University of Greenwich

School of Science

In partnership with

October University for Modern Sciences and Arts

Faculty of Biotechnology

Course Specifications

BSc (Hons) Biotechnological Sciences

Programme Submission Document

2015

COURSE DESCRIPTION:

Course Code: CSB101b **School:** Biotechnology (MSA)
Course Title: Introduction to Information Technology
Head of Department: Prof. Ali Elbastawy **Pre-requisites:** None
Course Co-ordinator: Dr. Soha Safwat
Level: 1 (1st semester) **Credit:** 3 **Subject Group:** Computer Science

AIMS:
The aims of the course are:

- To ensure that the student is computer literate. It provides the basic principles of the computer, information technology and systems and provides intensive exposure to computer-related terminology and jargon.
- To introduce the student to the Internet, the World Wide Web, and their basic applications such as browsing, e-mail, chats, etc.
- The course will emphasize the use of the Internet for scientific and business applications such as search and e-business.
- To introduce the student to the basic hardware components and how they operate, emphasis will be on how to choose the appropriate computer configuration and the correct peripherals for the job.
- To introduce computer and data networking and communication principles.
- To introduce basic software concepts.
- To familiarize the students with system software such as operating systems and programming languages.
- To introduce the students to the types of application software such as personal productivity tools, scientific visualization and graphics applications, and different business applications.

The Laboratory part of the course aims to:

- Improve keyboarding skills.
- Train the student on the practical use of the Internet. Attention will be given to search techniques, such as using search engines, meta-search engines, subject directories, and searchable database and their applications in the *bio*-: medical, pharmaceutical, agricultural, industrial and envirnomental fields.
- Train the student on popular computer application packages, namely, Microsoft Office: including word processor, spreadsheet, presentation, graphics.

LEARNING OUTCOMES:
Upon the completion of the course, the student will be able to:

Knowledge:

- Describe the basics of using computers.
- Describe the essential hardware components of the computer, the available peripheral devices and how they work.
- Demonstrate the functions of PC operating systems.
- Define the basics of computer communications and networks and describe their applications.
- Show how to use the Internet, how to use browsers and search engines.
- Differentiate between search engines, meta-search engines, subject directories, and searchable database.
- Explore and use the Internet learning resources.

Skills:

- Use the basic computer productivity tools and applications (word processing, spreadsheets, presentations, and graphics).
- Use a networked computer to communicate with others and connect to the Internet.
- Effectively use the Internet resources for study, work and recreation.
- Select, and setup a home or work computer.

INDICATIVE CONTENT :(SYLLABUS)

1. World of computers - A brief overview of the information society, networking, computer essentials, micros to supercomputers, capabilities and uses, a computer system at work, how to use computers.
2. Introduction to the Internet: definitions, applications, website classification, and searching the Internet
3. Inside the computer - details about data storage, encoding systems, analyzing a computer system, describing the processor (distinguishing characteristics), inside the PC(system board-buses-cards).
4. Software – common software concepts, purpose and objectives of an operating system, understanding relationship between computers and programming languages, distinguishing between several types of programming languages and visual programming, and differentiating between different platforms.
5. Computer Networks, a brief overview of data communications hardware, data highways, network topologies, local area networks.
6. Practical training on Windows operating systems, productivity tools and the Internet.

Main Learning and Teaching Activities :(Strategies)

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	Class Presentation
⇧			⇧	

Assessment Strategy:

- All quiz and exam questions assess the knowledge outcomes described above and the ability of the student to demonstrate and apply this knowledge to practical situations.
- Lab assignments: The students are expected to use computers for a variety of tasks. All lab work focuses on assessing the practical skills described earlier. All lab work will be assessed on the student expertise using and troubleshooting the computer and ready-made applications.
- Lab Project: The students are also expected to do a group project. The project focuses on using the Internet to collect information on a subject related to the student field of study and prepare a power point presentation on that subject. The project will be assessed on the student ability to effectively use the internet, and preparing good documentation and presentation.

Assessment of the student's knowledge about:

1- Computer principles and major components.
2- Operating systems.
3- Computer applications: general, scientific, business……etc.
4- Electronic mail and "Internet".

Assessment of the student's ability to:

1- Use major operating systems, particularly Windows.
2- Use computer applications: general, scientific, business.
3- Use the Internet as a source of medical information.
4- Efficiently send and receive emails.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Class participation		10%			
Assignments & Quizzes		10%			Before & After midterm
Lab work & Projects		20%			
Unseen Midterm Examination		20%			1.5 Hour
Unseen Final Examination		40%			2 Hours

- **Software Requirements**
  Microsoft office 2000, Keyboard master

- **Useful Websites**
  http://wps.prenhall.com/bp_capron_computers_8
  http://www.prenhall.com/~longlong
  http://www.microsoft.com
  http://www.howstuffworks.com/

Indicative Texts:

ISBN Number	Author	Title	Publisher
0131405640	H. L. Capron, J. A. Johnson	Computers: Tools for an Information Age, latest edition	Prentice Hall
0131432249	Larry Long & Nancy Long	Computers, latest edition	Prentice Hall
0763722650	Mark Meyer	Explorations in Computer Science: A Guide to Discovery, latest edition	Jones & Bartlett Pub
0619200782	Thomas J. Cashman & Gary B. Shelly	Essential Introduction to Computers, latest edition	Course Technology
0763717606	Nell Dale & John Lewis	Computer Science Illuminated, latest edition	Jones & Bartlett Pub
0471073806	Efraim Turban, R. Kelly Rainer, Jr., Richard E. Potter	Introduction to Information Technology, latest edition	John Wiley & Sons

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hour
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester: 28
Total Other Contact Hours per Semester: 28
Total Study Hours per Semester: 56

COURSE DESCRIPTION:

Course Code: CSB102b
School: Biotechnology (MSA)
Course Title: Computer Programming I
Head of Department: Prof. Ali Elbastawi
Pre-requisites: CSB101b
Course Co-ordinator: Dr. Soha Safwat
Level: 1 (2nd semester)
Credit: 3
Subject Group: Computer Science

AIMS:
The aims of the course are to:

- Introduce the basics of programming with emphasize on object oriented techniques using C++.
- Familiarize the students with the syntax and the semantics of the C++ programming language.
- Shed light on the input/output instructions, data types, arithmetic operations, control structures, arrays, and functions.

LEARNING OUTCOMES:
Upon the completion of the course, the student will be able to:

Knowledge:
- Explain how to use computers for problem solving.
- Explain the key programming concepts.
- Demonstrate the basic structures and components of high level programming language; C++.
- Demonstrate good programming techniques for readability and trace ability.
- Read and program source code.

Skills:
- Professionally use the VC++ programming language to convert the logic and design into a computer program.
- Choose the appropriate programming technique for a problem and apply it to write a well-structured program.
- Use automated and manual debugging tools to fix a given program.

INDICATIVE CONTENT :(SYLLABUS)
1. Basic program construction (identifiers, statements, functions, comments, and preprocessors).
2. C++ simple data types.
3. Constants and variables declaration.
4. Input and output statements (cin and cout).
5. Output manipulators.
6. Assignment statement mathematical expressions.
7. Automatic type conversions and casting.
8. Decision statements (if and switch).
9. Logical expressions.
10. Repetition statements (for, while, and do).

11. One and multidimensional arrays.
12. String manipulations.
13. Built-in functions and user-defined functions.
14. Passing value and reference arguments.
15. Local and global identifiers.

Main Learning and Teaching Activities :(Strategies)

- ***Weekly lectures*** to introduce the basic concepts of the course subjects.
- ***Weekly tutorials*** to discuss the course materials.
- ***Weekly computer laboratory*** to apply the concepts learned to develop workable programming solutions for different types of problems from a variety of fields, e.g. mathematical, text manipulation and business problems. The student will be assigned a weekly programming homework to develop on his own or in class. All programs have to be turned in tested and working.
- ***Team Projects*** the student will work as a member of project team to apply the concepts learned in the course to develop a program solving a real world problem, selected from a variety of fields. The project is expected to be a sizable programming task (200 to 300 line requiring 30 to 50 programming hours).

