**Diploma of Analytical Biochemistry**

**(قسم الكيمياء)**

1. **Introduction/ Background**

The faculty of science is designed to the need of the local market in Egypt and its association with the movement of world trade. Faculty of science seeks to achieve the following:

To be part characterized by qualified faculty members dedicated to prepare our students to compete at a high level and long-term success in the science. The development section to be a major source of teaching biochemistry and conducting research of various analysis , and to be a major source of the section to provide students with the information in the field of modern science. Comply with the standards and curriculum standard adopted by the local scientific community and external.

The aim of the analytical Biochemistry diploma is to produce postgraduate students with a sound knowledge of analytical biochemistry; the diploma covers the aspects and the necessary skills to undertake individual and collaborative research in this field. This diploma has been designed for students wishing to make a career in the biochemistry, Pharmaceutical industry, medical and academic or any field where knowledge of biochemical analysis is desirable.

**Vision**

This diploma aspire to produce postgraduate students with a sound knowledge of analytical biochemistry; the diploma covers the aspects and the necessary skills to undertake individual and collaborative research in in this field to cover Pharmaceutical industry, medical and academic

**Mission:**

This Diploma seeks student in biochemistry for Rehabilitation and provide them with modern theories and technical skills in Field of analytical of biochemistry and pursue higher education and research in this field. Also, it provide students the basic professional skills, technical and academic enough to qualify them to work in various fields of analytical biochemistry

1. **Aims/ Objective**
2. Rehabilitation of student in biochemistry and provide them with modern theories and technical skills in science, according to the needs of recent developments and future in Egypt.
3. Prepare students / to pursue higher education and research in the field of analysis.
4. Provide students the basic professional skills, technical and academic enough to qualify them to work in various fields of analytical biochemistry
5. Enrich the knowledge and contribute to scientific developments in biochemistry through scientific research and follow developments in the science.

#### The strategic situation of the program

#### The program submitted by the Department of Chemistry - Faculty of Science – Tanta University, a program serving the middle area of ​​Delta's In analytical biochemistry process in the presence of many of the medical laboratory and pharmaceutical companies and correlation of many students' academic in Analytical biochemistry.

#### Faculty and the Department of Chemistry had an infrastructure and basic and modern instruments for student activities and various advanced education, which leads to a distinguished educational quality.

#### There is a distinct integration between the disciplines of faculty of science and university faculties especially experimental faculties.

####  There are many schools distinguished research in the Department of Chemistry in the competitive field of scientific research and provide community services to provide high-level and graduate students with a proper knowledge in analytical biochemistry.

#### The availability of financial and material resources through exchange for educational services provided.

#### The availability of infrastructure for laboratories and research student and qualified human resources and electronics that help lead to the upgrading of skills and scientific process for the graduate student.

#### 2- The analysis of the internal environment of the program and link them to community service and development environment

#### It is important to analyze of internal environment to demonstrate the strengths and weaknesses and weakness and the points that need to be improved. Statement as well as potential opportunities and threats for the establishment of the program will be observed.

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| Points of Strengths | Points need to improve |
| * There are a sufficient number of competent faculty members in the field of specialty program analytical biochemistry.
* There is good infrastructure and suitable to the educational process of the student labs and lecture halls and research laboratories.
* There are an effective system of academic counseling for students of the program.
* Faculty available electronic infrastructure and electronic library and halls for study and quiet lines allow students access to the Internet, adopted a strategy of self-education. - Faculty introduced academic accreditation from the National Accreditation and quality.
 | * Limited some books and references.
* Upgrading of professional technicians and engineers of instruments and workers. - Elevating the level of classrooms and modernize equipment and means to display them. - Upgrading the professional side of the application of quality standards and the development of faculty members in this area. - Lack of some chemicals, which may be available from the program - Accredation the faculty from National Accreditation and Quality.
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#### 3- The analysis of the external environment of the program and link them to community service and development environment

