochemistry should:

1. Provide students with Core Knowledge, Understanding and Skills in areas relevant to Biochemistry and supporting disciplines.
2. Produce skilled and motivated graduates to continue in research or to be employed in related fields.
3. Cultivate interest in the Biosciences, particularly at the cellular and molecular level.
4. Encourage students to develop their full academic potential.
5. Promote the development of a range of key skills, which will be useful in problem-solving approaches.

3- Essential skills.

At bachelor's honors level, students are expected to develop a wide range of different abilities and skills.
These may be divided into four broad categories:
1. Knowledge and Understanding.
2. Intellectual Skills.
3. Practical Skills.
4. Transferable/Key Skills.

Knowledge and Understanding
1. Basic knowledge in Physics, Chemistry and Biology.
2. Knowledge of the different levels of organization and complexity, from molecules, through cells, organs, to organisms.
3. The structures and functions of biological molecules and their assemblies.
4. Key metabolic reactions involved in the biosynthesis and degradation of biological molecules.
5. Key processes involved in the control of metabolism, including signal transduction and the arrangement, expression and regulation of genes.
6. Appropriate practical scientific methods and approaches.

Intellectual Skills
1. Retrieve and select appropriate biochemical and biological information.
2. Evaluate primary and secondary evidence and arguments as well as make critical judgments.
3. Analyze and interpret quantitative information in graphs, figures, tables and equations and use appropriate statistical tests.
4. Integrate and link information across course components, including material from different disciplines.
5. Formulate and test hypotheses.
6. Use Simulation program to understand confirm and optimize, his practical techniques.
7. Present data correctly, choose and apply an appropriate basic statistical test and interpret the output.
8. Plan and conduct a research task.
9. Undertake a supervised project in an industrial or other workplace setting.

Practical Skills
1. Design appropriate experiments and sampling programs in the laboratory, bearing in mind technical, logistical, safety and ethical limitations.
2. Consider variations inherent in dealing with biological materials such as sample size, accuracy, calibration and precision.
3. Use appropriate basic laboratory equipment safely and efficiently.
4. Explain the principles and limitations of a range of more advanced practical techniques.
5. Use appropriate software packages to analyze quantitative data and to present results appropriately with necessary statistical treatment.

**Transferable/Key Skills**

**I-Communication Skills**

1. Write structured reports including visualization aids.
2. Give oral presentations.

**II-IT Skills**

1. Use current networked PC operating systems for normal file management
2. Use current common desktop operations software (e.g. Word, Excel … etc.)
3. Use on-line catalogues and databases.

**III-Numeracy Skills**

1. Use appropriate precisions, scales, units, scientific notations… etc.
2. Use simple algebra and trigonometry and elementary calculus.

**IV-Problem-solving Skills**

Explore, analyze and find effective solutions for problems involving reasonably complex information.

**V-Team-work Skills**

Work as part of a team to collect data and/or produce reports and presentations.

**VI-Self-teaching Skills**

1. Developing the skills necessary for self-managed and lifelong learning (e.g. working independently, time management and organisation skills).
2. Identifying and working towards targets for personal, academic and career development.
3. Developing an adaptable, flexible, and effective approach to study and work.

**4-Academic standards of Bachelors degree attainment**

1. 
2. 
3. Have an understanding of the explanation of biological phenomena at a variety of levels (from molecular to ecological systems) and be able to explain how evolutionary theory is relevant to their area of study.
4. 
5. Have some understanding of ethical issues and the impact on society of advances in the biochemistry.
6. 
7. Have developed basic strategies to enable them to update their knowledge of the biochemistry.
8. 
9. Understand how the chemistry and structure of the major biological macromolecules, including proteins and nucleic acids, determines their biological properties.
10. Understand how the principles of genetics underlie much of the basis of modern molecular biology.
11. Understand the main principles of gene expression.
12. Know and understand the structure and function of various types of cells in unicellular and multicellular organisms, the structure and function of cell membranes, cell differentiation.
13. Understand a range of appropriate and relevant experimental techniques and how they are used; be able to perform some of them.
14. Have a knowledge of cell metabolism, including the main anabolic and catabolic pathways.
15. Have knowledge of enzyme structure and function and of some of the most important mechanisms controlling the action of enzymes and other proteins.

5-Performance Criteria

Although all students graduating at bachelor's honors level in biochemistry are expected to demonstrate that they have acquired knowledge, abilities and skills in the areas identified in the foregoing sections, it is accepted that there will be significant differences in their attainment.

Threshold Performance for Bachelors Honors Degrees

Students who are awarded a bachelors honors degree in biochemistry are expected to demonstrate knowledge, abilities and skills corresponding on balance to at least attainment level fair.

Appendix
1. **Science sector indicator.** *(Biochemistry Proposal)*
   Membership of Academic Reference Standards for NARS
   
   Prof. Dr. Ahmed Salem  
   Ain Shams University

2. **Professional syndicates standards.**


   The Quality Assurance Agency for Higher Education

Membership of the benchmark group

1. Professor Jeffrey Bale  
   University of Birmingham
2. Professor Paul Brain  
   University of Wales, Swansea
3. Dr Darrell Brooks  
   University of Central Lancashire
4. Dr Sara Churchfield  
   Kings College London
5. Dr Simon van Heyningen (chair)  
   University of Edinburgh
6. Dr Kathleen Kane  
   University of Strathclyde
7. Dr Jackie Landman  
   The Nutrition Society
8. Professor Caroline MacDonald  
   University of Paisley
9. Professor David Male  
   Open University
10. Professor Roger Marchant  
    University of Ulster
11. Dr Helen O'Sullivan  
    Liverpool Hope
12. Professor Wendy Purcell  
    University of the West of England
13. Dr James Rimmer  
    Aston University
14. Professor Robert Slater  
    University of Hertfordshire
15. Professor Janet Sprent  
    University of Dundee
National Academic Reference Standards for honors degree (Chemistry)

Contents
1- Introduction.
2- Subject knowledge and understanding.
3- Essential skills.
4- Performance Criteria

1- Introduction

These academic standards references characterize the skills and achievements that graduates of Chemistry-based degrees should have:
1- Single honors degree
2- dual honors degrees
where Chemistry forms a significant proportion.
These references relate to the Chemistry components of all such degrees.

