#### Course Title: Chemistry 6 (Proteins and Enzymes)

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| **University** | **Benha** |
| **Faculty** | **Agriculture** |
| **COURSE SPECIFICATIONS:** |
| Program of which the course is given | Agricultural Biotechnology Program |
| Major or Minor element of program | Major |
| Departments offering the program | Agricultural Chemistry  |
| Department offering the course | Agricultural Chemistry  |
| Academic year (level) | Level 3 (First Semester) |
| Date of specification approval |  |

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| **A- BASIC INFORMATION**  |
| Title  | Chemistry 6 (Proteins and Enzymes) |
| Code | (Code: AC 0906). |
| Credit Hours  | 4 Hours/ week (14 week). |
| Lecture | 2 Hours / week |
| Practical | 2 Hours / week  |
| Total: | 56 Hours |

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| **B- PROFESSIONAL INFORMATION** |
| 1. OVERALL AIMS OF COURSE |
| The course is concerned with the study of proteins and enzymes and there interaction from different aspects and by the completion of this course the student will be able:* To understand the structure of most protein and factors determining the tertiary structure of proteins
* To separate and purify of proteins
* To apply the enzyme structure, role and factors affecting the activity.
* To define the enzyme classification and mode of action as well as the coenzyme role.
* Understand the mode of action of enzymes.
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| 2. INTENDED LEARNING OUTCOMES OF COURSE (ILOs) |
| **A. Knowledge and Understanding:** |
| ***By the end of the course, students should:**** Understand and specify the relation between chemical structure and biological activity for both proteins and enzymes.
* Identify the three dimensional shape of proteins and factors affecting the secondary structure of protein and stability of polypeptide.
* Predict the secondary structure from primary structure of proteins.
* Characterize the enzyme types and its role in biochemical reactions in addition to the valuation of its activities and kinetics.
* Recognize the role of enzymes and proteins on organ functions and related diseases.
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| B. Intellectual Skills: |
| ***Successful completion of this course will allow students to:**** Identify a simple program for extraction, purification and studying the sequence of amino acyl residues in a polypeptide.
* Design the best methods for determination of protein and peptides and their contents of amino acids.
* Determine the activities of some enzymes in plasma and other sources and how to use the enzyme as a diagnostic tool.
* Identify a simple program for extraction, purification and studying the sequence of amino acyl residues in a polypeptide.
* Design the best methods for determination of protein and peptides and their contents of amino acids.
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| C. Professional and Practical Skills: |
| The Student should be able to: * Measure the proteins in any sample.
* Isolate and purification of proteins
* Separate and determination of amino acids in a protein sample.
* Specify the theoretical and practical bases of different methods for determination of the enzymes (Chemical, Biological methods, Radioimmunoassay and ELIZA)
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| D. General and Transferable Skills: |
| * Contribute constructively to group discussions
* Work in a team with positive intent.

d1- Identify and solve the scientific problems .  Learn the scientific ethics for discussion* Use the computer to obtain the proper information.
* Using Microsoft word and excel applications.
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| 3. CONTENTS |
| **Topic** | **No. of hours** | **Lectures** | **Practical** |
| 1. Physical and chemical properties of proteins.
 | 4 | 2 | 2 |
| 1. Amino acids and their reactions.
 | 4 | 2 | 2 |
| 1. Peptides and their chemical configuration.
 | 4 | 2 | 2 |
| 1. Biochemical functions of amino acids, peptides and proteins.
 | 4 | 2 | 2 |
| 1. Isolation and purification of proteins
 | 4 | 2 | 2 |
| 1. Methods for preparing concentrated proteins.
 | 4 | 2 | 2 |
| 1. Enzymes definition and their nature, function and mode of action.
 | 4 | 2 | 2 |
| 1. Enzymatic and chemical cleavage of specific peptide bonds.
 | 4 | 2 | 2 |
| 1. Enzyme specificity, factors affecting enzyme activity
 | 4 | 2 | 2 |
| 1. Classification of enzyme and enzyme codes.
 | 4 | 2 | 2 |
| 1. Enzyme inhibition, coenzymes, types, functions and vitamin relationship.
 | 8 | 4 | 4 |
| 1. Immobilized enzymes and analytical tools
 | 8 | 4 | 4 |

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| 4. TEACHING AND LEARNING METHODS |
| 1. The main subject areas are covered in the lectures (see syllabus Plan).
2. Case study.
3. Several student seminar sessions give the opportunity for students to bring questions or discuss any aspects of the course with the tutor.
4. Students are given a topic to research in small groups which they report as an oral presentation. Collective feedback on the strengths and weaknesses of the presentations are provided.
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| 5. STUDENT ASSESSMENT METHODS |
| ***Students will be evaluated by attendance, fulfillment and effort in exercises and presentations, and examination grades:***1. Med-term exam: to assess the knowledge & understanding skills.
2. Oral-exam: to assess the knowledge, understanding, intellectual and general skills.
3. Practical-exam: to assess Professional, intellectual and general skills.
4. Laboratory work: to assess the ability of students to understand and perform small laboratory experiments.

Final-exam: to assess relined knowledge & understanding skills. |

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| 6. ASSESSMENT SCHEDULE |
| No | AssessmentAssessment | **Week** |
| 1 | Periodical exam  | 7 |
| 2 | Practical exam | 11 |
| 3 | Oral exam | 13 |
| 4 | Final exam | 14 |

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| 7. WEIGHING OF ASSESSMENT |
| No | AssessmentAssessment | **%** |
| 1 | Periodical exam  | 15% |
| 2 | Practical exam | 15% |
| 3 | Oral exam | 10 % |
| 4 | Final exam | 60 % |
| TOTAL | 100 % |

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| 8. LIST OF REFERENCES |
| * 1. **Copeland, R.A. 2004**. Enzymes: A practical introduction to structure, mechanism, and data Analysis. Wiley, NY, USA. [**Link**](http://books.google.de/books?id=14nqceIs_ywC&printsec=frontcover&dq=Enzymes:+A+practical+introduction+to+structure,+mechanism,+and+data+Analysis&hl=en&sa=X&ei=O_P3Ut2xAYjItQaL5oC4BQ&ved=0CDcQ6AEwAA#v=onepage&q=Enzymes%3A%20A%20practical%20introduction%20to%20structure%2C%20mechanism%2C%20and%20data%20Analysis&f=false)
	2. **Richard, B.R. and Deutscher, M.P. 2009.** Guide to protein purification. Elsevier Inc. Oxford, UK. [**Link**](http://books.google.de/books?id=f6Lp4yna4hoC&printsec=frontcover&dq=Guide+to+protein+purification&hl=en&sa=X&ei=H_P3UozAAoGktAbIwIDoCQ&ved=0CEEQ6AEwAA#v=onepage&q=Guide%20to%20protein%20purification&f=false)
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| 9. FACILITIES REQUIRED FOR TEACHING AND LEARNING |
| 1. Teaching aids/materials: e.g. smart boards-overhead projector-data-show projector – stationary.. etc.
2. Teaching room/hall.
3. Connect WiFi Computers.
4. Facilities for site visits etc., which are necessary for teaching the course.
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| **Course Coordinators:**  | **Prof. Dr.** **Prof. Dr.**  |
| **Date: / / 2015** |