

*University of Sadat city*  
*Genetic Engineering and Biotechnology Research Institute*

**Industrial Biotechnology**  
**Master Program Specification**  
**(2015/2016)**

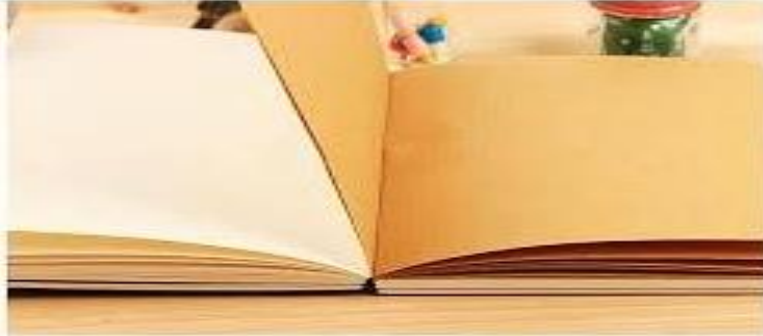
**Approved on 20/9/2010**



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جامعة مدينة السادات  
معهد بحوث الهندسة الوراثية والتكنولوجيا الحيوية  
وحدة ضمان الجودة



رقم  
الصفحة

الموضوع

- رؤية ورسالة القسم
- معلومات اساسية عن البرنامج
- ٣ - المعايير القياسية الإسترشادية للدراسات العليا للهيئة القومية لضمان جودة التعليم والتطوير المستمر
- توصيف برنامج بيوتكنولوجيا الصناعية لدرجة الماجستير
- ٥ - المعايير الأكاديمية المتبناه لبرنامج الماجستير في بيوتكنولوجيا الصناعية
- المخرجات التعليمية
- ١٦ - Bench Marks: ARS
- ١٨ - المقررات الاجبارية والتخصصية
- ١٩ - متطلبات التسجيل بالبرنامج
- ١٩ - نظام التقييم للطلاب وحساب الدرجات
- ٢١ - مصفوفة ارتباط المقررات بالمخرجات التعليمية
- مصفوفة ارتباط المعايير الأكاديمية للبرنامج بالمعايير القياسية للهيئة
- الملحقات



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**University: Sadat City**

**Institute: Genetic engineering and Biotechnology Research Institute**

**Program Specification**

**(2015/2016)**

**A-Basic Information**

**1- Program title: Master of Industrial Biotechnology**

**2- Program type: Single  Double  Multiple**

**3- Department: Industrial Biotechnology**

**4- Program coordinator: Dr. Hoda Mahrous**

**5- Last date of program specifications reapproval: 20 / 9 /2010**

**6- Program initiation Date: / /2002**

**7- Program internal reviewer: Prof.Dr Ashraf F. El-Baz**

**8- Program external reviewer: Prof.Dr Abdelwahab abdel hafez (Fac. Agriculture -Ain shams Univ.).**

**Department mission and vision:**

**رؤية القسم**

● تطوير تعليم وتطبيق التكنولوجيا الحيوية الصناعية عن طريق رفع الأداء الأكاديمي والتطبيقي لكوادر القسم وإعدادهم للمنافسة العالمية في هذا المجال وتحقيق الريادة العلمية داخل وخارج الوطن للمساهمة في إستكمال رسالة الجامعة وتنفيذ التوجهات العامة للدولة.

**رسالة القسم:**

● إعداد كوادر (طالب وباحث) بحثية متميزة على المستوى الأكاديمي والتطبيقي تتمكن من التعامل مع متغيرات وأليات سوق (مجال) الصناعات ذات الأصل البيولوجي.

● ترسيخ فكر تطوير العمليات لإنتاج المركبات الحيوية المختلفة.

● إستحداث وتطوير الأبحاث الخاصة بإنتاج المواد ذات الأصل البيولوجي بدءاً من إختيار المصدر البيولوجي المناسب وإجراء العمليات اللازمة

● لتطويره ثم تجريبه على المستوى المعملى ثم النصف صناعى وما يلى من خطوات لإعداده للوصول الى صورة المنتج النهائى.