The undergraduate program is designed to provide students with an education in the main branches of the subject, namely, analytical, inorganic, organic, physical and computational chemistry. The broad objectives of teaching chemistry are summarized in the following definition of education. Education is learning to appraise data critically, to try to think up an intellectual framework, to be able to test it, to be able to marshal facts, to be able to write about them, to be able to communicate with people who may - and almost certainly will - have less knowledge of those facts than you have, because they will be asking you questions about them with a view to taking some action.

The main aims of bachelor's honors degree programs in chemistry should be:
1- To instill in students a sense of enthusiasm for chemistry, an appreciation of its application in different contexts and to involve them in an intellectually stimulating and satisfying experience of learning and studying.
2- To encourage originality of thought.
3- To provide students with a broad and balanced foundation of chemical knowledge and practical skills.
4- To develop in students the ability to apply their chemical knowledge and skills to the solution of theoretical and practical problems in chemistry.
5- To develop in students, through an education in chemistry, a range of transferable skills, of value in chemical and non-chemical employment
6- To provide students with a knowledge and skills base from which they can proceed to further studies in specialized areas of chemistry or multi-disciplinary areas involving chemistry.
7- To generate in students an appreciation of the importance of chemistry in an industrial, economic, environmental and social context.
8- To provide students with experience in computing and information technology.
9- To provide students with a broad education in fundamental aspects of chemistry and higher level of knowledge and understanding of subjects.

2- Subject knowledge and understanding.

It is expected that single honors degree chemistry program will ensure that students become conversant with the following main aspects of chemistry:-
1. Major aspects of chemical terminology, nomenclature, conventions and units.
2. The major types of chemical reaction and the main characteristics associated with them.
3. The principles and procedures used in chemical analysis and the characterization of chemical compounds.
4. The characteristics of the different states of matter and the theories used to describe them.
5. The principles of quantum mechanics and their application to the description of the structure and properties of atoms and molecules.
6. The principles of thermodynamics and their applications to chemistry.
7. The kinetics of chemical change, including catalysis; the mechanistic interpretation of chemical reactions.
8. The principal techniques of structural investigations, including spectroscopy.
9. The characteristic properties of elements and their compounds, including group relationships and trends within the Periodic Table.
10. Physical and bioorganic chemistry.
11. The constitution and properties of aliphatic, aromatic, heterocyclic and organometallic compounds, with considerable attention to reaction mechanisms.
12. The nature and behavior of functional groups in organic molecules.
13. The structural features of chemical elements and their compounds, including stereochemistry.
15. The relation between bulk properties and the properties of individual atoms and molecules, including macromolecules.
17. Awareness of major issues currently at the frontiers of chemical research and development.

3-Essential skills

At bachelor's honors level, students are expected to develop a wide range of different abilities and skills. These may be divided into three broad categories:

A- Chemistry-related cognitive abilities and skills, i.e., abilities and skills relating to intellectual tasks, including problem solving.

The graduate of chemistry program must be able to:

i- Differentiate between the different state of matter, elements and compounds based on the recognition and quantification of the properties.

ii- Explain concepts and determine the efficiency of chemical systems by applying mathematical expressions.

iii- Elucidate, the stricter of different compounds utilizing chemical and spectral date.

iv- Suggest an acceptable reaction mechanism based on physical kinetic and spectral date.

B - Chemistry-related practical skills, e.g., skills relating to the conduct of laboratory work.

C - Transferable skills that may be developed in the context of chemistry and are of a general nature and applicable in many other contexts.

The main abilities and skills that students are expected to have developed by the end of their bachelors honors degree program in chemistry, are as follows.
A - Chemistry-related cognitive abilities and skills
1. Ability to demonstrate knowledge and understanding of essential facts, concepts, principles and theories relating to the subject areas identified above.
2. Ability to apply such knowledge and understanding to the solution of qualitative and quantitative problems of a familiar and unfamiliar nature.
3. Ability to recognize and analyze novel problems and plan strategies for their solution.
4. Skills in the evaluation, interpretation and synthesis of chemical information and data.
5. Ability to recognize and implement good measurement science and practice.
6. Skills in presenting scientific material and arguments clearly and correctly, in writing and orally, to a range of audiences.
7. Computational and data-processing skills, relating to chemical information and data.

B - Chemistry-related practical skills
1. Skills required for the conduct of standard laboratory procedures involved in synthetic and analytical work, in relation to both inorganic and organic systems.
2. Skills in the safe handling of chemical materials, taking into account their physical and chemical properties, including any specific hazards associated with their use.
3. Skills in the monitoring, by observation and measurement, of chemical properties, events or changes, and the systematic and reliable recording and documentation thereof.
4. Competence in the planning, design and execution of safely practical investigations, from the problem recognition stage through to the evaluation and appraisal of results and findings; this to include the ability to select appropriate techniques and procedures.
5. Skills to use computational tools and packages.
6. Skills to prepare technical reports.
7. Skills to use scientific literature effectively.
8. Skills in the operation of standard chemical instrumentation such as that used for structural investigations and separation.
9. Ability to interpret data derived from laboratory observations and measurements in terms of their significance and the theory underlying them.
10. Ability to conduct risk assessments concerning the use of chemical substances and laboratory procedures.

C - Transferable skills
1. Presentation skills, student able to express (orally and writing) there understanding of core chemical principle, the results of experiments, and their analysis of problems.
2. Problem-solving skills, student able to identify the essential parts of a problem and formulate a strategy for solving the problem and able to estimate the solution to a problem, apply appropriate techniques to arrive the solution, test the correctness of there solution, interpret their results and connect it to related areas of chemistry.
3. Numeric and computational skills, including such aspects as error analysis, order-of-magnitude estimations, correct use of units and modes of data presentation.
4. Information –technology skills, student should be competent user of basic software, such as word processing, spreadsheet use, and graphic program, data-logging and storage, internet communication.
5. Information-retrieval skills, student able to use information and communications technology.
6. Interpersonal skills, student able to work independently and as a part of a team, and learn independently with open - mindedness and critical enquiry.
7. Information-retrieval skills, student able to use information and communications technology.
8. Interpersonal skills, student able to work independently and as a part of a team, and learn independently with open - mindedness and critical enquiry.
9. Information-retrieval skills, student able to use information and communications technology.
10. Interpersonal skills, student able to work independently and as a part of a team, and learn independently with open-mindedness and critical enquiry.
11. Time-management and organizational skills as evidenced by the ability to plan and implement efficient and effective modes of working.
12. Study skills, needed for purpose of continuing professional development.