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| Opportunities | Potential challenges |
| The faculty is characterized by strategically place amid population density and diversity of the industrial, agricultural and Technology in the Delta governorates. The program is characterized by binding directly to the labor market, allowing employment opportunities for graduates. The existence of a labor market of local, Arab and international based on the technology of biochemical analysis.Take advantage of the community service program and the development of the surrounding environment in the conclusion of agreements analyzes vital for the environment and pharmaceutical companies and medical laboratory. The lack of efficiency of the two works medical analysis the labor market and the urgent need for them in the high efficiency | Upgrading professional graduate program through interaction with the surrounding environment The need to use the strategies for continuing education, modernization and measure the impact of the results of input regularly to ensure competition in the labor market and employment opportunities. Increase the relationship between the college and the business owners and the pharmaceutical companies and medical laboratory. |

#### From the above, the internal of the environmental analysis the results of an external environmental analysis can conclude the following:The strengths to create a program in analytical biocheemistry far superior points on the potential challenges when creating the program by more than 80% and then the program strategy is a strategy of growth and expansion and the introduction of new programs needed by the labor market.

**Strategic goals and objectives of the program of analytical biochemistry**

The strategic plan of the program sponsored by the Department of Chemistry - Faculty of Science –Tanta University is Characterized by a package and ultimate goals, which covers the areas of axes and quality of academic programs and then applied academic accreditation, which is achieved through two main goals:

1. Program management, which includes an agreement with the mission and vision of the faculty and university leaders and the availability of academic and administrative efficiency with distinct. Finally, human resources, financial and material support to achieve the program's mission.
2. The role of the effectiveness of the educational program, which includes the academic standards of the program and an evaluation of its outputs and students and faculty members and quality management systems and program evaluation.

 **Therefore the goal at the end of the program are:**

1. Strengthening the management and development of the program.
2. Promote and develop teaching and learning strategies.
3. The promotion and development programs and the development of community-based services environment.
4. Development of own resources for the program to support the educational process and training.
5. Strengthening the policies and mechanisms linking the graduate labor market to ensure employment opportunities and competition.
6. Obtaining academic accreditation of the local program.

 **Aim of the program**
7. Give graduates the knowledge and skills of scientific and technical in the field of analytical biochemistry.
8. Qualifying students in biochemistry and provide them with modern theories and technical skills in the field of science, according to the needs of the future and recent developments in Egypt and the world.
9. Prepare students to pursue higher education and research in the field of analysis.
10. Provide students with the basic skills of professional, technical and academic enough to qualify them to work in different areas of analytical biochemistry.
11. Enriching the knowledge and contributing to the scientific developments in the field of biochemistry through scientific research and to follow developments in the field of science.
12. Provide students with a set of generic skills to develop their personal skills.
13. Testing and interpretation of the special problems of vital operations analysis.
14. The use of theoretical and practical skills through learning in groups and address the problems of analysis, using the proper scientific method to solve problems.
15. Exploit the potential of the Department of Chemistry, Faculty of Science – Tanta University and scientific laboratory to meet the requirements of this program and in particular the potential of faculty members do not mind the use of the expertise of the other inside and outside the university if necessary.

#### Intended Learning outcomes

***A. Knowledge and understanding:***

At the end of the program the student will be able to demonstrate knowledge and understanding of:

1. The information and basic knowledge of the methods of analysis vital.
2. The scientific concepts for practical applications in the field of modern analysis.
3. The analytical skills and face the vital problems.
4. Methods and techniques of scientific research.

**B. Intellectual skills:**

Students should also acquire the ability to:

1. Summarize and interpret information related to the cumulative knowledge of the tests.
2. Solving problems related to dynamic analyzes.
3. Integration of theoretical and practical skills in scientific research related analyzes vital
4. Practical ability and professional in various vital operations analysis.