● وتحقق رسالة القسم من خلال:

تطبيق أعلى معايير الجودة فى إعداد المقررات العلمية التى تدرس لطالب القسم بحيث تتواكب مع أحدث المستجدات العالمية سواء على المستوى الأكاديمي أو التطبيقي.

رفع قدرات الطلاب والباحثين بالقسم عن طريق إثارة النشاطات الذهنية والعملية لديهم.

نقل أحدث الخبرات والتقنيات العلمية فى مجال التقنية الحيوية الصناعية إلى كوادر القسم من خلال عقد ورش العمل



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والمؤتمرات والندوات المتخصصة والتعاون مع الكيانات العلمية والبحثية محليا ودوليا.  
الوقوف على أهم المشكلات والعقبات التي تواجه الصناعات الحيوية ووضع وتنفيذ خطط بحثية لإيجاد الحلول العملية المناسبة لمواجهتها.  
التداخل والتعاون مع الكيانات الاقتصادية المهمة بالتقنيات الحيوية محليا ودوليا وتبادل الخبرات والمعارف بينها وبين القسم.



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## **National authority of quality assurance and accreditation of education (NAQAAE) for postgraduate studies:**

### **1- Attributes of the graduate**

#### **The graduate of Master program of any specialty must:**

- 1.1. Master the basics of scientific research and methodologies using the different biotechnology tools.
- 1.2. Apply and use the applications of analytical method in the field of specialization.
- 1.3. Apply and integrate the relevant knowledge in specialized professional practice.
- 1.4. Demonstrate awareness of the ongoing specialty problems and modern visions.
- 1.5. Identify and solve professional problems.
- 1.6. Master appropriate scale of professional skills, and use of suitable technological means to serve professional practice.
- 1.7. Communicate effectively and lead work teams.
- 1.8. Make decisions in different professional contexts.
- 1.9. Use available resources to achieve the highest benefit and preservation.
- 1.10. Be aware of the role in community development and environmental conservation according to global and regional changes.
- 1.11. Act with commitment to integrity, credibility and profession rules.
- 1.12. Dedicate to academic, professional self-development and continuous learning.

### **2- General Academic Standards**

#### **2.1. Knowledge & Understanding**

#### **By the end of the study of Master program of any specialty, the graduate should have sufficient knowledge & understanding of:**

- 2.1.1. Basic facts, theories, of the specialty and related fields.
- 2.1.2. Mutual effects between professional practice and environment.
- 2.1.3. Main scientific advances in the specialty field.
- 2.1.4. Ethical and legal fundamentals of profession.
- 2.1.5. Quality standards of the profession practice.
- 2.1.6. Basics and ethics of scientific research.

#### **2.2 Intellectual Skills**

#### **By the end of the study of Master program of any specialty, the graduate should be able to do the following (related to the specialty):**

- 2.2.1. Interpret, analyze & evaluate the information to solve problems.
- 2.2.2. Solve some problems that do not conform to classic data (incomplete data).
- 2.2.3. Integrate different information to solve professional problems.
- 2.2.4. Conduct a scientific research &/ or write scientific systematic approach to a research problem (hypothesis).
- 2.2.5. Evaluate professional risks.



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- 2.2.6. Plan for professional improvement.
- 2.2.7. Take professional decisions.

### **2.3. Professional Skills**

**By the end of the study of Master program of any specialty, the graduate must:**

- 2.3.1. Competent in all basic and some of the advanced professional skills.
- 2.3.2. Write and appraise reports
- 2.3.3. Evaluate methods and tools used in specialty.

### **2.4. General & Transferable Skills**

**By the end of the study of Master program of any specialty, the graduate should be able to:**

- 2.4.1. Communicate effectively using all methods.
- 2.4.2. Use information technology to improve professional practice.
- 2.4.3. Practice self appraisal and determines learning needs.
- 2.4.4. Utilize different information sources to obtain data. Share in determination of standards for evaluation of others (e.g.: subordinates/ trainees etc.)
- 2.4.5. Determine standards for evaluation of others (e.g.: subordinates/ trainees etc.)
- 2.4.6. Work in and lead a team in comparable work level.
- 2.4.7. Manage time effectively.
- 2.4.8. Learn independently.