4-Performance Criteria

Although all students graduating at bachelor's honors level in chemistry are expected to demonstrate that they have acquired knowledge, abilities and skills in the areas identified in the foregoing sections, it is accepted that there will be significant differences in their attainment.

Threshold Performance for Bachelors Honors Degrees
Students who are awarded a bachelors honors degree in Chemistry are expected to demonstrate knowledge, abilities and skills corresponding on balance to at least attainment level fair.

Appendix


Membership of Academic Reference Standards for NARS

Prof. Nazmi Kassab
Prof. Nadia Kandile
Prof. Ibrahim Shehatta
Dr. Mohamed Rabie
Cairo University
Ain Shams University
Mansoura University
Cairo University

2. Professional syndicates standards.

The Quality Assurance and Standards Framework for UK Higher Education, the Quality Assurance Agency for Higher Education (QAA)
http://www.qaa.ac.uk/academicinfrastructure/benchmark/honours/chemistry.asp

Chemistry Academic Reference Standards group membership

1. Professor E Abel (Chair), University of Exeter
2. Professor P Atkins Lincoln College, University of Oxford
3. Professor I Haines, University of North London
4. Professor R Jones, The Open University
5. Professor R Kempa, University of Keele
6. Professor M Page, University of Huddersfield
7. Professor B Parsons, NEWI
8. Professor D Phillips, Imperial College, London
9. Professor D Rice, University of Reading
10. Professor K Smith, University of Wales, Swansea
11. Professor A Townshend, University of Hull
12. Professor P Tasker
13. Professor J Winfield, University of Glasgow
14. Dr S Gruber (ex-officio), The Royal Society of Chemistry
National Academic Reference Standards for honors degree (Mathematics)

Contents
1- Introduction.
2- Subject knowledge and understanding.
3- Essential skills.
4- Academic standards of Bachelors degree attainment.
5- Performance Criteria

1- Introduction

These academic standards references characterize the skills and achievements that graduates of Mathematics-based degrees should have:
1- Single honors degree,
2- Dual honors degrees, where Mathematics forms a significant proportion.
These references relate to the Mathematics components of all such degrees.

Mathematics is a major intellectual discipline in its own right, with a pedigree which extends back through various cultures including the Ancient Greeks to even earlier civilizations. It has its roots in the systematic development of methods to solve practical problems in areas such as surveying, mechanical construction and commerce. The subject evolved with the realization that such methods, when stripped of the details of the particular situations, had a wide range of application and highlighted the essential common characteristics of many different problems. Thus generalization and abstraction became important features of the subject. This led to logical verification propositions concerning abstract entities. Thus mathematics as a subject developed with watertight arguments and it became a science involving strict logical deduction with conclusions that follow with certainty and confidence from clear starting points. Consequently mathematics has made a pre-eminent contribution to the development of human thought.

Mathematics programs today should bring a rich diversity of experiences. Providing a supportive environment, and in improving curricular and instructional strategies. This diversity challenges educators to define clear goals and standards, develop effective instructional strategies, and present mathematics in appropriate contexts.

2- Subject knowledge and understanding.

Undergraduate B.Sc (Honors) degree programs in mathematics address:

1- The more general and fundamental topics of Math.
2- Provide a selection of more advanced topics.
3- Develop investigative, mathematical, computational, modeling and other transferable skills.
4- Students should also study the application of the fundamental principles to particular areas.
3-Essential skills

A-Mathematical skills.

Students should learn:

1- How to formulate, Prove and tackle problems in mathematics. For example, they should learn how to identify the appropriate mathematical principles, how to use Theorems, propositions, conjecture,…..conditions in order to estimate and guide their thinking about a problem and how to present the solutions mathematically, making their assumptions and approximations explicit.

2- How to plan, execute and report the results of an investigation. They should be able to use appropriate methods to analyze the data and to evaluate the level of its uncertainty. They should also be able to relate any conclusions they make to current theories of the mathematics involved.

3- How to use mathematic to describe the world problems. They should have an understanding of mathematical modeling and the roles of approximation. They should be able to compare critically the results of model calculations with those from observation.

4- How to employ technology to enhance mathematical thinking.

B-Transferable skills

A mathematics degree should enhance:

I-Problem-solving Skills

1. Involve mathematics students in solving problems with well-define solutions.

2. Students should Gain confidence by trying different approaches and tackling open-ended problems.

3. Students should develop their ability to formulate problems in precise mathematical terms and to identify key issues.

4. Students should develop the confidence to try different approaches in order to make progress on challenging problems.

II-Investigative Skills

1. Students will have opportunities to develop their skills of independent investigation and mathematical thinking.

2. Students will generally have experience of using textbooks, and other available literature, of searching databases and of interacting with colleagues to extract important information.

III-Communication Skills

1. A mathematics degree should develop student's ability to read, write, listen to, and speak mathematics.

2. A mathematics degree should develop student's ability to present complex information in clear and concise mathematical statements.

IV-Analytical Skills

1. Mathematics helps students to learn the need to pay attention to detail.

2. Mathematics helps students to develop their ability to manipulate precise and intricate ideas.

3. Mathematics helps students to use proper technical language and to construct logical arguments correctly.
V- Information Technology (IT) skills
1. Students will use appropriate technology to enhance their mathematical thinking and understanding and to solve mathematical problems and judge the reasonableness of their results.
2. Students will develop their computing and IT (Information Technology) skills in a variety of ways, including their ability to use appropriate software and packages.

VI-Personal Skills
1. Students in mathematics programs should develop their ability to work independently.
2. Dealing with others in teams in addition to time management and organization is acquired.
3. Students are capable to interact constructively with other people.

VII- Practical Skills
1. Students should learn and gain the ability to execute and analyze the results of an investigation.
2. Students should develop their ability to recognize and be familiar with the computer laboratory apparatus.

4-Academic Standards of Bachelors Degree Attainment

1. Mathematics program will model the use of appropriate technology in the teaching of mathematics so that students can benefit from the opportunities it presents as a medium of instruction.
2. Mathematics program will model the use of appropriate technology in the teaching of mathematics so that students can benefit from the opportunities it presents as a medium of instruction
3. Mathematics Program will actively involve students in meaningful mathematics problems that build upon their experiences, focus on broad mathematical themes, and build connections within branches of mathematics and between mathematics and other disciplines so that students will view mathematics as a connected whole relevant to their lives.
4. Mathematics Program will model the use of multiple approaches: Numerical, graphical, symbolic, and verbal-to help students learn a variety of techniques for solving problems.
5. Mathematics Program will provide learning activities, including projects and apprenticeships, that promote independent thinking and require sustained effort and time so that students will have the confidence to access and use needed mathematics and other technical information independently, to form conjectures from an array of specific examples, and to draw conclusions form general principles.