Learning Materials

- **Software Requirements**
  Borland C++, VC++

- **Useful Websites**
  http://www.cplusplus.com/doc/tutorial/

- **Reference Text:**
  Object-Oriented programming in C++, 4th ed. Robert Lafore, Waite Group Press, 2001

- **Supplementary Readings:**
  - C++ Programming: An Object-Oriented Approach, by Course Technology, latest edition
  - The C++ Programming Language 3rd ed. by Bjarne, Stroustrup, Addison-Wesley, latest edition
  - C++ and Object-oriented Numeric Computing for Scientists and Engineers, by Daoqi Yang, Springer Verlag, latest edition
  - Microsoft Visual C++ .Net: Step by Step: by Julian Templeman, Andy Olsen, John Sharp, Microsoft Press, latest edition

Assessment Scheme:

- ***Unseen examinations:*** 3 hours in final and 1.5 hours in Midterm.
- ***Quizzes:*** at least 2 quizzes before Midterm exam and 2 quizzes before Final exam (1.5 hours for each).
  This is a programming course, therefore, all quiz and exam questions assess the ability of the student to choose the appropriate programming technique for a problem and demonstrate and apply his programming knowledge in problem solving.
- ***Lab work and team projects:*** The students are expected to use the C++ programming language to solve different types of problems from a variety of fields, the lab focuses on assessing the practical skills described earlier. All lab work and projects will be assessed according to the students' programming ability and efficiency; speed of development, proper use of language constructs, proper structure of the program, clarity and annotation of the programs and the quality of the overall solution developed; ease of use and speed of execution. All lab assignments and projects should correctly run, be documented and presented.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
- Class attendance and participation:		5%			
- Quizzes:		15%			
- Assignments:		10%			
- Lab projects:		15%			
- Mid-Term:		20%			1.5 Hour
- Final Exam:		40%			3 Hours

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hour
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester: 28
Total Other Contact Hours per Semester: 28
Total Study Hours per Semester: 56

COURSE DESCRIPTION:

Course Code: ENG101b **School:** Biotechnology (MSA)
Course Title: English for academic purposes
Head of Department: Prof. Dr. Soha Raafact **Prerequisite:** None
Course Co-ordinator: Prof. Dr. Soha Raafat
Level: 1 (1st Semester) **Credit:** 3 **Subject Group:** English

AIMS:
The aims of the course are:

- To help students in effectively writing academic essays and avoiding common errors.
- To teach students how to read comprehension passages, to learn style and organization patterns to do summary writing and understand vocabulary in context.
- To introduce specialized vocabulary items pertaining to Pharmaceutical Sciences.

LEARNING OUTCOMES:
Upon completion of the course the students will be able to:

Knowledge:
- Demonstrate in their writing, a clear knowledge of the subject, awareness of the reader, appropriate organization, and correct use of punctuation, style and coherence.
- Analyze and criticize the style and organization of different texts.
- Show an understanding of specialized vocabulary in context.

Skills:
At the end of this course students will be able to:

- Write effective five-paragraph essays.
- Apply multi-draft writing which involves revision and editing of their essays.
- Correct their earlier drafts using the feedback and the correction codes provided by the instructor.
- Master writing effective summaries focusing on main ideas.
- Master specialized vocabulary pertaining to pharmaceutical sciences.

INDICATIVE CONTENT: (SYLLABUS)

1. **Writing: the Essay**
   - Introduction of writing correction code
   - From Grammar to Writing: The Sentence
   - Stems and Affixes (Medical Terminology)

2. **Reading: "Unit I"**
   - Writing: Describing a Person
   - From Grammar to Writing: Subject/Verb agreement
   - Stems and Affixes (Medical Terminology)

3. **Reading: "Unit II"**
   - Writing: Describing a Place
   - From Grammar to Writing: Editing exercises
   - Specialized Vocabulary (Medical Terminology)

4. **Reading: "Unit III"**
   - Writing: Describing an Event
   - From Grammar to Writing: Parallelism
   - Specialized Vocabulary (Medical Terminology)

5. **Reading: "Unit IV"**
   - Writing: Describing a Process
   - From Grammar to Writing: Editing exercises
   - Specialized Vocabulary (Medical Terminology)

6. **Reading: "Unit V"**
   - Writing: Distinguishing facts from opinions
   - Specialized Vocabulary (Medical Terminology)

7. **Writing: Directed Free Writing/Editing**
   - From: Grammar to Writing: Parallelism of Gerunds and Infinitives
   - Specialized Vocabulary (Medical Terminology)

8. **Reading "Unit VI"**
   - Writing: Narrative Writing
   - From Grammar to Writing: Sentences and Fragments
   - Specialized Vocabulary (Medical Terminology)

9. **Reading: "Unit VII"**
   - Writing: Narrative Writing
   - From Grammar to Writing: Editing exercises
   - Specialized Vocabulary (Medical Terminology)

10. **Reading: "Unit VIII"**
    - Writing: Expository Writing (Comparison and Contrast)
    - From Grammar to Writing: Punctuation of Adjective Clauses
    - Specialized Vocabulary (Medical Terminology)

11. Reading: "Unit VIX"

- Writing: Expository Writing (Definition and Partition)
- From Grammar to Writing: Editing exercises
- Specialized Vocabulary (Medical Terminology)

12. Reading: "Unit X"

- Writing: Expository Writing (Classification)
- From Grammar to Writing: Avoiding run-on sentences and comma splices
- Specialized Vocabulary (Medical Terminology)

13. Reading: "Unit XI"

- Writing: Practice – Summary Writing
- From Grammar to Writing: Editing exercises

Main Learning and Teaching Activities: (Strategies)

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	Class Presentation
⇧			⇧	

Assessment Strategy:

Assessment of the students knowledge about:

1. Grammatical strategies and editing.
2. Expository and narrative discourse.
3. Standards of scientific literature analysis and evaluation.
4. Specialized Pharmaceutical vocabulary items.

Assessment of the students ability to:

1. Use description, narration and exposition for expressive, referential or persuasive ends.
2. Pair editing and grammatical strategies.
3. Evaluate different kinds of writing.

Assessments Details:

Method of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Class participation		5%			
Assignments		5%			
Quizzes		10%			
Portfolio		20%			
Mid-Term Examination		20%			
Final Examination		40%			

Key Texts:

ISBN Number	Author	Title	Publisher
0471421812	Anderson, J. Poole, M.	Assignment & Thesis Writing, latest edition	Wiley
0321112040	Ann M.Persone, Steven B.Katz	Writing for Science, latest edition	Longman
02013405042	Alice Oshima, Ann Hogue	Writing Academic English, latest edition	Addison Wesley
0472087134	Swales, John Feak, Christine B. Swales, John M.	English in Today's Research World: A Writing Guide, latest edition	Michigan Press
0521328691	Swales, John	Genre Analysis: English in Academic & Research Settings, latest edition	Cambridge University Press
0521317606	Greenall,S.	Effective Skills Reading for Advanced Students, latest edition	Cambridge University Press
0072395990	Benson, B.	Improving the Grammar of Written English: The Editing Process, latest edition	Wadsworth Publishing Co.

Useful websites:

www.eslcafe.com
www.geocities.com/soho/atrium
www.204.pair.com/ebaack
www.io.com
www.better.english.com
www.eviews.net/references.html
www.ohiou.edu/esl/english/index.html

Learning Unit Contact Hours:

Per Week:

Lectures:	**3**	Hours
Others:	**-**	Hours

Total Class Contact Hours per Semester:	**42**
Total Other Contact Hours per Semester	**-**
Total Study Hours per Semester	**42**

COURSE DESCRIPTION:

Course Code: ENG102b
School: Biotechnology (MSA)
Course Title: English Language for studying skills
Head of Department: Prof. Dr. Soha Raafat
Prerequisite: ENG 101
Course Co-ordinator: Prof. Dr. Soha Raafat
Level: 1 (2nd Semester)
Credit: 3
Subject Group: English

AIMS:
The aims of the course are:

- To improve formal reports and business proposals writing, note taking and oral presentation skills.
- To help students to acquire study skills that would facilitate any research process.
- To teach students types of business writing, such as reports, business letters, memos, and curriculum vitae. There is also a focus on reading and listening skills and learning vocabulary in context.