## **3- Program Academic Standards**

*Derived from the national authority of quality and accreditation of education (NAQAAE) for Master program*

*Approved by the Industrial Biotechnology Department and Institute Council*

### **3.1 Knowledge & Understanding**

**By the end of the study of Master program in industrial biotechnology, the graduate should have sufficient knowledge & understanding of:**

- 3.1.1 Basic facts, theories of the industrial biotechnology and related subjects.
- 3.1.2 Mutual effects between professional practice and environment of industrial biotechnology and effects on environment.
- 3.1.3 Main scientific advances of industrial biotechnology practice.
- 3.1.4 Ethical and legal fundamentals and their application in the field of industrial biotechnology researches.
- 3.1.5 Quality standards of professional practice in the field of industrial biotechnology.
- 3.1.6 Basics and ethics of scientific research in the field of industrial biotechnology.

### **3.2 Intellectual Skills**

**By the end of the study of Master program in industrial biotechnology, the graduate must be able to do the following:**



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معهد بحوث الهندسة الوراثية والتكنولوجيا الحيوية  
وحدة ضمان الجودة

- 3.2.1 Interpret, analyze & evaluate the information to solve problems in the field of industrial biotechnology.
- 3.2.2 Solve some problems that do not conform to classic data regarding industrial biotechnology.
- 3.2.3 Integrate different information to solve professional problems in the field of industrial biotechnology.
- 3.2.4 Conduct a scientific research and/ or write scientific systematic approach to a research problem (hypothesis) in the field of industrial biotechnology.
- 3.2.5 Evaluate professional risks of industrial biotechnology.
- 3.2.6 Plan for professional improvement in the field industrial biotechnology.
- 3.2.7 Take professional decisions in industrial biotechnology fields.

### **3.3. Professional Skills**

**By the end of the study of Master program in industrial biotechnology, the graduate must be able to:**

- 3.3.1 Competent in all basic and some of the advanced professional skills in Industrial biotechnology fields.
- 3.3.2 Write and appraise reports about industrial biotechnology.
- 3.3.3 Evaluate methods and tools used in industrial biotechnology fields.

### **3.4. General & Transferable Skills**

**By the end of the study of Master program in industrial biotechnology, the graduate must be able to:**

- 3.4.1 Communicate effectively using all methods.
- 3.4.2 Use information technology to improve professional practice.
- 3.4.3 Practice self appraisal and determines learning needs.
- 3.4.4 Utilize different information sources to obtain data. Share in determination of standards for evaluation of others (e.g.: subordinates/ trainees etc.).
- 3.4.5 Determine standards for evaluation of others (e.g.: subordinates/ trainees etc.).
- 3.4.6 Work in and lead a team in comparable work level.
- 3.4.7 Manage time effectively.
- 3.4.8 Learn independently.



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# The matrix between ARS and NAQAAE





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## The matrix between Academic Reference Standards ARS and Master Program NAQAAE

	NAQAAE	ARS
<b>Knowledge &amp; Understanding</b>	<i>By the end of the Industrial Biotechnology master program, the graduate must have knowledge and understanding of:</i>	<i>By the end of the Industrial Biotechnology master program, the graduate should be able to:</i>
	2.1.1. Basic facts, theories, of the specialty and related fields.	3.1.1 Basic facts, theories of the industrial biotechnology and related subjects.
	2.1.2. Mutual effects between professional practice and environment.	3.1.2 Mutual effects between professional practice and environment of industrial biotechnology and effects on environment.
	2.1.3. Main scientific advances in the specialty field.	3.1.3 Main scientific advances of industrial biotechnology practice.
	2.1.4. Ethical and legal fundamentals of profession.	3.1.4 Ethical and legal fundamentals and their application in the field of industrial biotechnology researches.
	2.1.5. Quality standards of the profession practice.	3.1.5 Quality standards of professional practice in the field of industrial biotechnology.
	2.1.6. Basics and ethics of scientific research.	3.1.6 Basics and ethics of scientific research in the field of industrial biotechnology.
<b>Intellectual abilities</b>	<i>By the end of the Microbial Biotechnology master program, the graduate should be able to:</i>	<i>By the end of the Microbial Biotechnology master program, the graduate should be able to:</i>
	2.2.1. Interpret, analyze & evaluate the information to solve problems.	3.2.1 Interpret, analyze & evaluate the information to solve problems in the field of industrial biotechnology.