5-Performance Criteria

Although all students graduating at bachelor's honors level in Mathematics are expected to demonstrate that they have acquired knowledge, abilities and skills in the areas identified in the foregoing sections, it is accepted that there will be significant differences in their attainment.
**Threshold Performance for Bachelors Honors Degrees**

Students who are awarded a bachelors honors degree in Mathematics are expected to demonstrate knowledge, abilities and skills corresponding on balance to at least attainment level fair.

**Appendix**

**Science sector indicator**

**Membership of Academic Reference Standards for NARS**

1. Professor Dr./ A. F. Obada
2. Professor Dr./ I. A. Abdalla

2. **Professional syndicates standards.**

http://www.qaa.ac.uk/academicinfrastructure/benchmark/honours/mathematics.asp

**Membership of the Academic Reference Standards group**

1. Professor Rob Archbold University of Aberdeen
2. Professor Russell Cheng University of Southampton
3. Professor Neville Davies The Nottingham Trent University
4. Dr John Erdos King’s College London
5. Dr Judy Goldfinch Napier University, Edinburgh
6. Mr Gerald Goodall The Royal Statistical Society
7. Mr Tony Palmer De Montfort University
8. Professor Chris Robson (chair) University of Leeds
9. Dr Stephen Ryrie University of the West of England, Bristol
10. Professor Peter Saunders King’s College London
11. Dr Stephen Siklos University of Cambridge
12. Professor Joan Walsh University of Manchester (retired)
National Academic Reference Standards for honors degree (Zoology)

Contents
1- Introduction.
2- Subject knowledge and understanding.
3- Essential skills.
4- Academic standards of Bachelors degree attainment.
5- Performance Criteria

1- Introduction

*These academic standards references characterize the skills and achievements that graduates of Zoology and chemistry-based degrees should have dual honors degrees where Zoology and chemistry forms a significant proportion.*

Zoology and chemistry has become a topical and important subject relevant to everyone

- Cloning,
- Genetically-modified organisms,
- The human genome project
- The influence of mankind on the environment,
- The potential risks of some foods,
- And many other such topics appear in the media regularly. The biosciences have much to contribute to the health and wealth of the nation.

We have reached a point in the earth's history where a knowledge of biology (Zoology and Botany) is essential for a viable human future. It is therefore important for leaders of society whether industry, business or education to appreciate this and for an informed electorate to understand the scope and limitations of biological knowledge and techniques.

Our object in this statement is therefore not so much to describe the factual knowledge that a graduate in Zoology and chemistry program must have; the subject is too wide and diverse for that to be useful. Rather it is to describe the skills and attributes acquired by the biosciences graduate that would equip him or her for a career in biosciences, and make them valued by employers.

2- Subject knowledge and understanding

Approaches to study and forms of subject knowledge to Zoology and Chemistry degree program will include the following:

1. A broadly-based core covering the major elements defined by the program and providing the wider context required for the subject area, together with specialized in-depth study of some aspects of the discipline or subject area.
2. Knowledge and understanding of the processes and mechanisms of life
   i. From molecular to cellular
   ii. From Organism to community
3. Engagement with the essential facts, major concepts, principles and theories associated with the chosen discipline.
4. Understanding of information and data, and their setting within a theoretical framework, accompanied by critical analysis and assessment to enable understanding of the subject area as a coherent whole;
5. Familiarity with the terminology, nomenclature and classification systems as appropriate.
6. Methods of acquiring, interpreting and analyzing biological information with a critical understanding of the appropriate contexts for their use through the study of texts, original papers, reports and data sets.
7. Developing knowledge about the diversity of life and its evolution.
8. Knowledge of a range of practical and presentational techniques and methodologies relevant to the particular discipline, including data analysis and the use of statistics.
9. Engagement with current developments in the biosciences and their applications, and the philosophical and ethical issues involved.
10. The applicability of the biosciences to the careers to which graduates will be progressing.
11. Understand processes and mechanisms of different Eco-systems.

3 - Essential skills.
In order to fulfill international standards, our students should acquire:

A-Generic skills
B-Key skills

A-Generic skills

The qualities of mind that a student should acquire by studying biosciences are as follows. Learners working to acquire them should recognise that much of what they are taught is contested and provisional, particularly in the light of continuing scientific advances:

1. An appreciation of the complexity and diversity of life processes through the study of organisms, their molecular, cellular and physiological processes, their genetics and evolution, and the interrelationships between them and their environment.
2. The ability to read and use appropriate literature with a full and critical understanding.
3. The capacity to give a clear and accurate account of a subject.
4. Critical and analytical skills: a recognition that statements should be tested and that evidence is subject to assessment and critical evaluation.
5. The ability to employ a variety of methods of study in investigating, recording and analysing material.
6. The ability to think independently, set tasks and solve problems.

B-Key skills

The specific graduate and key skills that should be developed in bioscience (Zoology and Chemistry double degree courses) are subdivided into the following headings:

- Intellectual skills.
- Practical skills.
- Communication skills.
- Numeracy, communications and information technology (CAIT) skills.
- Interpersonal and teamwork skills.
- Self-management and professional development skills.
I- Intellectual skills

1. Recognizing and applying subject-specific theories, paradigms, concepts or principles. For example, the relationship between genes and proteins, or the nature of essential nutrients in microbes, cells, plants and animals.
2. Analyzing, synthesizing and summarizing information critically, including published research or reports.
3. Obtaining and integrating several lines of subject-specific evidence to formulate and test hypotheses.
4. Applying subject knowledge and understanding to address familiar and unfamiliar problems.
5. Recognizing the moral and ethical issues of investigations and appreciating the need for ethical standards and professional codes of conduct.

II- Practical skills

1. Solving biological problems by a variety of methods.
2. Designing, planning, conducting and reporting on investigations, which may involve primary or secondary data (e.g. From a survey database). These data may be obtained through individual or group projects.
3. Obtaining, recording, collating and analyzing data using appropriate techniques in the field and/or laboratory, working by themselves or in a group, as is most appropriate for the subject under study.
4. Undertaking field and/or laboratory investigations of living systems in a responsible, safe and ethical manner. For example, students must pay due attention to risk assessment, relevant health and safety regulations, and procedures for obtaining informed consent.

