#### Course Title: Food and Dairy Biotechnology (Code: FS 0724). (Code: FS 0724)

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| **University** | **Benha** |
| **Faculty** | **Faculty of Agriculture** |
| **COURSE SPECIFICATIONS:** |
| Program of which the course is given | Agricultural Biotechnology Program |
| Major or Minor element of Program | Minor |
| Departments offering the Program | Faculty of Agriculture, Benha university |
| Department offering the course | Food technology |
| Academic year / Level | Level 4 Second semester |
| Date of specification approval |  |

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| **A- BASIC INFORMATION**  |
| Title  | **Industrial Fermentation**  |
| Code | FS 0725 |
| Credit Hours  | 3 Hours |
| Lecture | 2 Hours / week |
| Practical | 2 Hours / week  |
| Total: |  Hours |

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| **B- PROFESSIONAL INFORMATION** |
| **1 – OVERALL AIMS OF COURSE** |
| ***The overall objectives of this course are:***1. Introduction of the importance of microbial industries technology.
2. Factor affecting in growth of organisms used in fermentation.
3. Modified of genetic microorganisms.
4. To define the student the different types of fermentation.
5. To define the student about the organisms which used in fermentation.
6. Utilization of agriculture and food industrial waste.
7. Management of waste by products.
8. Controlling any process during fermentation.
9. To teach the student to produce any products from raw materials or waste materials.
10. Understanding the students how can produce new product by fermentation.
11. Understanding the units and equipments used in plant fermentation.
12. To evaluate the safety of fermented products.
13. To used the fermentation for keeping some food.
14. Production of acids, alcohol, lipids, vitamins, gibberellins, enzymes, amino acids and coloring materials.
15. Production some specials foods.
16. Keeping microorganisms as starter culture.
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| **2 – Intended Learning Outcomes of Course (ILOs)** |
| **A. Knowledge and Understanding:** |
| ***By the end of the course, students should:***1. Understanding the chemistry of raw and waste materials used in fermentation (i.e. protein, lipids, carbohydrate, minerals, water, enzymes, pigments and flavors.).
2. Understanding the properties of microorganisms used in fermentation.
3. Explain the methods for industrials fermentation.
4. Understanding the factor affecting in fermentation.
5. Explain the unit and equipment used in fermentation.
6. Production any common product from by fermentation.
7. Known the additive used in fermentation.
8. produce new product by fermentation .
9. Explain the development of food fermentation.
10. Explain the methods of sensory evaluation of food fermentation
11. Explain the method for keeping the cultures which used in fermentation.
12. Understanding the safety of the fermentation products.
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| B. Intellectual Skills: |
| ***Successful completion of this course will allow students to:***1. Solving the problems for the agriculture waste and food plant by fermentation.
2. The student should be able to analyze data and write conclusions about food fermintation.
3. Choose the best method for making different kind of food fermentation by choosing good culture, equipment and controlling the factor affecting in fermentation .
4. Understanding the change of raw and waste materials used during manufacturing and storage any fermented products.
5. Understanding the unit operation and any systems used in plan for producing fermented products.
6. Understanding the chemicals and physical of other materials which used in fermented products.
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| C. Professional and Practical Skills: |
| ***By the end of this course, students will be able to:***1. The students should be able to analysis of raw materials, agriculture and industrials waste.
2. The students should be able analysis of fermented product.
3. The students should be able identify the different type of organisms used in fermented products.
4. The students should be able to understand the methods used in fermentation.
5. The students should be able how can be storage of agriculture and industrials waste until used.
6. Knowing the method used for propagation and keeping the culture.
7. Evaluate the for fermented products.
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| D. General and Transferable Skills: |
| 1- Students should be familiar with working in small groups in the practical classes from which they produce individual reports. 2- They will be able to communicate effectively with a wide range of individuals using a variety of means.3- Plan and organize their time to ensure that all tasks are completed and deadlines met.4- Utilize problem solving skills in a variety of theoretical and practical situations.5- Use computers for communication, data handling and word processing.6- Students should be familiar with writing a case study. 7-Use of new technological tools and ICDL.8- Access to Web sites. 9- Life-long learning skills.10- Communicate effectively with a wide range of individuals using a variety of means.11- Work effectively individuals or as part of a team. |