 ***C. Professional and practical skills:***

By the end of the Programe, the students should be able to:

1. Analyze of various methods and tools used in the field of biochemistry.
2. Design analysis and interpretation of the different results.
3. Discuss the familiarity with the ways of the types of laboratory tests.
4. Apply application-specific risk assessment process.

***D. General and transferable skills:***

1. The ability to optimize the different analysis and use modern technique of analysis to evaluate and interpret the results.
2. Prepare different devices and methods of preservation.
3. Use information technology and analysis with modern appliances.
4. Work individually, and as part of a team, and self-learning with an open mind and accuracy.
5. **Content**

The diploma is structured around a series of two semester modules covering the core skills required by analytical chemists, a specialist skills module Students have an opportunity to specialize through options in the specialist module and by the choice of project topic.

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| **Semester 1** | **Course title** | **Hours** |
| **Code** | **Preq** | **Obligatory** | **Lec.** | **Prac.** | **Cred.** |
| **CH5101** |  | **Analytical methods** | **2** | **3** | **3** |
| **CH 5103** |  | **Instrumental analysis** | **1** | **3** | **2** |
| **BC5101** |  | **General metabolism** | **2** | **3** | **3** |
| **BC5103** |  | **Proteomics : Principle and techniques** | **1** | **3** | **2** |
| **BC5105** |  | **Experimental Techniques in Biochemistry(1)** | **1** | **3** | **2** |
|  |  | **Optional: select Three credits hours from the following modules** |  |  |  |
| **BC5107** |  | **Hormones** | **1** |  | **1** |
| **BC5109** |  | **Enzymolog** | **1** |  | **1** |
| **BC5111** |  | **Metal ions In Biochemistry** | **1** |  | **1** |
| **BC5113** |  | **Nutritional analysis** | **1** |  | **1** |
| **CH5105** |  | **Water analysis and treatment** | **1** |  | **1** |
| **CH5107** |  | **Air pollution** | **1** |  | **1** |
|  |  |  |  |  | **15** |

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| **Semester 2** | **Course title** | **Hours** |
| **Code** | **Preq** | **Obligatory** | **Lec.** | **Prac.** | **Cred.** |
| **CH5102** | CH5105 | **Analytical spectroscopy** | **1** | **3** | **2** |
| **BC 5108** | BC5101 | **Microbial biochemistry** | **1** | **--** | **1** |
| **BC5102** | BC5101 | **Clinical Biochemistry** | **2** | **3** | **3** |
| **BC5104** | BC5103 | **Biotechnology** | **2** | **3** | **3** |
| **BC5106** | BC5105 | **Experimental Techniques in Biochemistry(2)** | **1** | **3** | **2** |
| **MA5102** |  | **Biostatistics** | **1** | **2** | **2** |
|  |  | **Optional: select Three credits hours from the following modules** |  |  |  |
| **BC5110** | BC5101 | **Regulation metabolism** | **1** |  | **1** |
| **BC5112** | BC5101 | **Immunology** | **1** |  | **1`** |
| **BC5114** | BC5105 | **Clinical quality control** | **1** |  | **1** |
| **BC5116** | BC5101 | **Clinical and Biopharmaceutical Analysis** | **1** |  | **1** |
| **BC51118** | BC5101 | **Biochemical Toxicology**  | **1** |  | **1** |
| **CH5108** | CH5103 | **Introductory forensic chemistry** | **1** |  | **1** |
|  |  |  |  |  | **15** |