III- Numeracy, communication and information technology skills

1. Receiving and responding to a variety of sources of information: textual, numerical, verbal, graphical.
2. Communicating about their subject appropriately to a variety of audiences using a range of formats and approaches.
3. Citing and referencing work in an appropriate manner.
4. Sample selection; recording and analyzing data in the field and/or the laboratory; validity, accuracy, calibration, precision, replicability and uncertainty during collection.
5. Preparing, processing, interpreting and presenting data, using appropriate qualitative and quantitative techniques.
6. Solving problems by a variety of methods.
7. Using the internet and other electronic sources critically as a means of communication and a source of information.

IV- Interpersonal and teamwork skills

1. Identifying individual and collective goals and responsibilities and performing in a manner appropriate to these roles.
2. Recognizing and respecting the views and opinions of other team members; negotiating skills.
3. Evaluating performance as an individual and a team member; evaluating the performance of others.
4. Developing an appreciation of the interdisciplinary nature of science and of the validity of different points of view.
V- Self-management and professional development skills

1. Developing the skills necessary for self-managed and lifelong learning (e.g., working independently, time management and organisation skills);
2. Identifying and working towards targets for personal, academic and career development;
3. Developing an adaptable, flexible, and effective approach to study and work.

4-Academic standards of Bachelors degree attainment

1. Be able to access Zoology information from a variety of sources and to communicate the principles in a manner appropriate to the programme of study.
2. Have ability in a range of practical bioscience techniques including data collection, analysis and interpretation of those data, and testing of hypotheses.
3. Have an understanding of the explanation of biological phenomena at a variety of levels (from molecular to ecological systems) and be able to explain how evolutionary theory is relevant to their area of study.
4. Be able to plan, execute and present an independent piece of work (e.g., a project) within a supported framework in which qualities such as time management, problem solving, and independence are evident.
5. Have some understanding of ethical issues and the impact on society of advances in the Zoology.
6. Be able to record data accurately, and to carry out basic manipulation of data (including qualitative data and some statistical analysis when appropriate);
7. Have developed basic strategies to enable them to update their knowledge of the Zoology.
8. Be able to express relevant biological reactions in chemical terms.
9. Understand how the principles of genetics underlie much of the basis of modern molecular biology.
10. Understand the main principles of gene expression.
11. Know and understand the structure and function of various types of cells in unicellular and multicellular organisms, the structure and function of cell membranes, cell differentiation.
12. Understand a range of appropriate and relevant experimental techniques and how they are used; be able to perform some of them.

5-Performance Criteria

Although all students graduating at bachelor's honors level in Zoology are expected to demonstrate that they have acquired knowledge, abilities and skills in the areas identified in the foregoing sections, it is accepted that there will be significant differences in their attainment.

Threshold Performance for Bachelors Honors Degrees

Students who are awarded a bachelors honors degree in Zoology-Chemistry programme are expected to demonstrate knowledge, abilities and skills corresponding on balance to at least attainment level fair.

Appendix


Membership of Academic Reference Standards for NARS

1. Prof. Samy Zalat (Suez Canal University)
2. Prof. Maimona Kord (Cairo University)
3. Dr. Kamal Imam (Ain Shams University)
4. Dr. Mona Mohamed (Cairo University)
5. Prof. Mohamed Soliman (Helwan University)
6. Dr. El-Gohary Attiah (Ain Shams University)
2. **Professional syndicates standards.**

http://www.qaa.ac.uk/academicinfrastructure/benchmark/honours/biosciences.asp.

The Quality Assurance Agency for Higher Education

**Membership of the benchmark group**

1. Professor Jeffrey Bale, University of Birmingham
2. Professor Paul Brain, University of Wales, Swansea
3. Dr Darrell Brooks, University of Central Lancashire
4. Dr Sara Church field, Kings College London
5. Dr Simon van Heyningen (chair), University of Edinburgh
6. Dr Kathleen Kane, University of Strathclyde
7. Dr Jackie Landman, The Nutrition Society
8. Professor Caroline MacDonald, University of Paisley
9. Professor David Male, Open University
10. Professor Roger Marchant, University of Ulster
11. Dr Helen O’Sullivan, Liverpool Hope
12. Professor Wendy Purcell, University of the West of England, Aston University
13. Dr James Rimmer, University of Hertfordshire
14. Professor Robert Slater, University of Dundee
15. Professor Janet Sprent,
National Academic Reference Standards for honors degree (Botany)

Contents
1- Introduction.
2- Subject knowledge and understanding.
3- Essential skills.
4- Academic standards of Bachelors degree attainment.
5- Performance Criteria

1- Introduction

These academic standards references characterize the skills and achievements that graduates of Botany-based degrees should have dual honors degrees where Botany forms a significant proportion.

Botany has become a topical and important subject relevant to everyone

- Cloning,
- Genetically-modified organisms,
- The human genome project
- The influence of mankind on the environment,
- The potential risks of some foods,
- And many other such topics appear in the media regularly. The biosciences have much to contribute to the health and wealth of the nation.

We have reached a point in the earth's history where a knowledge of biology (Botany and Zoology) is essential for a viable human future. It is therefore important for leaders of society whether industry, business or education to appreciate this and for an informed electorate to understand the scope and limitations of biological knowledge and techniques.

Our object in this statement is therefore not so much to describe the factual knowledge that a graduate in Botany and chemistry program must have; the subject is too wide and diverse for that to be useful. Rather it is to describe the skills and attributes acquired by the biosciences graduate that would equip him or her for a career in biosciences, and make them valued by employers.

2- Subject knowledge and understanding

Approaches to study and forms of subject knowledge to Botany and chemistry degree program will include the following:

1. A broadly-based core covering the major elements defined by the program and providing the wider context required for the subject area, together with specialized in-depth study of some aspects of the discipline or subject area.
2. Knowledge and understanding of the processes and mechanisms of life
   i. From molecular to cellular
   ii. From Organism to community
3. Engagement with the essential facts, major concepts, principles and theories associated with the chosen discipline.
4. Understanding of information and data, and their setting within a theoretical framework, accompanied by critical analysis and assessment to enable understanding of the subject area as a coherent whole;
5. Familiarity with the terminology, nomenclature and classification systems as appropriate.
6. Methods of acquiring, interpreting and analyzing biological information with a critical understanding of the appropriate contexts for their use through the study of texts, original papers, reports and data sets.
7. Developing knowledge about the diversity of life and its evolution.
8. Knowledge of a range of practical and presentational techniques and methodologies relevant to the particular discipline, including data analysis and the use of statistics.
9. Engagement with current developments in the biosciences and their applications, and the philosophical and ethical issues involved.
10. The applicability of the biosciences to the careers to which graduates will be progressing.