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معهد بحوث الهندسة الوراثية والتكنولوجيا الحيوية  
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	2.2.2. Solve some problems that do not conform to classic data (incomplete data).	3.2.2 Solve some problems that do not conform to classic data regarding industrial biotechnology.
	2.2.3. Integrate different information to solve professional problems.	3.2.3 Integrate different information to solve professional problems in the field of industrial biotechnology.
	2.2.4. Conduct a scientific research &/ or write scientific systematic approach to a research problem (hypothesis).	3.2.4 Conduct a scientific research and/ or write scientific systematic approach to a research problem (hypothesis) in the field of industrial biotechnology.
	2.2.5. Evaluate professional risks.	3.2.5 Evaluate professional risks of industrial biotechnology.
	2.2.6. Plan for professional improvement.	3.2.6 Plan for professional improvement in the field industrial biotechnology.
	2.2.7. Take professional decisions.	3.2.7 Take professional decisions in industrial biotechnology fields.
<b>Practical and professional skills</b>	<i>By the end of the Microbial Biotechnology master program, the graduate should have the following abilities:</i>	<i>By the end of the Microbial Biotechnology master program, the graduate should be able to:</i>
	2.3.1. Competent in all basic and some of the advanced professional skills.	3.3.1 Competent in all basic and some of the advanced professional skills in Industrial biotechnology fields.
	2.3.2. Write and appraise reports	3.3.2 Write and appraise reports about industrial biotechnology.



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معهد بحوث الهندسة الوراثية والتكنولوجيا الحيوية  
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	2.3.3. Evaluate methods and tools used in specialty.	3.3.3 Evaluate methods and tools used in industrial biotechnology fields.
<b>General and transferable skills</b>	<i><b>By the end of the Industrial Biotechnology master program, the graduate should have the following abilities:</b></i>	<i><b>By the end of the Industrial Biotechnology master program, the graduate should be able to:</b></i>
	3.4.1 Communicate effectively using all methods.	3.4.1 Communicate effectively using all methods.
	3.4.2 Use information technology to improve professional practice.	3.4.2 Use information technology to improve professional practice.
	3.4.3 Practice self appraisal and determines learning needs.	3.4.3 Practice self appraisal and determines learning needs.
	3.4.4 Utilize different information sources to obtain data. Share in determination of standards for evaluation of others (e.g.: subordinates/ trainees etc.).	3.4.4 Utilize different information sources to obtain data. Share in determination of standards for evaluation of others (e.g.: subordinates/ trainees etc.).
	3.4.5 Determine standards for evaluation of others (e.g.: subordinates/ trainees etc.).	3.4.5 Determine standards for evaluation of others (e.g.: subordinates/ trainees etc.).
	3.4.6 Work in and lead a team in comparable work level.	3.4.6 Work in and lead a team in comparable work level.
	3.4.7 Manage time effectively.	3.4.7 Manage time effectively.
	3.4.8 Learn independently.	3.4.8 Learn independently.



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# **Industrial Biotechnology Master Program Specification (2015/2016)**



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**University:** *Sadat City University*

**Institute:** *Genetic Engineering and Biotechnology Research Institute*

## **Master Program Specification (2015/2016)**

### **A-Basic Information**

1- Program title: Master of Science *in* Industrial Biotechnology

2- Program type:           Single   √           Double           Multiple

3- Department: Industrial Biotechnology

4- Program coordinator: Dr. Hoda Mahrous

5- Program Approval Date: 20/9/2010

### **B- Professional Information**

#### **1- Program Aims**

**Preparation of Master graduate capable of:**

- a- Improving skills of the Master graduate in identifying problems and using available resources to solve them & to achieve highest benefits in the field of Industrial Biotechnology and relating interests.
- b- Preparing Master graduate having the capability of applying the basics and methodologies of scientific research using of its different tools in the field of industrial biotechnology and relating interests.
- c- Applying analytical methods & specialized knowledge and using appropriate technological means in industrial biotechnology.
- d- Demonstrating awareness of the ongoing problems in the surrounding industrial biotechnology.