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| 3. CONTENTS |
| **Topic** | **No. of hours** | **Lectures** | **Practical** |
| 1. Introduction and applications to food production.
 | 3 | 2 | 2 |
| 1. Bio-nano-technology application in food manufacturing and inspection
 | 3 | 2 | 2 |
| 1. Biotechnology applications in fermented food.
 | 3 | 2 | 2 |
| 1. Application of food inspection methods.
 | 3 | 2 | 2 |
| 1. Ethics and safety of food biotechnology products.
 | 3 | 2 | 2 |
| 1. Regulations of food biotechnology.
 | 3 | 2 | 2 |
| 1. Biotechnology of vitamins, peptides, enzymes, flavors, polysaccharides, amino acid and fatty acids.
 | 3 | 2 | 2 |
| 1. Metabolism of lactic acid bacteria (LAB).
 | 3 | 2 | 2 |
| 1. Milk fermentation.
 | 3 | 2 | 2 |
| 1. Biosynthesis of lipoprotein, carbohydrate, vitamins and biopolymers.
 | 3 | 2 | 2 |
| 1. Genetic engineering of lactic acid bacteria and laboratory scales.
 | 6 | 4 | 4 |
| 1. Transgenic foods and diagnostic system in food industry.
 | 6 | 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. Laboratory practical / exercises
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 class participation/ attendance, fulfillment and effort in exercises and presentations, and examination grades:***1) Laboratory work: to assess the ability of students to understand and perform small laboratory experiments.2) Hour examination grades: to assess how progress of the students.3) Term-paper: to assess student ’ability to understand and figure out an article review of specific subject. 4) Mid-Term examination: to assess how difficult or easy of course subjects taken through the first mid-term to understand and realize by students.5) Oral Examination: to assess how student’ ability to discuss a problem and suggest an realized solving.6) Practical/Lab Examination: to assess student’ ability to carry out small experiment, analysis, and discuss the results.7) Final Examination: to assess how much the student gain totally. |

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| 6. ASSESSMENT SCHEDULE |
| No | Assessment | **Week No.** |
| 1 | Periodical exam  | 4, 8, 12 |
| 2 | Practical exam | 13 |
| 3 | Oral exam | 13 |
| 4 | Final exam | 14 |

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| 7. WEIGHTING OF ASSESSMENT |
| No | Assessment | **%** |
| 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. [**Goldberg**](http://www.amazon.com/s/ref%3Dntt_athr_dp_sr_1?_encoding=UTF8&field-author=Israel%20Goldberg&search-alias=books&sort=relevancerank)**, I. and**  [**Williams**](http://www.amazon.com/s/ref%3Dntt_athr_dp_sr_2?_encoding=UTF8&field-author=Richard%20Williams&search-alias=books&sort=relevancerank)**, R. 2007**. Biotechnology and food ingredients. Springer, NY, USA.

<http://books.google.de/books?id=4W5N5eFu2CMC&printsec=frontcover&dq=Biotechnology+and+food+ingredients&hl=en&sa=X&ei=V0b3UsrXAYjbtAaX04C4AQ&ved=0CDwQ6AEwAA#v=onepage&q=Biotechnology%20and%20food%20ingredients&f=false> 1. **Grandison, A.S. and Lewis, M.J. 2006**. Separation processes in the food industries: Principles and applications. Woodhead Publ. Ltd. Cambridge, UK.

<http://books.google.de/books?id=4W5N5eFu2CMC&printsec=frontcover&dq=Biotechnology+and+food+ingredients&hl=en&sa=X&ei=V0b3UsrXAYjbtAaX04C4AQ&ved=0CDwQ6AEwAA#v=onepage&q=Biotechnology%20and%20food%20ingredients&f=false>.1. **Polak, B.S. and Tramper, J. 2000.** Food biotechnology. [Elsevier](http://books.google.com.eg/url?id=eEnkQPz-iHQC&pg=PA171&q=http://www.elsevierdirect.com&clientid=ca-print-elsevier&channel=BTB-ca-print-elsevier+BTB-ISBN:0080531814&linkid=1&usg=AFQjCNHW4WoygN7wDOILg0yza_kAe2eLUQ&source=gbs_pub_info_r) Publishers, Netherlands.

<http://books.google.de/books?id=E3bvD2jU4B0C&printsec=frontcover&dq=Food+biotechnology&hl=en&sa=X&ei=jUb3Uu6lLMLEtQbzu4CADw&ved=0CEIQ6AEwAQ#v=onepage&q=Food%20biotechnology&f=false>  |

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| 9. FACILITIES REQUIRED FOR TEACHING AND LEARNING |
| 1. Teaching aids/ materials: e.g. boards – overhead projector – data-show projector – stationary.. etc.
2. Teaching room/hall.
3. Computers.
4. Facilities for site visits etc., which are necessary for teaching the course.
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| **Course Coordinators:**  | **Prof. Mohamed Bedier El-Alfy****Prof. Dr. Hassan Barakat** |
| **Date: / / 2015** |