3 - Essential skills.

In order to fulfill international standards, our students should acquire:

A-Generic skills
B-Key skills

A-Generic skills

The qualities of mind that a student should acquire by studying biosciences are as follows. Learners working to acquire them should recognize that much of what they are taught is contested and provisional, particularly in the light of continuing scientific advances:

1. An appreciation of the complexity and diversity of life processes through the study of organisms, their molecular, cellular and physiological processes, their genetics and evolution, and the interrelationships between them and their environment.
2. The ability to read and use appropriate literature with a full and critical understanding.
3. The capacity to give a clear and accurate account of a subject.
4. Critical and analytical skills: a recognition that statements should be tested and that evidence is subject to assessment and critical evaluation.
5. The ability to employ a variety of methods of study in investigating, recording and analyzing material.
6. The ability to think independently, set tasks and solve problems.

B-Key skills

The specific graduate and key skills that should be developed in bioscience (Botany and chemistry double degree courses) are subdivided into the following headings:

- Intellectual skills.
- Practical skills.
- Communication skills.
- Numeracy, communications and information technology (c & it) skills.
- Interpersonal and teamwork skills.
- Self-management and professional development skills.
I- Intellectual skills

1. Recognizing and applying subject-specific theories, paradigms, concepts or principles. For example, the relationship between genes and proteins, or the nature of essential nutrients in microbes, cells, plants and animals.
2. Analyzing, synthesizing and summarizing information critically, including published research or reports.
3. Obtaining and integrating several lines of subject-specific evidence to formulate and test hypotheses.
4. Applying subject knowledge and understanding to address familiar and unfamiliar problems.
5. Recognizing the moral and ethical issues of investigations and appreciating the need for ethical standards and professional codes of conduct.

II- Practical skills

1. Designing, planning, conducting and reporting on investigations, which may involve primary or secondary data (e.g. From a survey database). These data may be obtained through individual or group projects.
2. Obtaining, recording, collating and analyzing data using appropriate techniques in the field and/or laboratory, working by themselves or in a group, as is most appropriate for the subject under study.
3. Undertaking field and/or laboratory investigations of living systems in a responsible, safe and ethical manner. For example, students must pay due attention to risk assessment, relevant health and safety regulations, and procedures for obtaining informed consent.

III- Numeracy, communication and information technology skills

1. Receiving and responding to a variety of sources of information: textual, numerical, verbal, graphical.
2. Communicating about their subject appropriately to a variety of audiences using a range of formats and approaches.
3. Citing and referencing work in an appropriate manner.
4. Sample selection; recording and analyzing data in the field and/or the laboratory; validity, accuracy, calibration, precision, replicability and uncertainty during collection.
5. Preparing, processing, interpreting and presenting data, using appropriate qualitative and quantitative techniques.
6. Solving problems by a variety of methods.
7. Using the internet and other electronic sources critically as a means of communication and a source of information.

IV- Interpersonal and teamwork skills

1. Identifying individual and collective goals and responsibilities and performing in a manner appropriate to these roles.
2. Recognizing and respecting the views and opinions of other team members; negotiating skills.
3. Evaluating performance as an individual and a team member; evaluating the performance of others.
4. Developing an appreciation of the interdisciplinary nature of science and of the validity of different points of view.
V- Self-management and professional development skills

1. Developing the skills necessary for self-managed and lifelong learning (eg working independently, time management and organization skills);
2. Identifying and working towards targets for personal, academic and career development;
3. Developing an adaptable, flexible, and effective approach to study and work.

4- Academic standards of Bachelors degree attainment

1. Be able to access Botany information from a variety of sources and to communicate the principles in a manner appropriate to the programme of study.
2. Have ability in a range of practical bioscience techniques including data collection, analysis and interpretation of those data, and testing of hypotheses.
3. Have an understanding of the explanation of biological phenomena at a variety of levels (from molecular to ecological systems) and be able to explain how evolutionary theory is relevant to their area of study.
4. Be able to plan, execute and present an independent piece of work (e.g. a project) within a supported framework in which qualities such as time management, problem solving, and independence are evident.
5. Have some understanding of ethical issues and the impact on society of advances in the Botany.
6. Be able to record data accurately, and to carry out basic manipulation of data (including qualitative data and some statistical analysis when appropriate);
7. Have developed basic strategies to enable them to update their knowledge of the Botany.
8. Be able to express relevant biological reactions in chemical terms.
9. Understand how the principles of genetics underlie much of the basis of modern molecular biology.
10. Understand the main principles of gene expression.
11. Know and understand the structure and function of various types of cells in unicellular and multicellular organisms, the structure and function of cell membranes, cell differentiation.
12. Understand a range of appropriate and relevant experimental techniques and how they are used; be able to perform some of them.

5- Performance Criteria

Although all students graduating at bachelor's honors level in Botany are expected to demonstrate that they have acquired knowledge, abilities and skills in the areas identified in the foregoing sections, it is accepted that there will be significant differences in their attainment.

Threshold Performance for Bachelors Honors Degrees

Students who are awarded a bachelors honors degree in Botany-Chemistry programme are expected to demonstrate knowledge, abilities and skills corresponding on balance to at least attainment level fair.