LEARNING OUTCOMES:
Upon completion of the course, the students will be able to:

Knowledge:
- Analyze the texts they need to incorporate in their reports.
- Identify graphical and visual information.

Skills:
- Paraphrase, summarize and analyse the texts they need to incorporate in their reports.
- Write clear and effective curriculum vitae, business letters and memos.
- Design and administer questionnaires.
- Analyze the quantitative and qualitative data obtained from the questionnaires.
- Integrate graphical, visual and statistical information into their reports.
- Produce a report with an outline and a simplified "Reference" page.
- Present their reports using slides or computer software.

INDICATIVE CONTENT: (SYLLABUS)

1. **Introduction to Report Writing**
– Reading: Unit 1 – Chapter 1
2. **Using Grammatical Information in Paraphrasing**
– Reading: Unit 1 – Chapter 2
3. **Paraphrasing**
– Reading: Unit 1 – Chapter 2
4. **Organization Analysis**
– Reading: Unit 2 – Chapter 3
5. **Organization Analysis + Outline**
– Reading: Unit 2 – Chapter 3

6. **Questionnaire**
– Reading: Unit 2 – Chapter 4
7. **Memo Writing**
– Reading: Unit 2 – Chapter 4
8. **Writing a Curriculum Vitae**
– Reading: Unit 3 – Chapter 5
9. **News Releases**
– Reading: Unit 3 – Chapter 5
10. **Writing Business Letters**
– Reading: Unit 3 – Chapter 6
11. **Writing Business Reports**
– Reading: Unit 3 – Chapter 6
12. **Writing Technical Reports and Giving Presentations**
– Reading: Unit 3 – Chapter 6

Main Learning and Teaching Activities :(Strategies)

Weekly Lectures	**Tutorials**	Rounds	Laboratory Work	**Class Presentation**
⇧	⇧			⇧

Assessment Strategy:

Assessment of the student knowledge about:
1. Business proposals, note taking and oral presentations.

Assessment of the student ability to:
1. Communicate effectively in debate in a professional manner.
2. Write formal reports with all relevant information in clear and concise manner.
3. Take notes and do oral presentations.
4. Do complex rhetoric tasks.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Class participation		5%			
Assignments		5%			
Quizzes		10%			
Report		20%			
Mid-Term Examination		20%			
Final Examination		40%			

Key Texts:

ISBN Number	Author	Title	Publisher
0471421812	Anderson, J. Poole, M.	Assignment & Thesis Writing ,latest edition	Wiley
0321112040	Silyn-Roberts, H.	Writing for Science, latest edition	Longman
02013405042	Oshima, Alice Hogue, Ann	Writing Academic English, latest edition	Addison Wesley
0472087134	Swales, John Feak, Christine B. Swales, John M.	English in Today's Research World: A Writing Guide, latest edition	Michigan Press
0521328691	Swales, John	Genre Analysis: English In Academic & Research Settings, latest edition	Cambridge University Press
0521578205	Espeseth, Miriam	Academic Encounters, Listening, Note Taking & Discussion. (UK), latest edition	Cambridge University Press
0521221102	Wallace, Michael J.	Study Skills in English. (UK), latest edition	Cambridge University Press
0582852226	Howe, I.	The Language of Presentations, latest edition	Longman
0195146123	Houp	Reporting Technical Information, latest edition	Oxford University

Useful websites:

www.devry-phx.edu/Irnresrc/dowsc.com
www.owl.english.purdue.edu/
www.io.com
www.better.english.com

Learning Unit Contact Hours:

Per Week:

Lectures:	**3**	Hours
Others:	**-**	Hours

Total Class Contact Hours per Semester: 42

Total Other Contact Hours per Semester -

Total Study Hours per Semester 42

COURSE DESCRIPTION:

Course Code: ENG201b **School:** Biotechnology (MSA)
Course Title: English for Research Purposes
Head of Department: Prof. Dr. Soha Raafat **Prerequisite:** ENG102b
Course Co-ordinator: Prof. Dr. Soha Raafat
Level: 2 (1st semester) **Credit:** 3 **Subject Group:** English

AIMS:
The aims of the course are:

- To prepare students for writing research papers and project reports and books.
- To emphasize research skills necessary for writing research papers.
- To provide a survey of different articles on specialized topics.
- To train students on rhetorical awareness beyond traditional composition, intensive writing practice with a thorough guidance on using references and citing sources.

LEARNING OUTCOMES:
Upon completion of the course, the students will be able to:

Knowledge:

- Analyze different texts to identify thesis statements and developmental functions of those texts.
- Identify fallacies in the texts they analyze.
- Identify different library classification systems and card catalogs.

Skills:

- Write outlines and summaries.
- Develop logical arguments.
- Identify key elements of problems and choose appropriate methods for their resolution in a considered manner.
- Write a research paper using correct in-text citations according to the APA style.
- Prepare in their research paper a complete “Reference” page, prepared according to the APA style.
- Present their papers using slides or computer software.

INDICATIVE CONTENT: (SYLLABUS)

1. Reading: Unit 1
- Library Skills and Classification Systems
- Introduction and instructions explaining objectives, assignments and grading system

2. Reading: Unit 2
- Thesis Statement

3. Reading: Unit 3
- Outlining (Submit research paper outline)

4. Reading: Unit 4
- Summary Writing

5. Application of Summary Writing (Source I)
- Organization Analysis
- APA in-text citations

6. Application of Summary Writing (Source II)
- Organization Analysis
- Reading: Unit 5

7. Reading: Unit 6
- Fallacies

8. Reading: Unit 7
- Fallacies (Cont.)

9. Application of Summary Writing (Source III)
- APA Style Sheet

10. Application of Summary Writing (Source IV)
- Reading: Unit 8
- APA Style Sheet (Cont.)

11. Application of Summary Writing (Source V)
- Submitting Research Paper and Giving Oral Presentations

Main Learning and Teaching Activities :(Strategies)

Weekly Lectures	**Tutorials**	Rounds	Laboratory Work	**Class Presentation**
⇧	⇧			⇧

Assessment Strategy:

Assessment of the students knowledge about:

1. Writing research papers and project reports

Assessment of the students ability to:

1. Survey different articles on specialized topics.
2. Use proper reference citations.
3. Analyze new abstract data and situations using a wide range of techniques
4. Synthesize information, expand or redefine existing knowledge.
5. Organize research papers, project reports and books.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Class participation		10%			
Research Paper		30%			
Mid-Term Examination		20%			
Final Examination		40%			

Key Texts:

ISBN Number	Author	Title	Publisher
0471421812	Anderson, J. Poole, M.	Assignment & Thesis Writing (4th edition), latest edition	Wiley
0321112040	Silyn-Roberts, H.	Writing for Science, latest edition	Longman
02013405042	Oshima, Alice, Hogue, Ann	Writing Academic English, latest edition	Addison Wesley
0521328691	John Swales	Genre Analysis: English In Academic & Research Settings, latest edition	Cambridge University Press
521317606	Greenall, S.	Effective Skills Reading for Advanced Students, latest edition	Cambridge University Press

Useful websites:

http://www.devry-phx.edu/irnresrc/dowsc/
http://www.owl.english.purdue.edu/

Learning Unit Contact Hours:

Per Week:

Lectures:	3	Hours
Others:		Hours

Total Class Contact Hours per Semester:	42
Total Other Contact Hours per Semester	
Total Study Hours per Semester	42

COURSE DESCRIPTION:

Course Code: MTH101b **School:** Biotechnology (MSA)
Course Title: Elementary Calculus
Head of Department: Dr. Ali Diab **Prerequisite:** None
Course Co-ordinator: : Dr. Mohamed Khalil
Level: 1 (1st semester) **Credit:** 2 **Subject Group:** Mathematics

AIMS:
The aims of the course are:

- To give students a basic knowledge of exponentials, logarithms functions Straight line, circle equation, and analysis of Graphical information.
- To describe the basic techniques of differentiation and its applications.
- To provide students with basic knowledge about definitive and indefinitive integrals, and technique of integration.
- To introduce students to some basic techniques for solving the differential equation.
- To enable students to use the statistic techniques.

