#### Course Title: Agronomy Biotechnology

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| **University** | **Benha** |
| **Faculty** | **Faculty of Agriculture** |
| **COURSE SPECIFICATIONS:** |
| Program of which the course is given | Biotechnology & Food safety programs. |
| Major or Minor element of program | Minor element |
| Departments offering the program | Food safety & Biotechnology  |
| Department offering the course | Agronomy |
| Academic year (level) | Third year |
| Date of specification approval | 8\_ 11\_ 2015 |

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| **A- BASIC INFORMATION**  |
| Title  | Agronomy Biotechnology |
| Code | AG 0105 |
| 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 aim of the course is to know the applications of up-to-date techniques in crop breeding such as tissue culture, somatic hybridization, somatic variation, molecular markers, genetic engineering and gene transfer.
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| 2. INTENDED LEARNING OUTCOMES OF COURSE (ILOs) |
| **A. Knowledge and Understanding:** |
| ***By the end of the course, students should:**** Recognize different tissue culture techniques
* Define molecular markers.
* Mention different ways of gene transfer.
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| B. Intellectual Skills: |
| ***Successful completion of this course will allow students to:**** Differentiate between different methods of tissue culture.
* Choose the best appropriate molecular markers techniques.
* Determine the best way for gene transfer.
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| C. Professional and Practical Skills: |
| * Apply the appropriate tissue culture technique to achieve the objective of breeding program.
* Analyze data obtained from molecular technique using computer software.
* Prepare appropriate media for tissue culture techniques.
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| D. General and Transferable Skills: |
| * Manage time effectively.
* Use computer skills in a proper manner.
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| 3. CONTENTS |
| **Topic** | **No. of hours** | **Lectures** | **Practical** |
| 1. New biological techniques of crop production versus conventional ones.
 | 2 | 1 | 1 |
| 1. Tissue culture and embryo culture.
 | 4 | 2 | 2 |
| 1. Somatic embryogenesis, hybridization and variation
 | 6 | 3 | 3 |
| 1. Molecular markers, RFLP (Restriction Fragment Length Polymorphism), PCR (Polymerase Chain Reaction), RADP (Random Amplified Polymorphic DNA).
 | 6 | 3 | 3 |
| 1. Microsatellite.
 | 4 | 2 | 2 |
| 1. Genetic engineering and gene transfer methods.
 | 6 | 3 | 3 |
| Total | 28 | 14 | 14 |

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| 4. TEACHING AND LEARNING METHODS |
| 1. Lectures.
2. Lab
3. Assignments.
4. Reports.
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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. Laboratory work: to assess the ability of students to understand and perform small laboratory experiments.
2. Oral exam to assess understanding and intellectual skills.
3. Practical exam to assess practical skills.
4. Final exam to assess knowledge and intellectual skills.
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| 6. ASSESSMENT SCHEDULE |
| No | AssessmentAssessment | **Week** |
| 1 | Periodical exam  |  |
| 2 | Practical exam |  |
| 3 | Oral exam |  |
| 4 | Final exam |  |

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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. **Sambrook, J., Fritsch, E.F. and Manatis, T. 2001.** Molecular cloning: A laboratory manual. Cold Spring Lab. Press, NY, USA.

<http://books.google.de/books?id=SZ-FtgAACAAJ&dq=Molecular+cloning&hl=en&sa=X&ei=ozz3UvSAO4HEtQbS_4G4BA&ved=0CEEQ6AEwAA> 1. **Slater, A., Scott, N.W. and Fowler, M.R. 2008**. Plant biotechnology: The genetic manipulation of plants. 2nd Ed., Oxford Univ. Press, Oxford, UK. <http://books.google.de/books?id=jUVlxEkjy7oC&printsec=frontcover&dq=Plant+biotechnology&hl=en&sa=X&ei=uTz3Uvj6OYbUsga4sYFw&ved=0CEIQ6AEwAQ#v=onepage&q=Plant%20biotechnology&f=false>
2. **Smith, D. L. and Hamed, C. 1999**. Crop yield physiology and processes. Springer-Verlag, BerlinHeidelberg, Germany.

<http://books.google.de/books?id=QEIhAQAAMAAJ&q=Crop+yield+physiology+and+processes&dq=Crop+yield+physiology+and+processes&hl=en&sa=X&ei=4Tz3UuDGN8fOsga33IEQ&ved=0CC4Q6AEwAA>  |

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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.
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| **Course Coordinators:**  | **Prof. Dr. Mahmoud E. El-Badawy** |
| **Date: 8/ 11/ 2015** |