Appendix

1. **Science sector indicator.**

Membership of Academic Reference Standards for NARS

1. Prof. Samy Zalat (Suez Canal University)
2. Prof. Maimona Kord (Cairo University)
3. Dr. Kamal Imam (Ain Shams University)
4. Dr. Mona Mohamed (Cairo University)
5. Prof. Mohamed Soliman (Helwan University)
6. Dr. El-Gohary Attiah (Ain Shams University)

2. **Professional syndicates standards.**


   The Quality Assurance Agency for Higher Education

**Membership of the benchmark group**

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>University</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>Professor Jeffrey Bale,</td>
<td>University of Birmingham</td>
</tr>
<tr>
<td>17</td>
<td>Professor Paul Brain,</td>
<td>University of Wales, Swansea</td>
</tr>
<tr>
<td>18</td>
<td>Dr Darrell Brooks,</td>
<td>University of Central Lancashire</td>
</tr>
<tr>
<td>19</td>
<td>Dr Sara Churchfield,</td>
<td>Kings College London</td>
</tr>
<tr>
<td>20</td>
<td>Dr Simon van Heyningen (chair)</td>
<td>University of Edinburgh</td>
</tr>
<tr>
<td>21</td>
<td>Dr Kathleen Kane,</td>
<td>University of Strathclyde</td>
</tr>
<tr>
<td>22</td>
<td>Dr Jackie Landman,</td>
<td>The Nutrition Society</td>
</tr>
<tr>
<td>23</td>
<td>Professor Caroline MacDonald,</td>
<td>University of Paisley</td>
</tr>
<tr>
<td>24</td>
<td>Professor David Male,</td>
<td>Open University</td>
</tr>
<tr>
<td>25</td>
<td>Professor Roger Marchant,</td>
<td>University of Ulster</td>
</tr>
<tr>
<td>26</td>
<td>Dr Helen O'Sullivan,</td>
<td>Liverpool Hope</td>
</tr>
<tr>
<td>27</td>
<td>Professor Wendy Purcell,</td>
<td>University of the West of England,</td>
</tr>
<tr>
<td>28</td>
<td>Dr James Rimmer,</td>
<td>Aston University</td>
</tr>
<tr>
<td>29</td>
<td>Professor Robert Slater,</td>
<td>University of Hertfordshire</td>
</tr>
<tr>
<td>30</td>
<td>Professor Janet Sprent,</td>
<td>University of Dundee</td>
</tr>
</tbody>
</table>
National Academic Reference Standards for honors degree
(Geology)

Contents
1- Introduction.
2- Subject knowledge and understanding.
3- Essential skills.
4- Performance Criteria

1-Introduction

These academic standards references characterize the skills and achievements that graduates of Geology-based degrees should have dual honors degrees where Geology forms a significant proportion.

Geology is the study of the earth, its nature, chemical composition as well as its dynamic. The specific aims of the geology programme are:

a)- To enhance the student's enthusiasm for geology and the application of these subjects to contemporary issues.
b)- To provide the student with a thorough understanding of the functioning and management of the physical environment, based on firm scientific foundations.
c)- To give the student the opportunity to develop specialist knowledge and understanding in his chosen areas of geology, while ensuring that he maintains a broader view of the role of geological processes in shaping the environment.
d)- To give the student an appreciation of the importance of geology.
e)- To provide an exciting and enjoyable learning environment that stimulates the student's intellectual curiosity and enhances his achievement.
f)- To develop the student's critical and analytical problem-solving powers, especially in relation to the areas of geology covered by the programme.
g)- To provide the student with opportunities to develop a range of generic skills including the ability to think critically and reflectively; the ability to communicate articulately; and the skills of literacy and numeracy.
h)- To enhance the student's employability in a variety of careers in geography and other areas.
i)- To provide the student with the knowledge and skills for further study at a higher

2- Subject knowledge and understanding.

Undergraduate B.Sc degree programs in Geology and Chemistry having successfully completed their programme will be able to demonstrate knowledge and understanding of:

1. The nature of change in physical environments at local, regional and global Scales.
2. The relationships between physical, ecological and human processes in shaping environments and landscapes.
3. Past, present and future variability in atmospheric, fluvial, glacial and terrestrial environments, with in-depth competence and detailed knowledge of specific local contexts.
4- Types and distribution of economical raw materials (rocks, minerals, oils and gases).
5. The application of geological knowledge to contribute to the sustainable management of fluvial, glacial and terrestrial environments.
6. The influence of spatial and temporal scale upon geological processes.
7. The distinctiveness of particular places and regions within the global mosaic.
8. The various geological approaches available for representing the physical world.
9. The use of concepts of space and spatial variation in geographic analysis.
10. The nature of the disciplines as dynamic, plural and contested.
11. A substantial range of analytical and observational strategies.
12. The value and need for multi-disciplinary approaches in advancing knowledge.

3-Essential skills

A- Subject-specific intellectual skills
B- Subject-specific practical skills
C- Transferable skills

A- Subject Specific Intellectual Skills

The student will be able to:

1. Analyze critically literature in Geology and Chemistry.
2. Assess the merits of contrasting geological theories, explanations and policies.
3. Abstract and synthesize information from a range of different geographical and geological sources.
4. Use geological principles, theories and methods to design and undertake primary research of field phenomena.
5. Understand the importance of the spatial and temporal characteristics of geological data.
6. Analyze and critically interpret primary and secondary geological data.
7. Structure conceptual and empirical geological material into a reasoned argument.

B- subject-specific practical skills

The student will be able to:

1. plan and carry out an exacting piece of research in Geology and Chemistry and produce a report to a high standard.
2. conduct field and laboratory research with appropriate geological techniques, in a responsible and safe manner, paying due attention to risk assessment, rights of access, relevant health and safety regulations, and sensitivity to the impact of investigations on the environment and stakeholders.
3. use appropriate geological techniques, including computer software, to produce clear diagrams and maps.
4. collect, analyze and understand data in Geology and Chemistry, using laboratory and computer techniques.
5. understand the ways in which geological data of various types can be combined, interpreted and modeled.
6. understand the importance of data integrity, quality assurance and archiving in field and laboratory contexts.

C- Transferable skills

A geology degree should enhance:

I-Problem-solving Skills

Basic ability to:
1. Define and solve routine problems.
2. Analyze and summaries information.
3. Consider issues from a range of multi-disciplinary.
**II-Investigative Skills**

The student will investigate and understand:
1. Scientific reasoning and logic.
2. Aspects of the history and evolution of the earth.

**III-Communication Skills**
1. Receiving and responding to a variety of information sources (e.g. textual, numerical, verbal, graphical).
2. Communicating to a variety of audiences in written, verbal, and graphical forms.
3. Use laboratory and field equipment safely either for the samples or attached tools.
4. Prepare, process and interpret data using suitable techniques with guidance.

**IV-Information technology**
1. Honest about the sample selections, accuracy, precision and uncertainty during collection, recording and analysis of data in the field and laboratory.
2. Preparing, processing, interpreting and presenting data, using suitable qualitative and quantitative techniques and packages.
4. Using the internet critically as a means of communication and a source of information.

**V-Personal Skills**
1. Identifying individual and collective goals, responsibilities and performing in a manner suitable to these roles.
2. Recognizing and respecting the views and opinions of other team members.
3. Evaluating performance as an individual and a team member.