LEARNING OUTCOMES:
Upon completion of the course, students will be able to:

Knowledge:

- Define the essential basic concepts and principles of mathematics.
- Acquire knowledge and understanding of the fundamentals of calculus, algebra, logarithmic, exponentials problems and techniques.
- Become familiar with various modern mathematical techniques used in biotechnology-related problems.
- Appreciate the modern mathematical techniques for solving differential equations, and statistics.

Skills:

- Recognize various mathematical terminologies.
- Solve pharmaceutical problems by using suitable mathematical techniques.
- Develop their skills through tackling and solving biotechnology-related problems.

INDICATIVE CONTENT: (SYLLABUS)

1. Mathematical concepts and their applications (order of pairs, circle, straight lines, parabolic graphs, trigonometric functions and exponentials & logarithms.
2. Differentiation.
3. Solving differential Equations.
4. Integration.
5. Application of integration.
6. Statistics.

Main Learning and Teaching Activities :(Strategies)

Weekly Lectures	**Tutorials**	Rounds	Laboratory Work	Class Presentation
⇧	⇧			

Assessment Strategy:

Assessment of the student's knowledge about:

1- Analytical methods used in tackling biotechnology-related problems.
2- Concepts of mathematics: algebra, logarithms and calculus.

Assessment of the student's ability to:

1- Solve algebraic, logarithmic, differential and integral equations.
2- Apply mathematical analysis to biotechnology-related problems.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Quizzes		15%			Before & after Midterm
Assignments:		25%			
Mid-Term:		20%			1.5 Hour
Final Exam:		40%			3 Hours

Useful Websites:

- http://www. Math.ucdavis.edu
- http://www.math.nmc.edu
- http://www.math.montana.edu
- http://www.ugrad.math.ubc.ca

Indicative Texts:

ISBN Number	Author	Title	Publisher
0789457350	John Kennedy, Sean McArdle	Math Made Easy, latest edition	DK Publishing Inc
0966621115	Richard W. Fisher	Mastering Essential Math Skills, latest edition	Math Essentials

Learning Unit Contact Hours:

Per Week:

Lectures and Tutorials:	**2**	**Hours**
Tutorial	1	**Hour**
Lab Work:	**-**	**Hours**

Total Class Contact Hours Per Semester: 28
Total Other Contact Hours Per Semester: 14
Total Study Hours Per Semester: 42

COURSE DESCRIPTION:

Course Code: MTH201b **School:** Biotechnology (MSA)
Course Title: Biostatistics
Head of Department: Dr Ali Diab **Pre-requisites:** MTH101b
Course Coordinator: Dr Mohamed Khalil
Level: 2 (1st semester) **Credit:** 2 **Subject Group:** Mathematics

AIMS:
The aims of the course are:

- To introduce to students the types of statistics, population versus sample, mean, median, mode, variance, standard deviational, and coefficient of variation.
- To give students a basic knowledge of some standard probability distributions; random variable, frequency distribution, sampling distribution and estimation of population parameters.
- To enable students to implement statistical hypotheses and put them to the test; tests of significance, and also perform analysis of variance as well as regression and correlation to biological studies.

LEARNING OUTCOMES:
Upon completion of the course, students will be able to acquire the following:

Knowledge:

- Acquire knowledge and understanding of the fundamentals of Statistics; as in systematic collection, organization and mathematical analysis of experimental data.
- Become familiar with various modern statistics techniques and their applications in Biotechnology.
- Appreciate the modern statistics techniques for surveying, collecting and organizing representative biological data.

Skills:

- Interpret biological data used in various applications such as frequency or sampling distributions.
- Utilizing formulas in solving biotechnology-related problems.
- Testing an idea/hypothesis.
- Develop Sampling skills for surveys/marketing.

INDICATIVE CONTENT: (SYLLABUS)

1. Types of Statistics.
2. Population versus sample.
3. Relationship between the Mean, Median, and Mode.
4. The analysis of variance and the standard deviation for ungrouped and grouped data.
5. The sample space, events, and counting sample points.
6. The concept of probability. Adding and multiplying probabilities. The conditional probability and independent events.
7. Random variables. Discrete and continuous probability distributions.
8. The normal and standard normal distributions and their applications in the field of biotechnology.
9. Sampling distributions. Sampling from a normally and non-normally distributed population.
10. Estimation of a population mean for a large and small samples.

Main Learning and Teaching Activities :(Strategies)

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	Class Presentation
⇧			⇧	

Assessment Strategy:

Assessment of the student's knowledge about:

1- Different types of data distribution and probabilities and their examples.
2- Analytical methods used in tackling biotechnology-related problems.
3- The basics of inferential statistics.
4- Comparison of groups with outcome in continuous data.
5- Correlation of continuous data and linear regression; ordinal and nominal data.

Assessment of the student's ability to:

1- Apply statistical analysis skills for a specific clinical or basic research project or the appropriate selection of statistical analysis in a technical paper.
2- How to evaluate significance with different statistical techniques.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Quizzes:		20%			Before & after Midterm
Assignments:		10%			
Lab Work:		10%			
Mid-Term:		20%			1.5 Hour
Final Exam:		40%			3 Hours

Useful Websites:

- biostat.ucdavis.edu/**links**.html
- www.graphpad.com/recommendations/morestat.htm
- www.mva.org/composite-316.htm
- www.biostat.harvard.edu/**links**/

Indicative Texts:

ISBN Number	Author	Title	Publisher
9771750836	Hafez A. Radi	**An Introduction to Biostatistical Analysis,** latest edition	MSA
1850707499	Christos P. Carvounis	**Handbook of Biostatistics: A Review and Text,** latest edition	DK Publishing Inc
0471318035	Wayne W. Daniel	**Biostatistics: A Foundation For Analysis In The Health Sciences,** latest edition	John Wiley & Sons
0387239189	David Kleinbaum, Mitchel Klein	**Survival Analysis: A Self-Learning Text (Statistics for Biology and Health),** latest edition	Springer

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	**Hours**
Tutorial:	1	
Lab Work:	-	**Hours**

Total Class Contact Hours Per Semester: 28
Total Other Contact Hours Per Semester: 14
Total Study Hours Per Semester: 42

COURSE DESCRIPTION:

Course Code: BT202b **School:** Biotechnology (MSA)
Course Title: Molecular Biology
Head of Department: Dr. Ahmed M K Nada **Prerequisite:** GEN201b, MB102b
Course Co-ordinator: Dr. Osama S S Hassan
Level: 2(2nd semester) **Credit:** 4 **Subject Group:** Biotechnology

AIMS:
The aims of the course are to:

- Provide a focus on prokaryotic and eukaryotic gene structure, expression, regulation, and analysis.
- Introduce the concepts of restriction enzymes functions and applications.
- Introduce the concepts of PCR methods and applications.
- Introduce the concepts of restriction enzymes functions and applications.
- Introduce the concepts of molecular markers and their applications.
- Emphasize on current understanding of gene expression and methods used to study gene expression
- Distinguish between different methods used in gene isolation.
- Prepare students for higher techniques in molecular biology.

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:
- Begin to recognize structure, function, types and properties of both DNA and RNA.
- Understand the genetic code and enzymatic reaction.
- Identify the action of restriction enzymes.
- Explore the polymerase chain reaction and real time PCR.
- Understand the concept of Molecular marker and control of Gene Expression in Bacteria and Eukaryotes.
- Understand the gene isolation strategies.