#### **2- Intended Learning Outcomes (ILOs)**

##### **2.1 Knowledge & Understanding**

**By the end of this program, the graduate should have sufficient knowledge & understanding of:**

- a- Describe basic facts and theories of industrial biotechnology.



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- b- Summarize the main fundamental concepts of fermentation technology and industrial biotechnology.
- c- Classify the basic information of general and specific microbiology.
- d- Summarize actual fundamental of ethical and legal practice in the field of biological treatment of industrial effluent.
- e- Divide different pathways for bio-transforming a biological material to another.
- f- Summarize main basics & ethics of scientific researches of industrial biotechnology fields.
- g- Express the assessment tools for insuring the nutritional value of biologically modified foods and the role of food constituents in human health and diseases.
- h- Write lists of scientific terms of English language of industrial area.

### **2.2 Intellectual Skills**

**By the end of this program, the graduate must be able to:**

- a- Analyze the incoming demands for specific microbial products and find new sources for them.
- b- Compare the overall requirements for a microbial production process in lab, semi pilot and pilot scales.
- c- Appoint suitable methods for different biological treatment of industrial biotechnology.
- d- Analyze available raw materials as possible substrates for microbial production.
- e- Compare between the different aspects of bio-processing.
- f- Interpret the probable hazards and risks resulting from industrial bioproduction.
- g- Compare active compounds in dietary foods and use it for treating deficiency diseases.
- h- Derive microbial mass for bioremediation of contaminated environments.
- i- Analyze new produced compounds for their biological activity and safety.
- j- Take a professional decision for suitable methods of industrial biotransformation and plan paraphrasing English technical terms used in scientific researches.

### **2.3. Professional Skills**

**By the end of this program, the graduate must be able to:**

- a- Apply the different analytical methods for determination and analysis of industrial pollutants and its treatment.
- b- Measure and evaluate industrial hazards.
- c- Evaluate techniques and tools during the experimental part of research.
- d- Prepare technical reports and scientific essay.

### **2.4. General & Transferable Skills**

**By the end of this program, the graduate must be able to:**

- a- Communicate effectively using all methods with public, collegeous and appropriate authorities.
- b- Use information technology to improve professional practice in internet and relative information for obtaining data in a given course topics.
- c- Practice self appraisal and determines his learning needs.
- d- Work as team leader in situation comparable to his level.



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وحدة ضمان الجودة

- e- Learn independently and seek continuous learning in industrial biotechnology.
- f- Take professional decision for suitable methods of biological waste management.
- g- Manage time efficiently in teams and with other groups.

### **3- Program Academic Standards**

**Derived from the national authority of quality assurance and accreditation of education (NAQAAE) for Master Program the graduate should have sufficient knowledge & understanding of:**

*Approved by the Industrial Biotechnology Department and Institute Council.*

#### **3.1 Knowledge & Understanding**

**By the end of the study of Master program in industrial biotechnology, the graduate should have sufficient knowledge & understanding of:**

- 3.1.1 Basic facts, theories of the industrial biotechnology and related subjects.
- 3.1.2 Mutual effects between professional practice and environment of industrial biotechnology and effects on environment.
- 3.1.3 Main scientific advances of industrial biotechnology practice.
- 3.1.4 Ethical and legal fundamentals and their application in the field of industrial biotechnology researches.
- 3.1.5 Quality standards of professional practice in the field of industrial biotechnology.
- 3.1.6 Basics and ethics of scientific research in the field of industrial biotechnology.