**VI- Practical Skills**
1. Planning, conducting, and reporting investigations, including the use of secondary data.
2. Collecting, recording and analyzing data using suitable techniques in the field and laboratory.

**4-Performance Criteria**

Although all students graduating at bachelor's honors level in Geology and Chemistry are expected to demonstrate that they have acquired knowledge, abilities and skills in the areas identified in the foregoing sections, it is accepted that there will be significant differences in their attainment.

*Threshold Performance for Bachelors Honors Degrees*

Students who are awarded a bachelors honors degree in Geology and Chemistry are expected to demonstrate knowledge, abilities and skills corresponding on balance to at least attainment level fair.

**Appendix**
1. **Science sector indicator.**

**Membership of Academic Reference Standards for NARS (QAAP Project No.4)**

1. Prof. Dr. Ahmed Abukhadra Cairo University
2. Prof. Dr. Hafez sh. El-Din- Ain Shams University
3. Prof. Dr. Mostafa H. Kamel Cairo University
4. Dr. Ibrahim M. Khalaf Menoufia University

2. **Professional syndicates standards.**
   [http://www.geog.soton.ac.uk/undergrad/general/docs/progspecs/GGGY_new.pdf](http://www.geog.soton.ac.uk/undergrad/general/docs/progspecs/GGGY_new.pdf)

School of Geography
University of Southampton
National Academic Reference Standards for honors degree (Physics)

Contents
1- Introduction.
2- Subject knowledge and understanding.
3- Essential skills.
4- Academic standards of Bachelors degree attainment.

1- Introduction

These academic standards references characterize the skills and achievements that graduates of Physics-based degrees should have:
1- Single honors degree
2- Dual honors degrees
where Physics forms a significant proportion.
These references relate to the Physics components of all such degrees

Physics is a major subject in the higher education system. Physics graduates play a major role in the economy of the developed countries. Physics is at the core of our intellectual understanding of all aspects of nature and is the foundation of many sciences. Physics is concerned with the observation, understanding and prediction of natural phenomena and the behavior of man-made systems. Physics is an empirical science. The skills and methods used to make measurements are an integral part of physics. Many important discoveries are made as the result of the development of some new experimental techniques.

Studying physics at university level brings benefits that last a lifetime, and knowledge and skills that are valuable even beyond physics.

Such benefits include
1- A practical approach to problem solving, often using mathematical formulation and solution,
2- The ability to reason clearly and to communicate complex ideas
3- Self-study skills
4- The pleasure and satisfaction that comes from being able to understand discoveries in science

2-Subject knowledge and understanding

Undergraduate B.Sc (Honors) degree programs in physics address:
1- The more general and fundamental topics of physics.
2- Provide a selection of more advanced topics.
3- Develop investigative, experimental, mathematical, computational, modeling and other transferable skills.
4- Various programs will emphasize different areas. Theoretical physics programs will normally include more mathematical and computational skills, much more than laboratory work. Applied physics courses will emphasize experimentation and provide a more industrially applicable focus to the curriculum.
5- Students should also study the application of the fundamental principles to particular areas.
3-Essential skills

A-Physics skills.
B-Transferable skills

A- Physics skills

Students should learn:

1-How to formulate and tackle problems in physics.
2-How to plan, execute and report the results of an experiment or investigation.
3-How to use mathematics to describe the physical world.

B-Transferable skills

A physics degree should enhance:

I-Problem-solving Skills
1. Involve physics students in solving problems with well-defined solutions
2. Gain confidence by trying different approaches and tackling open-ended problems

II-Investigative Skills
1. Develop independent investigative skills by using textbooks and other sources (Internet, Library, etc).
2. Students will learn the means of searching and extracting information through interacting with colleagues.

III-Communication Skills
Students enhance and realize the importance of communicating complex mathematical and physical ideas in a good way.

IV-Analytical Skills
1. Physics students should learn to pay attention to detail.
2. Using proper technical language and constructing logical arguments is developed.

V-Personal Skills
1. Dealing with others in teams in addition to time management and organization is acquired.
2. Students are capable of independent work as well.

VI-Practical Skills
1. Students should learn to execute and analyze experimental results.
2. They should be familiar with basic laboratory apparatus.
3. They should be present theoretical and experimental results in understandable form such as Table and graphs.

4-Academic Standards of Bachelors Degree Attainment

Typical holders of honors bachelor's degrees will have demonstrated:

1- A knowledge and understanding of most fundamental physical laws and principles, and competence in the application of these principles to diverse areas of physics.
2- An ability to solve problems in physics using appropriate mathematical tools. Students should be able to identify the relevant physical principles and make approximations necessary to obtain solutions;
3- The ability to execute and analyze critically the results of an experiment or investigation and draw valid conclusions.
4- Students should be able to evaluate the level of uncertainty in their results and compare these results with expected theoretical predictions or with published data. They should be able to evaluate the significance of their results in this context.
5- An ability in numerical manipulation and the ability to present and interpret information graphically.
6- An ability to use mathematical techniques and analysis to model physical behavior.
7- An ability to communicate scientific information. In particular, students should be able to produce clear and accurate scientific reports.
8- An ability to manage their own learning and to make use of appropriate texts, research-based materials or other learning resources;
9- A sound familiarity with laboratory apparatus and techniques if on experimental programs.

Appendix

1. **Science sector indicator.**

**Membership of Academic Reference Standards for NARS**

*Prof. Dr. Mahmoud Hammam* *(Helwan University)*

*Prof. Dr. Hussein El Samman* *(Monoufia University)*

*Dr. Hala Hosny* *(Ain Shams University)*

*Dr. Nabil Kinawy* *(Mansoura University)*

2. **Professional syndicates standards.**


**Membership of benchmark group**

1. Dr Nick d'Ambrumenil, University of Warwick
2. Dr Craig Adam, Staffordshire University
3. Professor Mick Brown, University of Cambridge
4. Dr Philip Diamond (secretary), Institute of Physics
5. Professor Michael Edmunds, University of Wales, Cardiff
6. Professor Peter Main, University of Nottingham
7. Dr Tony Phillips, University of Manchester
8. Professor David Saxon, University of Glasgow
9. Dr Edward Slade (chair), University of Keele
10. Dr Alison Voice, University of Leeds
11. Dr Robin Walker, University of Bristol
12. Dr Nicola Wilkin, University of Birmingham
13. Professor John Young, Sheffield Hallam University