Skills:
- Define subnuclear organization and gene expression.
- Begin to develop an overview of transcription; transcription factors, cis-acting elements, regulation, and methods of analysis.
- Understand translation initiation and regulation of translation.
- Identify and isolate genes

INDICATIVE CONTENT :(SYLLABUS)

- Concepts of Molecular Biology.
- Molecular of life.
- Genetic code and enzymatic reaction.
- Restriction enzymes.
- Polymerase chain reaction.
- Real time PCR (quantitative PCR)
- Molecular markers.
- Cloning and gene isolation.
- Control of gene expression Bacteria.
- Control of gene expression in Eukaryotes.

Main Learning and Teaching Activities :(Strategies)

This course will be taught through lectures and practical sessions**.** Principles and theory behind each practical session will be explained in lectures. Students will be asked to present written research assignments using the library and internet resources.

Weekly Lectures ⇧	Tutorials	Rounds	**Laboratory Work** ⇧	Class Presentation

Assessment strategy:

Assessment of the student's knowledge about:

1. DNA and RNA structure and function.
2. Recombinant DNA methods and molecular tools used in gene isolation and the analysis of gene expression.
3. Restriction enzymes.
4. Molecular methods for gene identification and isolation.
5. Polymers chain reaction and real PCR.
6. Gene expression.

Assessment of the student's ability to:

1. Perform restriction enzyme reaction.
2. Use molecular tools in the analysis of gene expression.
3. Identify methods used in gene identification and isolation
4. Design recombinant DNA vector
5. Explore the molecular biology techniques.
6. Use molecular technique in RNA, DNA, and protein isolation.
7. Perform DNA transformation.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Outline Details
Quizzes		5%		Before & After midterm
Assignments		10%		
Lab Work:		25%		
Mid-Term:		20%		1.5 Hour
Final Exam:		40%		3 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0815332181	Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter	**Molecular Biology of the Cell,** latest edition	Garland Publishing; 4th edition
0072345179	Robert F. Weaver	**Molecular Biology,** latest edition	McGraw-Hill; 2nd edition
1889899046	David P. Clark, Lonnie Dee Russell	**Molecular Biology Made Simple and Fun,** latest edition	Cache River Press; 2nd edition
1889899070	David P. Clark	**Molecular Biology Made Simple and Fun,** latest edition	Cache River Press; 3rd edition
080534635x	James D. Watson, Tania A. Baker, Stephen P. Bell, Alexander Gann, Michael Levine, Richard Losick	**Molecular Biology of the Gene,** latest edition	Benjamin Cummings; 5th edition

Useful Websites:

- www.4ulr.com
- www.molbiolcell.org
- www.expasy.org

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**4**	Hours

Total Class Contact Hours per Semester:	**28**
Total Other Contact Hours per Semester:	**56**
Total Study Hours per Semester:	**84**

COURSE DESCRIPTION:

Course Code: BT203b **School:** Biotechnology (MSA)
Course Title: Cell and Tissue Culture
Head of Department: Dr. Ahmed M K Nada **Prerequisite:** BIO201b
Course Co-ordinator: Dr Gihan Safwat
Level: 2(2nd semester) **Credit:** 4 **Subject Group:** Biotechnology

AIMS:

The aims of the course are to:

- Introduce the concepts of cell and tissue culture to the student.
- Teach the basic knowledge and skills essential to the successful cultivation of plant and animal cells and tissues.
- Expose the student, through the use of primary cell lines, to sterile technique, media preparation and sterilization.
- Familiarize the students with cryopreservation.
- Explore development phenomena in tissue culture cells.
- Provide information about equipment, procedures and terminology of aseptic culture.

LEARNING OUTCOMES:

Upon completion of the course, the student will be able to:

Knowledge:

- Understand the concepts of cell and tissue culture.
- Know about the basic knowledge of the successful cultivation of cells and tissues.
- Differentiate between deferent morphogenetic stages.
- Recognize the effect of hormones on cell development
- Understand the difference between culture types.

Skills:

- Demonstrate the principles of tissue culture.
- Ability to use sterile technique; carry out media preparation and sterilization.
- Solve problems related to tissue culture technique.
- Prepare media and solution.
- Working under aseptic conditions.

INDICATIVE CONTENT :(SYLLABUS)

1. History of cell and tissue culture.
2. Basic requirements for cell and tissue culture laboratory.
3. Plant cell and tissue culture.
4. Animal cell culture.
5. Cell and tissue culture terminology.

Main Learning and Teaching Activities :(Strategies)

Weekly Lectures ⇧	Tutorials	Rounds	**Laboratory Work** ⇧	Class Presentation

Assessment Strategy:

Assessment of the student's knowledge about:

1- Concepts of cell and tissue culture.
2- Equipment, procedures & terminology of aseptic culture.
3- The use of sterile technique, media preparation and sterilization.
4- Regeneration methods.
5- Plant cell and tissue culture.
6- Animal cell and tissue culture.
7- Cell and tissue culture terminology.

Assessment of the student's ability to:

1- Carry out sterile technique, media preparation and sterilization.
2- Perform tissue culture experiment.
3- Differentiate between regeneration stages.
4- Use different culture type.
5- Working in groups.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Quizzes		10%			Before & After midterm
Assignments		5%			
Mid-Term:		20%			1.5 Hour
Lab Work:		25%			
Final Exam:		40%			3 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
1578082374	M. K. Razdan	**Introduction to Plant Tissue Culture,** latest edition	Science Publishers Inc; 2nd edition
0471453293	R. Ian Freshney	**Culture of Animal Cells : A Manual of Basic Technique,** latest edition	Wiley-Liss; 5 edition
0306458594	Jennie P. Mather, Penelope E. Roberts	**Introduction to Cell and Tissue Culture : Theory and Technique,** latest edition	Springer

Useful websites

http://www.slumaffe.org/Agriculture/Crop_Development/Tissue_Culture/tissue_culture.html
http://fullstory1.info/design-for-tissue-culture-laboratory-r.html
http://www.tissue-cell-culture.com/

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**4**	Hours

Total Class Contact Hours per Semester: 28
Total Other Contact Hours per Semester: 56
Total Study Hours per Semester: 84

COURSE DESCRIPTION:

Course Code: BT321b **School:** Biotechnology (MSA)
Course Title: Industrial Microbiology and Fermentation
Head of Department: Dr.Ali Diab **Prerequisite:** MB102b
Course Co-coordinator: Dr Ahmed M K Nada
Level: 2 (2nd semester) **Credit:** 3 **Subject Group:** Biotechnology

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AIMS:
The aims of the course are:

- To introduce the structure/function relationship in the microbial cell and its constituents.
- To explore the basics of microbial physiology, and the major cycles for growth and energy production.
- To illustrate the use of microorganism in producing beneficial goods and services and the role of microorganisms in recycling and in degrading harmful pollutants.
- To provide information about biological production of goods and commodities.
- To extend the student's understanding and appreciation of the nature and particular attributes of microorganisms as a basis for studies in the applied areas of environmental and industrial microbiology and waste management.

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:
- Explore the structure and function of microbes and their relevance in production of useful fermentation products.
- Know about the ethical issues in production microbiology, such as confidentiality of information and standards of laboratory and in-plant behavior and etiquette.
- Know about the vast uses of microbiology in industry.

Skills:
- Classify microorganisms and recognize their physiological activities.
- To have critical review of current microbiology literature and independent learning.
- Acquire the skills used in fermentation microbiology.
- Identify industrial process layouts, units of use and regulation.

INDICATIVE CONTENT :(SYLLABUS)

1- The relation between structure and function in the microbial cell and its constituents.
2- Development of economically important microbial strains.
3- Microbial nutrition and metabolism for growth and energy production.
4- Microbial activities in different ecosystems and the factors influencing their activity.
5- Use of microorganisms in the production of beneficial goods and services.
6- Bioreactors (structure and control during processes).
7- Immobilization of microbial cells and enzymes and their uses.
8- Agroindustrial wastes of economic importance and their pretreatment for microbial action.
9- The role of microorganisms in the recycling of residues and degradation of harmful pollutants.
10- Biological pollution, its sources and avoidance.