**جدول درجات الطلاب لدبلومة الكيمياء الحيوية التحليلية**

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| **م** | **المــــــادة** | **محاضرات** | **عملى** | **عدد الساعات المعتمدة** | **درجة التحريري** | **درجة العملى** | **درجة أعمال فصلية** | **درجة التطبيقى** | **درجة الشفوى** | المجموع | **عدد ساعات الامتحان** |
| **Semester1** |
| **1** | **Analytical methods** | **2** | **3** | **3** | **60** | **20** | **10** | **5** | **5** | **100** | **2** |
| **2** | **Instrumental analysis**  | **1** | **3** | **2** | **60** | **20** | **10** | **5** | **5** | **100** | **2** |
| **3** | **Metabolism**  | **2** | **3** | **3** | **60** | **20** | **10** | **5** | **5** | **100** | **2** |
| **4** | **Proteomics : Principle and techniques**  | **1** | **3** | **2** | **60** | **20** | **10** | **5** | **5** | **100** | **2** |
| **5** | **Experimental Techniques in Biochemistry(1)** | **1** | **3** | **2** | **60** | **20** | **10** | **5** | **5** | **100** | **2** |
|  | **Selective course( 3 hours credit only) for the first semister** |
| **6** | **Hormones** | **1** | **--** | **1** | **60** | -- | **20** | **10** | **10** | **100** | **2** |
| **7** | **Enzymolog** | **1** | **--** | **1** | **60** | -- | **20** | **10** | **10** | **100** | **2** |
| **8** | **Metal ions In Biochemistry** | **1** | **--** | **1** | **60** | -- | **20** | **10** | **10** | **100** | **2** |
| **9** | **Nutritional analysis** | **1** | **--** | **1** | **60** | -- | **20** | **10** | **10** | **100** | **2** |
| **10** | **Water analysis and treatment** | **1** | **--** | **1** | **60** | -- | **20** | **10** | **10** | **100** | **2** |
| **11** | **Air pollution** | **1** | **--** | **1** | **60** | -- | **20** | **10** | **10** | **100** | **2** |
| **12** | **Hormones** | **1** | **--** | **1** | **60** | -- | **20** | **10** | **10** | **100** | **2** |
|  | **Semester 2** |
| **13** | **Analytical Spectroscopy** | **1** | **3** | **2** | **60** | **20** | **10** | **5** | **5** | **100** | **2** |
| **14** | **Microbial biochemistry** | **1** | **--** | **1** | **60** | -- | **20** | **10** | **10** | **100** | **2** |
| **15** | **Clinical Biochemistry** | **2** | **3** | **3** | **60** | **20** | **10** | **5** | **5** | **100** | **2** |
| **16** | **Biotechnology** | **2** | **3** | **3** | **60** | **20** | **10** | **5** | **5** | **100** | **2** |
| **17** | **Experimental Techniques in Biochemistry (2)** | **1** | **3** | **2** | **60** | **20** | **10** | **5** | **5** | **100** | **2** |
| **18** | **Biostatistics** | **1** | **2** | **2** | **60** | **20** | **10** | **5** | **5** | **100** | **2** |
| **Selective course( 3 hours credit only) for the second semister** |
| **19** | **Regulation metabolism** | **1** | **--** | **1** | **60** | -- | **20** | **10** | **10** | **100** | **2** |
| **20** | **Immunology** | **1** | **--** | **1** | **60** | -- | **20** | **10** | **10** | **100** | **2** |
| **21** | **Clinical quality control** | **1** | **--** | **1** | **60** | -- | **20** | **10** | **10** | **100** | **2** |
| **22** | **Clinical and Biopharmaceutical Analysis** | **1** | **--** | **1** | **60** | -- | **20** | **10** | **10** | **100** | **2** |
| **23** | **Biochemical Toxicology**  | **1** | **--** | **1** | **60** | -- | **20** | **10** | **10** | **100** | **2** |
| **24** | **Introductory forensic chemistry** | **1** | **--** | **1** | **60** | -- | **20** | **10** | **10** | **100** | **2** |
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|  | **المجموع الكلى لدرجات الدبلومة** | **--** | **--** |  | **--** | **--** |  | **--** |  | **1700** | **--** |

1. **Analytical methods**

Chromatography methods and its applications. Introduction of electrochemistry. Electro-analytical techniques. Potentiometric analysis

1. **Instrumental analysis (1)**

Spectrophotometrical analysis- Fluorometry- Thermal analysis-Electrophoresis.