#### **3.2 Intellectual Skills**

**By the end of the study of Master program in industrial biotechnology, the graduate must be able to do the following:**

- 3.2.1 Interpret, analyze & evaluate the information to solve problems in the field of industrial biotechnology.
- 3.2.2 Solve some problems that do not conform to classic data regarding industrial biotechnology.
- 3.2.3 Integrate different information to solve professional problems in the field of industrial biotechnology.
- 3.2.4 Conduct a scientific research and/ or write scientific systematic approach to a research problem (hypothesis) in the field of industrial biotechnology.
- 3.2.5 Evaluate professional risks of industrial biotechnology.
- 3.2.6 Plan for professional improvement in the field industrial biotechnology.
- 3.2.7 Take professional decisions in industrial biotechnology fields.



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### **3.3. Professional Skills**

**By the end of the study of Master program in industrial biotechnology, the graduate must be able to:**

- 3.3.1 Competent in all basic and some of the advanced professional skills in Industrial biotechnology fields.
- 3.3.2 Write and appraise reports about industrial biotechnology.
- 3.3.3 Evaluate methods and tools used in industrial biotechnology fields.

### **3.4. General & Transferable Skills**

**By the end of the study of Master program in industrial biotechnology, the graduate must be able to:**

- 3.4.1 Communicate effectively using all methods.
- 3.4.2 Use information technology to improve professional practice.
- 3.4.3 Practice self appraisal and determines learning needs.
- 3.4.4 Utilize different information sources to obtain data. Share in determination of standards for evaluation of others (e.g.: subordinates/ trainees etc.).
- 3.4.5 Determine standards for evaluation of others (e.g.: subordinates/ trainees etc.).
- 3.4.6 Work in and lead a team in comparable work level.
- 3.4.7 Manage time effectively.
- 3.4.8 Learn independently.

### **4- Bench Marks:**

There is external bench marks for minor specialist interest of industrial biotechnology.

Academic reference standards (ARS), Master of Science Program (March 2009), which were issued by the National Authority for Quality Assurance & Accreditation of Education NAQAAE

- 4.1. External bench marks ١ ملحق رقم ١





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## 5- Curriculum Structure and Contents

a. Program duration: 2 years min.

No. of hours/units: 44

b. Program structure:

Lectures	28	Lab./ Exercise	16	Total	44
Compulsory	32	Optional	-----	Elective	12

	No.	%
▪ Basic sciences courses	10	23

	No.	%
▪ Social sciences and humanity courses	3	7

	No.	%
▪ Specialized courses	31	70

	No.	%
▪ Other sciences courses	--	--

	No.	%
▪ Practical (Thesis)	The time spent in achievement of a thesis (8 hrs/week)	

c- Program Levels (in credit-hours system): *Not Applicable*



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## 6. Program courses

### a- Compulsory (General Courses)

Code No.	Course Title	No. of Units (hrs)	No. of hours/week			Year/Level	Semester
			Lect.	Ex.	Lab/ App		
	English language	3	3			1	1
	Research and research methodology	6	2		8	1	1
A-23	Biotechnology I	3	3			1	2
A-80	Computer	3	2		2	1	2
B5-28	Industrial Microorganisms	3	3			2	1
B5-45	Special topics	3	3			2	1
B5-46	Seminars	3	---		6	2	2
	Total	24	16		16		

### b- Elective: Specialized courses (At least 4 courses from the listed below courses)

Code No.	Course Title	No. of Units	No. of hours/week			Year/Level	Semester
			Lect.	Ex.	Lab/ App		
B5-1	Anaerobic process of waste treatment and utilization I	3	3			1	
B5-3	Analysis of natural products	3	3			1	
B5-5	Biochemical reactors I	3	3			1	
B5-7	Bioconversion of waste biomass materials to industrial products	3	3			1	
B5-16	Experimental food and fermentation technology	3	3			2	
B5-18	Fermentation technology	3	3			2	
B5-19	Food biotechnology	3	3			2	
B5-20	Food microbiology and hygiene	3	3			2	
B5-34	Operations research	3	3			2	
B5-43	Technical enzymes	3	3			2	
A-43	General bioprocessing principals	3	3			2	
C-29	Experimental microbiology I	3	2	2		2	



University of Sadat city  
Genetic Engineering and  
Biotechnology Research Institute  
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جامعة مدينة السادات  
معهد بحوث الهندسة الوراثية والتكنولوجيا الحيوية  
وحدة ضمان الجودة

### c- M.Sc. Thesis

All MSc-degree students should prepare a thesis in industrial biotechnology. The department and the ethical committees must approve the protocol of the research. The thesis should include a review part and a research part. The thesis is supervised by one or more senior staff members of the industrial biotechnology department and may include other specialties according to the nature of the research. The thesis should be evaluated and approved by a committee of three professors including one of the supervisors and an external professor.