Main Learning and Teaching Activities :(Strategies)

This course will be taught mainly through lectures and practical sessions, some subject matters will be discussed within discussion groups.

Weekly Lectures	Tutorials	Rounds	Laboratory Work	Class Presentation
⇧			⇧	

Assessment strategy:

Assessment of the student's knowledge about:

1. The immune system, its types, responsible tissues and cells.
2. The natural antigen antibody reaction.
3. The different immune responses and the mechanism of antibody synthesis.
4. The immune neutralization of microbial metabolites and toxins; immunity against microbial invasions.
5. Hypersensitivity and autoimmune diseases.

Assessment of the student's ability to:

1. Verify the structures and characteristics of antigens and antibodies.
2. Identify the various cellular and molecular components.
3. Classify microorganisms and recognize their physiological activates.
4. Work within time frame.
5. Work in groups.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Quizzes: Assignment: Mid-Term: Lab Work: Final Exam:		5% 10% 20% 25% 40%			Before & after midterm 1.5 Hour 3 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0632053070	Michael J. Waites	**Industrial Microbiology: An Introduction,** latest edition	Blackwell Publishers
0748407332	Charles F. A. Bryce	**Fermentation Microbiology and Biotechnology,** latest edition	CRC Press

Useful websites:

http://www.simhq.org/
http://www.microbeworld.org/
http://www.asm.org/
http://www.microbes.info/resources/Industrial_Microbiology/
http://imol.vub.ac.be/IMDO/IMDO.html
http://www.industrialmicrobiology.com/

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester: 28
Total Other Contact Hours per Semester: 28
Total Study Hours per Semester: 56

COURSE DESCRIPTION:

Course Code: BT301b **School:** Biotechnology (MSA)
Course Title: Introduction to Biotechnology
Head of Department: Dr. Ahmed M K Nada **Pre-requisites:** BT202b
Course Co-ordinator: Dr. Osama S S Hassan
Level: 3 (1st semester) **Credit:** 3 **Subject Group:** Biotechnology

AIMS:
The aims of the course are:

- To provide the students with an idea about the different branches of biotechnology.
- To teach the applications of biotechnology
- Discuss different ideas on different point of view
- To learn how to use different biotechnology tools on different scientific proposals or projects

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:
- Recognize the different branches of biotechnology.
- Understand the fundamental principles of using biotechnology tools.
- Recognize the biological hazards accompanying the release and spread of transgenic organisms into the environment and how to use biotechnology to control any environmental crisis.
- Develop deeper understanding on genetic engineering and applications used in different industries (agricultural, medical, pharmaceutical, military, environmental, nanobiotechnology, electronically...etc).

Skills:
- Hands on experience on the practice of biotechnology.
- Writing a professional proposal to be granted from high ranked scientific organizations.
- Designing, writing, and printing of scientific posters of research projects.
- Critically evaluate different ideas used in biotechnology.
- Team working and mind tuning.

INDICATIVE CONTENT :(SYLLABUS)

1. Introduction: origins of biotechnology.
2. Pharmaceutical applications of biotechnology (evolution, promises and challenges).
3. Medical applications of biotechnology (evolution, promises and challenges).
4. Biomaterials and their applications of biotechnology (evolution, promises and challenges).
5. Computing applications of biotechnology (evolution, promises and challenges).
6. Military applications of biotechnology (evolution, promises and challenges).
7. Agricultural applications of biotechnology (evolution, promises and challenges).
8. Functional biotechnology (genomics, proteomics, and cytomics).
9. Environmental applications of biotechnology (evolution, promises and challenges).
10. Marine applications of biotechnology (evolution, promises and challenges).
11. Bio-nanotechnology (promises and challenges).

Main Learning and Teaching Activities :(Strategies)

Weekly Lectures	**Tutorials**	Rounds	**Laboratory Work**	Class Presentation
⇧	⇧		⇧	

Assessment strategy:

Assessment of the student's knowledge about:

1- All concepts of biotechnology and its applications in different fields.
2- Writing applied projects in different biotechnological aspects.
3- Scientific methodology and how to use biotechnology tools in their projects.
4- The relationship between biotechnology and other industrial, biological and environmental activities.

Assessment of the student's ability to:

1- Define and recognize the biotechnology methodology and tools.
2- Isolate genes from complex genomes.
3- Write a complete scientific proposal.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Outline Details
Project:		10%		
Assignments:		5%		
Mid-Term:		20%		1.5 Hour
Lab Work:		25%		Scientific proposal, seminar and poster
Final Exam:		40%		3 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0521779170	Colin Ratledge , Bjorn Kristiansen	**Basic Biotechnology,** latest edition	Cambridge University Press
0131010115	Aluizio Borem, et al	**Understanding Biotechnology,** latest edition	Prentice Hall

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester: 28
Total Other Contact Hours per Semester: 28
Total Study Hours per Semester: 56

COURSE DESCRIPTION:

Course Code: BT204b **School:** Biotechnology (MSA)
Course Title: Bioinformatics
Head of Department: Dr Ahmed M K Nada **Prerequisites:** CSB102b
Course Co-ordinator: Dr. Amr Ageez
Level: 2 (2nd semester) **Credit:** 3 **Subject Group:** Biotechnology

AIMS:
The aims of the course are:

- To increase the awareness of the students to the importance of Bioinformatics as a rapidly growing field of biotechnology.
- To understand the different computer methods used to analyze the huge amount of information that is being gathered about human gene sequences and genetic diseases.
- To emphasize upon the integration of basic and applied research in human, plant and microorganism gene mapping and molecular cloning.

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:

- Know the mapping of the human genome.
- Locating of different genes.
- Recognize the characteristics of animal, plant and microorganism genome and
- Understand the structure of proteins and simulate protein interactions.
- Correlate between DNA sequencing and certain traits.

Skills:

- Prediction of the three-dimensional structure of nucleic acid protiens.
- Develop and design new medicine based on researching and discovering new therapeutic targets.
- Create biological data base.
- Use different biological software and data base

INDICATIVE CONTENT :(SYLLABUS)

1- Mapping of human genome.
2- Plant and microorganism genome characterization.
3- Molecular cloning and restriction mapping.
4- DNA sequencing and Computational analysis.
5- Relating genes to traits.
6- Determining protein structure and simulate protein interactions.
7- Predicting three dimensional protein structures.
8- Discovering new therapeutic targets and designing new medicines.

Main Learning and Teaching Activities :(Strategies)

This course will be taught through lectures and practical sessions. The student will be asked to prepare a portfolio and to do internet search covering a specific topic.

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	Class Presentation
⇧			⇧	

Assessment strategy:

Assessment of the student's knowledge about:

1- Understanding of the human genome map.
2- Relating genes to traits.
3- Predicting three dimensional protein structures.
4- Basics of developing and designing new medicines by setting new therapeutic targets.
5- Thorough understanding of molecular cloning and restriction mapping.

Assessment of the student's ability to:

1- Know their way around the human genetic map.
2- Perform complete DNA sequencing and computational analysis.
3- Identify the different structures of DNA, RNA, and chromatin.
4- Use data base and biological software

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Project:		10%			
Assignments:		5%			
Mid-Term:		20%			1.5 Hour
Lab Work:		25%			
Final Exam:		40%			3 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0262101068	Neil C. Jones, Pavel A. Pevzner	An Introduction to Bioinformatics Algorithms (Computational Molecular Biology), latest edition	The MIT Press
0387400826	Warren J. Ewens, Gregory Grant	Statistical Methods in Bioinformatics : An Introduction (Statistics for Biology and Health), latest edition	Springer; 2nd edition
0199251967	Arthur M. Lesk	Introduction to Bioinformatics, latest edition	Oxford University Press

Useful websites

- www.ii.uib.no/~inge/list.html
- **bioinformatics**.ubc.ca/resources/**links**_directory/
- www.cbs.dtu.dk/bio**links**/
- waksman.rutgers.edu/driscoll/biocomputing.html
- www.mcb.mcgill.ca/~pdlee/**bioinformatics**.html

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester: 28
Total Other Contact Hours per Semester: 28
Total Study Hours per Semester: 56

COURSE DESCRIPTION:

Course Code: BT305b **School:** Biotechnology (MSA)
Course Title: Animal Cell Biotechnology
Head of Department: Dr Ahmed M K Nada **Pre-requisite:** BT203b
Course Co-ordinator: Dr Ahmed M K Nada
Level: 3 (1st semester) **Credit:** 2 **Subject Group:** Biotechnology

AIMS:
The aims of the course are:

- To provide the students with an overview of modern research and industrial applications of animal cell biology.
- To critically appraise the applications of animal cell culture, related technologies and their applications in industry, research and medicine.
- To evaluate the industrial, research, and biomedical ideas and applications associated with animal cell biology.