1. **Metabolism**

A study of the metabolism of carbohydrates, lipid, proteins and nucleic acid. , enzyme kinetics and enzyme mechanisms. There is especially focus on the different tools of metabolic eprocess, overview of biochemical pathways. Energetics. Regulation of pathways.

1. **Proteomics : Principle and techniques**

An introduction to proteomics: Basics of protein structure and function, An overview of systems biology, Evolution from protein chemistry to proteomics; Abundance-based proteomics: Sample preparation and fractionation steps, Gel-based proteomics - two-dimensional gel electrophoresis (2-DE), two-dimensional fluorescence difference in-gel electrophoresis (DIGE), Staining techniques.

1. **Experimental Techniques in Biochemistry(1)**

General introduction to industrial downstream processing. Work through of examples of industrial downstream processing methods for different types of products. Principles of process design and development of downstream processing strategies. Separation principles and their effectiveness. Product release, secretion, cell disruption, flocculation processes, centrifugation, conventional filtration and membrane filtration, precipitation processes, process chromatography, and product polishing.

1. **Analytical spectroscopy**

The use of ultraviolet, visible spectroscopy as tools for the identification of organic compounds. Applications of various spectroscopic methods in quantitative analysis of environmental samples

1. **Instrumental analysis (2)**

Introduction in Laser- Laser in medical –Laser in ophthalmology-Basic mechanism.

1. **Clinical Biochemistry**

The course will outline the biochemical mechanisms for controlling different pathways under different physiological and nutritional conditions and the importance of diseases arising from defects in these pathways. Particular emphasis will be placed upon the aetiology, symptoms and treatment of diseases such as Type I and II diabetes mellitus; atherosclerosis and other lipid disorders and inborn errors of carbohydrate and amino metabolism. In addition the importance of how our knowledge of nucleotide metabolism has led to the development of different chemotherapeutic approaches to the treatment of cancer will be discussed.

1. **Biotechnology**

The aim of this course is to provide scientists with an understanding of how their skills may be used in society. The course explores the applications of biotechnology, its products and processes. It examines the mechanisms through which biotechnology is commercialised, such as university-industry links, spin-off firms and corporate alliances. The role of regulatory and ethical debates in the development of biotechnology is also explored.

1. **Experimental Techniques in Biochemistry (2)**

 The goal of this study is to bring the student in contact with the basic and modern techniques in the field of practical biochemistry. Subjects include: basic and modern techniques for the isolation, purification and characterization of biological molecules.

1. **Biostatstics**

The aim of the course is to apply the law of statistics in biochemistry researches. Subjects include: experimental design, describing and summarizing the data, estimation and hypothesis tests, the analysis of variance, analysis of regression and correlation and the analysis of categorical data.

1. **Hormones**

The Course hormone is intended to cover the major endocrine systems which regulate metabolism, reproduction, growth and developement. This includes endocrinology of the Hypothalamo/pituitary axis and its integration with the adrenal, thyroid, Parathyroid, ovary, testis. Additional systems include the control of salt balance, pancreatic control of carbohydrate metabolism, and the control of growth. Reproduction will be covered in detail including fertilization, implantation, placental function, maternal adaptation to pregnancy, parturition, and lactation.

1. **Enzymology**

The purpose of this study is how enzymes utilize binding interactions directed to non reacting parts of substrate molecules to catalyze the chemical transformations of the reacting parts of substrates. Subject include: Transition state theory , Enzyme mechanism and kinetics, Enzyme regulation and medical and pharmaceutical application of enzymes.

1. **Metal ions In Biochemistry**

This course will introduce biochemists to the function of metal ions in biochemistry, building from the introduction to the techniques that are used to study metals Subjects include: General introduction, distribution of the elements and the elements of life.Various classes of elements and their functions. Transport of metal ions and ionophores, model complexes. Hydrolytic enzymes iron-sulphur proteins, plastocyanin. Medical aspects of bioinorganic chemistry, including: platinum chemotherapy, gold compounds in treatment of arthritis, technetium radio-imaging agents.