### 7. Program Admission Requirements

✎ Bachelor degree from appropriate practical faculty from Egyptian or an equivalent university with general grade (Acceptable) or Diploma in fermentation or equivalent.

### 8. Regulations for progression and program completion

✎ Successful completion of the required courses (equivalent to at least 18 units) in addition to compulsory courses: English language, Computer, Research and research methodology, Special topics and Seminars.

- Student success in any course of study is estimated in one of the following estimates:

<b>Excellent</b>	From 90 to 100 degrees
<b>Very Good</b>	From 80 to less than 90 degrees
<b>Good</b>	From 70 to less than 80 degrees
<b>Pass</b>	From 60 to less than 70 degrees

- Approved completion of the research experiments.
- Approved scientific writing of M.Sc. thesis.
- Successfully passes of thesis open defense examination.

### 9. Assessment methods for Evaluating program Applicants

No.	Method	Intended Learning Outcomes ' ILO's '
1	Semester Works (5 <sup>th</sup> & 10 <sup>th</sup> )	Measure problems solving skills, presentation data and discussion and work on team.
2	Midterm Exam (6 <sup>th</sup> ) Week.	Measure abilities on concentration and understanding scientific points & background.
3	Oral Exam (14 <sup>th</sup> ) Week.	Measure analysis, presentation and discussion skills.
4	Written (Final) Exam (15 <sup>th</sup> ) Week.	Measure remembering & innovating skills.
5	Thesis discussion	To assess the ability to write a review article, perform the needed practical steps and to present the results in tables and graphs. In addition, the skills of analysis of results and discussion with previous findings obtained by other authors are also assessed.



University of Sadat city  
Genetic Engineering and  
Biotechnology Research Institute  
Quality Assurance Unit



جامعة مدينة السادات  
معهد بحوث الهندسة الوراثية والتكنولوجيا الحيوية  
وحدة ضمان الجودة

## 10. Program Evaluation methods

No.	Evaluator	Tool	Sample
1	Senior students	Questionnaire	20
2	Alumni	Depth Meeting	5
3	Stakeholders (Employers)	Nucleus Meeting	5
4	External (Evaluators & Examiners)	Remarking Questionnaire & Nucleus Meeting	2
5	Others	Not Applied	-----



University of Sadat city  
Genetic Engineering and  
Biotechnology Research Institute  
Quality Assurance Unit



جامعة مدينة السادات  
معهد بحوث الهندسة الوراثية والتكنولوجيا الحيوية  
وحدة ضمان الجودة

**Matrix of Knowledge and Skills of Master of Industrial Biotechnology Program Targeted**

No.	Course No.	Course title	Knowledge and Understanding									
			a	b	c	d	e	f	g	h		
1		English language										X
2	A-80	Computer										X
3		Research and research methodology (MSc)							X			
4	A-23	Biotechnology	X									
5	B5-45	Special topics							X			
6	B5-46	Seminars							X			
7	B5-28	Industrial Microorganisms	X								X	
8	B5-1	Anaerobic process of waste treatment and utilization I						X				
9	B5-3	Analysis of natural products							X			
10	B5-5	Biochemical reactors I			X							
11	B5-7	Bioconversion of waste biomass materials to industrial products	X									
12	B5-16	Experimental food and fermentation technology						X				
13	B5-18	Fermentation technology		X								
14	B5-19	Food biotechnology									X	
15	B5-20	Food microbiology and hygiene									X	
16	B5-34	Operations research							X			
17	B5-43	Technical enzymes						X				
18	A-43	General bioprocessing principals	X									
19	C-29	Experimental microbiology I			X							
MSc Thesis			X	X	X	X	X	X	X	X	X	X