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:

- Understand the concept and principles of cell and tissue engineering.
- Recognize the mechanisms of drug resistance and cell death.
- Increase the student's awareness of biotechnological techniques.
- Explore and understand the regulation of gene expression inside animal cells.
- Explore the methods used in gene transfer.

Skills:

- Differentiate between animal and human cells.
- Hands-on experience on the techniques used to prepare human embryonic stem cell culture.
- Work under aseptic conditions.

INDICATIVE CONTENT :(SYLLABUS)

Research, clinical and industrial applications of animal cell culture, including:

1. Cell and Tissue Engineering.
2. Scale-up of animal cell culture.
3. Mechanisms of drug resistance and cell death.
4. Differentiation of animal/human cells.
5. Animal cell culture techniques relevant to mRNA knockdown (e.g. antisense andribozyme technology)
6. How animal cells regulate gene expression, with emphasis on translational control.

Main Learning and Teaching Activities :(Strategies)

Students will be asked to present written research assignments using the library and internet resources.

Weekly Lectures	**Tutorials**	Rounds	Laboratory Work	Class Presentation
⇧	⇧			

Assessment Strategy:

Assessment of the student's knowledge about:

1- Fundamentals of Cell and Tissue Engineering
2- Distinguish between the structures of animal and human cells.
3- Animal tissue cell culture techniques used in biotechnology and correlate the relation between them and mRNA knockdown.
4- Mechanisms of gene regulation within animal cells.

Assessment of the student's ability to:

1- Recognize the difference between animal and human cells.
2- Perform techniques of animal tissue cell culture.
3- Identify different stage of animal cell development.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Outline Details
Term paper:		10%		
Assignments:		5%		
Lab work:		25%		
Mid-Term:		20%		1.5 Hour
Final Exam:		40%		3 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0896035476	Nigel Jenkins (Editor)	**Animal Cell Biotechnology: Methods and Protocols (Methods in Biotechnology),** latest edition	Humana Press
0471453293	R. Ian Freshney	**Culture of Animal Cells : A Manual of Basic Technique,** latest edition	Wiley-Lewis; 5th edition
1859960499	Michael J. Butler	**Animal Cell Culture and Technology,** latest edition	BIOS Scientific Publishers; 2nd edition
0792331567	T. Kobayashi	**Animal Cell Technology: Basic & Applied Aspects,** latest edition	Springer; 6th edtion

Useful websites

- www.library.tufts.edu/vet/signature/biotech.html
- www.lib.umd.edu/MCK/GUIDES/animal_science.html

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**-**	Hours

Total Class Contact Hours per Semester: 28
Total Other Contact Hours per Semester: -
Total Study Hours per Semester: 28

COURSE DESCRIPTION:

Course code: BT302b **School:** Biotechnology (MSA)
Course Title: Advanced Genetic Engineering: Gene Transfer

Head of Department: Dr Ahmed M K Nada **Prerequisites:** BT202b, BT301b
Course Co-ordinator: Dr.Gehan Safwat
Level: 3 (2nd semester) **Credit:** 4 **Subject Group:** Biotechnology

AIMS:
The aims of the course are:

- To provide the ability to isolate genes, analyze or alter them and return them to a suitable host.
- To give students a deeper insight on the concepts, methods, and applications of gene transfer.
- To show the students how the techniques of genetics can be applied to produce recombinant proteins in bacteria.

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:

- Understand the fundamental principles of handling and manipulating DNA in bacteria and complex organisms.
- Explore the techniques for isolating genes.
- Identify genes of interest to be used in transformation.
- Distinguish between different methods for gene transfer.
- Show time management skills by working to dead line.

Skills:

- Accurate handling and manipulation of DNA in bacteria and complex organisms.
- Hands-on experience on the techniques used to isolate genes from complex organisms and the different methods of gene transfer to produce transgenic plants and animals.
- Develop acute observational and technical skills.

INDICATIVE CONTENT :(SYLLABUS)

1) Manipulating nucleic acids (isolation, handling, quantification, radiolabelling and sequencing of nucleic acids).
2) Restriction enzymes and modifying enzymes.
3) Cloning vectors.
4) Cloning strategies.
5) Screening and analysis of recombinants.
6) Eukaryotic genes and their construction.
7) Different methods of gene transfer to plants and animals.

8) Evaluation of expression and integration of introduced genes.**Main Learning and Teaching Activities :(Strategies)**

This course will be taught mainly through lectures, some subject matters will be discussed within discussion groups

Weekly Lectures	**Tutorials**	Rounds	**Laboratory Work**	Class Presentation
⇧	⇧		⇧	

Assessment strategy:

Assessment of the student's knowledge about:

1- Gene handling, isolation, transfer, quantification, radiolabelling and sequencing.
2- Different types of screening and analysis of recombinants.
3- Different methods of gene transfer to plants and animals.
4- Types of cloning vectors.

Assessment of the student's ability to:

1. Analyze and isolate gene.
2. The concepts, methods, and applications of gene transfer.
3. Demonstrate the production of recombinant proteins by bacteria.
4. Perform molecular techniques.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Outline Details
Project:		10%		
Assignment:		5%		
Practical:		25%		
Mid-Term:		20%		1.5 Hour
Final Exam:		40%		3 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0816040001	by Lisa Yount	**Biotechnology and Genetic Engineering,** latest edition	Facts on File
0521004713	by Desmond S. T. Nicholl	**An Introduction to Genetic Engineering,** latest edition	Cambridge University Press
0444504303	A.D. Arencibia	**Plant Genetic Engineering (Developments in Plant Genetics and Breeding),** latest edition	Elsevier Science
1588290867	William C. Heiser	**Gene Delivery to Mammalian Cells: Non-viral Gene Transfer Techniques ,** latest edition	Humana Press

Useful Links:

- movies.yahoo.com/movie/1800179057/info
- www.rottentomatoes.com/
- www.btci.org/courses/**advanced**/ctpge05.html
- www.genengnews.com/news/bnitem. aspx?name=1058523XSL_NEWSML_TO_NEWSML_WEB.xml
- www.aleph.se/Trans/Individual/Body/genes.html

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**4**	Hours

Total Class Contact Hours per Semester: 28
Total Other Contact Hours per Semester: 56
Total Study Hours per Semester: 84

COURSE DESCRIPTION:

Course Code: BT401b **School:** Biotechnology (MSA)
Course Title: Introduction to Biosafety and risk assessment
Head of Department: Dr Ahmed M K Nada **Prerequisites:** BT301b
Course Co-ordinator: Dr Hesham El-Sheshtawi
Level: 3 (2nd semester) **Credit:** 2 **Subject Group:** Biotechnology

AIMS:
The aims of the course are to:

- Allow students to know about techniques used in biotechnology to perform biosafety.
- Give some information about the safety of Genetically Modified Organisms(GMOs)
- Study the biosafety policies and procedures associated and use of biotechnological sciences.
- Appraise the role of biotechnology science to avoid environmental risks.

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:

- Identify the Biosafety procedures and applications.
- Evaluate the Biosafety measures in Laboratory, green house and open field.
- Be aware about mechanism for building public acceptance.
- Demonstrate estimation and feasibility of systems to avoid risks.