1. **Nutritional analysis**

Survey of the structure, analysis and function of biological macro-molecules including proteins, carbohydrates, lipids, and nucleic acids. Analysis of foods, meat and milk.

1. **Water analysis and Treatments**

Physical ; chemical and biological characterization of water analysis—Physical; Chemical and biological water treatments (precipitation, flotation, chlorination, ozonolysis)

1. **Air pollution**

Composition of air –Types of air pollutant and there resources-Effect of air pollutant on enviroments. Methods of quantitative analysis of air pollution- Controlling air pollutions.

1. **Regulation metabolism**

The purpose of this course is to provide through description of the mechanism of metabolic regulation. Subject include: Regulation of Carbohydrate, Lipid and protein. Hormonal action of metabolic control. Regulation of metabolism in starvation and obesity.

1. **Immunology**

The aim of this course will be to discuss the mechanisms of immune recognition by the innate and acquired immune system and how failures of these responses can lead to disease. The course will demonstrate how failures of the immune system can lead to conditions such as allergies, hypersensitivity reactions, and autoimmunity, and how bacterial and viral pathogens can evade the immune system in order to cause disease.Also, discuss the different assays of immunological methods.

1. **Clinical quality control**

A study of the design and operation of a quality control program in a clinical laboratory. The course will include all those action necessary to provide adequate confidence that test results satisfy given requirements and standards. Such areas as statistics, patients preparation, specimen integrity, external proficiency control, internal quality control, analytical goals and laboratory management will be covered (Enrollment limited to clinical chemistry majors).

1. **Clinical and Biopharmaceutical Analysis**

Overall view of biotechnology and bioprocessing. It will cover molecular theories for biotherapeutics, the engineering and applicable sciences behind bioprocess development, and the latest advancements in bioprocessing and bioanalytical technology.

1. **Biochemical Toxocology**

The goal of this study is to provide extensive knowledge on the biochemical basis of toxicity. Subjects include: basis concepts in toxicology, history and branches, dose –response curves, statistically defined expression in toxicology, classification of toxicants and their mode of action, mutagens, and carcinogen, phytotoxins, zootoxin and environmental toxicants.

1. **Introduction of Forensic Chemistry**

The goal of this course is : Definition and scope of forensic science, Composition and identification of glass and soils. Study the structure and identification of hair and fibers. classification and identification of drugs, Controlled and toxic substances. Principle identification fingerprints.

1. **Role of Organization**

Teaching postgraduate students

1. Preparing the required courses
2. purchase the experiments and tools related to the diploma
3. setup and testing the experiments
4. teaching courses
5. Buy text books
6. Establishing web site
7. Preparing technician to repair technical problems

2- Quality Control and Monitoring

Monthly regular meeting for the staff t members

**The cost of the study**

The fees are about 1250 pounds per semester per student with a minimum of 25 students to open the diploma to be paid before the start of the study or in the schedule and declared that the college and distributed those fees activities:
- 5% share of the of Egyptian government University and College.

- 5% share of the University.

- 5% share of the College.

- 25% for the purchase of chemicals, tools and scientific references
- 25% for the purchase of equipment and maintenance
- 30% bonuses faculty members, teachers, teaching assistants and technocracy subscribers diploma.

**General conditions for admission and registration**

Accept the diploma Analytical biochemistry student winning a bachelor's degree, Tanta University, or a university recognized by the Supreme Council of Universities that have obtained a bachelor's degree in biochemistry Special, Major or Special chemistry or the Major from the students of chemistry / Botany or Chemistry / Zoology or Chemistry / Microbiology or Microbiology or Zoology special who also received the Diploma degree graduates from faculties of medicine and veterinary medicine and pharmacy and agriculture. The board of the department to decide other courses for students other than Bachelor of Science Biochemistry (Major and Special) to study by the student and lead successful and the exam grades are not calculated in the GPA of the student.