University of Sadat city  
Genetic Engineering and  
Biotechnology Research Institute  
Quality Assurance Unit



جامعة مدينة السادات  
معهد بحوث الهندسة الوراثية والتكنولوجيا الحيوية  
وحدة ضمان الجودة

No.	Course No.	Course title	Intellectual abilities																	
			a	b	c	d	e	f	g	h	i	j								
1		English language																		X
2	A-80	Computer				X														X
3		Research and research methodology (MSc)			X															
4	A-23	Biotechnology I																		X
5	B5-45	Special topics																		X
6	B5-46	Seminars																		X
7	B5-28	Industrial Microorganisms		X									X	X						
8	B5-1	Anaerobic process of waste treatment and utilization I								X										
9	B5-3	Analysis of natural products				X														
10	B5-5	Biochemical reactors I							X											
11	B5-7	Bioconversion of waste biomass materials to industrial products	X										X							
12	B5-16	Experimental food and fermentation technology						X		X										
13	B5-18	Fermentation technology		X																
14	B5-19	Food biotechnology								X										X
15	B5-20	Food microbiology and hygiene		X					X											
16	B5-34	Operations research			X								X							
17	B5-43	Technical enzymes	X					X												
18	A-43	General bioprocessing principals											X							
19	C-29	Experimental microbiology I		X	X															
MSc Thesis			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X



University of Sadat city  
Genetic Engineering and  
Biotechnology Research Institute  
Quality Assurance Unit



جامعة مدينة السادات  
معهد بحوث الهندسة الوراثية والتكنولوجيا الحيوية  
وحدة ضمان الجودة

No.	Course No.	Course title	Professional and practical skills			
			a	b	c	d
1		English language	-			
2	A-80	Computer			X	
3		Research and research methodology (MSc)				X
4	A-23	Biotechnology			X	X
5	B5-45	Special topics				X
6	B5-46	Seminars		X		
7	B5-28	Industrial Microorganisms			X	
8	B5-1	Anaerobic process of waste treatment and utilization I			X	
9	B5-3	Analysis of natural products	X			
10	B5-5	Biochemical reactors I			X	
11	B5-7	Bioconversion of waste biomass materials to industrial products		X		
12	B5-16	Experimental food and fermentation technology	X			
13	B5-18	Fermentation technology			X	
14	B5-19	Food biotechnology			X	
15	B5-20	Food microbiology and hygiene			X	
16	B5-34	Operations research	X			
17	B5-43	Technical enzymes			X	
18	A-43	General bioprocessing principals		X		
19	C-29	Experimental microbiology I			X	
<b>MSc Thesis</b>			X	X	X	X



University of Sadat city  
Genetic Engineering and  
Biotechnology Research Institute  
Quality Assurance Unit



جامعة مدينة السادات  
معهد بحوث الهندسة الوراثية والتكنولوجيا الحيوية  
وحدة ضمان الجودة

No.	Course No.	Course title	General and transferable skills						
			a	b	c	d	e	f	g
1		English language			X				
2	A-80	Computer		X					
3		Research and research methodology (MSc)		X					
4	A-23	Biotechnology					X		
5	B5-45	Special topics		X			X		
6	B5-46	Seminars		X	X				
7	B5-28	Industrial Microorganisms	X						
8	B5-1	Anaerobic process of waste treatment and utilization I						X	
9	B5-3	Analysis of natural products			X				
10	B5-5	Biochemical reactors I					X		
11	B5-7	Bioconversion of waste biomass materials to industrial products						X	
12	B5-16	Experimental food and fermentation technology					X		
13	B5-18	Fermentation technology				X		X	
14	B5-19	Food biotechnology	X				X		
15	B5-20	Food microbiology and hygiene		X					X
16	B5-34	Operations research		X					
17	B5-43	Technical enzymes			X		X		
18	A-43	General bioprocessing principals	X			X			
19	C-29	Experimental microbiology I		X				X	
MSc Thesis			X	X	X	X	X	X	X

Program coordinator: Dr/ Hoda Mahrous

Head of department: Prof. Dr/ Ashraf F. El-Baz