Skills:

- Know how to prevent and control a risk.
- Understand the environmental safety analysis.
- Judge the different ways of biosafety.

INDICATIVE CONTENT :(SYLLABUS)

1. Biosafety policies and procedures associated with the introduction and use of biotechnological tools.
2. Guidelines and regulation of biosafety.
3. Biosafety measures in the laboratory, greenhouse and open field.
4. Organization, membership and operation of national biosafety comities, institutional biosafety comities.
5. Biosafety procedures and permit applications.
6. Regulatory review and approval to commercial release.
7. Biosafety and public awareness.
8. Risk assessment of GMOs.
9. Risk management of GMOs and their possible impact on the environment.
10. Food and environmental safety analysis.
11. Mechanism for building public acceptance.

Main Learning and Teaching Activities :(Strategies)

This course will be taught mainly through lectures, some subject matters will be discussed within discussion groups

Weekly Lectures	**Tutorials**	Rounds	Laboratory Work	Class Presentation
⇧	⇧			

Assessment Strategy:

Assessment of the student knowledge about:

1. Regulation of Biosafety.
2. Risk assessment of GMOs.
3. Food and environmental analysis.
4. Role of biotechnology in prevention of environmental danger.

Assessment of the student's ability to:

1- To prevent and control a risk.
2- Carry out biosafety procedures and permit applications.
3- Appreciate the concepts risk management of GMOs and their possible impact on the environment.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Project		20%			
Assignment		20%			
Mid-Term:		20%			1 Hour
Final Exam:		40%			2 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0126887217	John A. Thomas, Roy L. Fuchs	**Biotechnology and Safety Assessment,** latest edition	Academic Press
052154405X	Heikki M. T. Hokkanen , James M. Lynch , James Lynch	**Biological Control : Benefits and Risks,** latest edition	Cambridge University Press

Useful websites:

- www.earthsummit2002.org/es/ issues/Conventions/Rioconventions.rtf
- www.unep.ch/biosafety/
- www.fao.org/WAICENT/OIS/ PRESS_NE/PRESSENG/2000/pren0017.html
- www.gmwatch.org/

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**2**	Hours
Lab Work:	**-**	Hours

Total Class Contact Hours per Semester: 28
Total Other Contact Hours per Semester: 28
Total Study Hours per Semester: 56

COURSE DESCRIPTION:

Course Code: BT411b **School:** Biotechnology (MSA)
Course Title: Regulatory & ethical aspects of biotechnology
Head of Department: Dr Ahmed M K Nada **Prerequisites:** BT301b
Course Co-ordinator: Dr Hesham El- Shishtawi
Level: 4 (1st semester) **Credit:** 2 **Subject Group:** Biotechnology

AIMS:
The aims of the course are to:

- Demonstrate the ability to apply decisions in ethics.
- Acquire the skills of literature surveying, analyzing information, interpreting, suggesting solutions, reporting and demonstrating presentation.
- Evaluate accepted and refused new trends in biotechnology
- Introduce and expand understanding of essential concepts in applying ethics in new sciences.
- Know about introducing concept of copy genes patenting
- Fully understand bio hazard accompanying wrong use of biotechnological science

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:

- Screen ethics in biotechnology.
- Have the ability of decision-making in accepting or refusing genes change**.**
- Know how far humans should intervene in God's creation.

Skills:

- Apply ethics in use of new trends in biotechnology.
- Discuss the concept of patency.
- Analysis biotechnological sciences and avoid risks of misuse.
- Judge regulations of release of GMOs
- Acquire presentation and negotiation skills.

INDICATIVE CONTENT :(SYLLABUS)

1. Ethical aspects in biotechnology.
2. Biotechnology science: biphasic fuel.
3. Wrong uses of biotechnological sciences like biological warfare agents.
4. How can we evaluate new technological trends to judge if we will accept or not.
5. Who has the authority to put ethical limits in biotechnology.
6. Concept of gene change: accepted or refused.
7. Problems of ignoring limits in applying new trends in science.

Main Learning and Teaching Activities :(Strategies)

This course will be taught mainly through lectures, some subject matters will be discussed within discussion groups

Weekly Lectures ⇧	Tutorials	Rounds	Laboratory Work	Class Presentation

Assessment Details:

Assessment of the students' knowledge about:

1. Ethics applied in science.
2. Gene transfer theory: accepted or refused.
3. Danger of canceling ethics in applying new science.
4. Biological warfare agents.

Assessment of the students' ability to:

1. Apply concepts of ethical aspects in biotechnology
2. Evaluate new technological trends to judge if we will accept or not.
3. Present a case study related to ethics in applying new science.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Project		20%			
Assignment		20%			
Mid-Term:		20%			1 Hour
Final Exam:		40%			2 Hours

Key Texts:

ISBN Number	Author	Title	Publisher
0415922917	Patrick O'Mahony	**Nature, Risk and Responsibility: Discourses of Biotechnology, Latest edition**	Routledge
1559639474	Britt Bailey (Editor), Marc Lappe (Editor)	**Engineering the Farm: The Social and Ethical Aspects of Agricultural Biotechnology, Latest edition**	Island Press
0123693705	David L. Finegold	**BioIndustry Ethics, Latest edition**	Academic Press

Useful Tools:

- www.bioethics.org.nz/news/
- europa.eu.int/comm/research/life/elsa/
- www.bio.org/bioethics/
- www.rsnz.org/news/biotech/

Learning Unit Contact Hours:

Per Week:

Lectures:	2	Hours
Others:	-	Hours

Total Class Contact Hours per Semester:	21
Total Other Contact Hours per Semester	-
Total Study Hours per Semester	21

COURSE DESCRIPTION:

Course Code: MB102b **School:** Biotechnology (MSA)
Course Title: Microbiology
Head of Department: Dr. Ali Diab **Prerequisites:** BIO101b
Course Co-ordinator: Dr. Ali Diab
Level: 1 (2nd semester) **Credit:** 3 **Subject Group:** Microbiology

AIMS:
The aims of the course are:

- To provide the students with basic knowledge about various types of microorganisms.
- To provide the students with knowledge about the structure, morphology, components of the microbial cell.
- To explore how microorganism maintain itself in a balanced state in the biosphere.

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:
- Understand how microorganisms are classified.
- Explain and differentiate between the various structures and components of the microbial cell (Prokaryotic and Eukaryotic).
- Explain the microbial growth and growth curve.
- Know the concepts of microbial genetics on molecular bases.

Skills:
- Develop microscopical skills and the use of oil immersion lens for detection of stained bacteria (simple or differential stain).
- Recognize different types of culture media (for bacteria and fungi).
- Understand the importance of the aseptic technique during work in microbiology laboratory and apply it.
- Acquire time management skills by working to dead lines.

INDICATIVE CONTENT :(SYLLABUS)
1- Pioneers in microbiology.
2- Eukaryotic and prokaryotic cells.
3- Nomenclature of microorganisms.
4- Structure and form of the bacterial cells.
5- Spores.
6- Mycoplasma or PPLO.
7- Actinomycetes.
8- Rickettsiae.

9- Viruses.
10- Eukaryotic microorganisms (fungi) .
11- Bacterial genetics.
12- Molecular genetics.
13- Physiology of microorganisms
14- The growth curve.
15- Microbial metabolism.

Main Learning and Teaching Activities :(Strategies)

This course will be taught through lectures and practical sessions.
The underlying principles and theory behind each practical session will be explained in lectures.
Students will be asked to present written research assignments using the library and internet resources.

Weekly Lectures	**Tutorials**	Rounds	**Laboratory Work**	Class Presentation
⇧	⇧		⇧	

Assessment Strategy:

Assessment of the student's knowledge about:
1- The methods of classifying microorganisms.
2- The structure and form of microorganisms.
3- The growth curve and microbial metabolism.
4- Bacterial genetics.

Assessment of the student's ability to:
1- Examine bacteria (stained and unstained).
2- Examine motility of bacteria.
3- Use of different culture media for bacteria and fungi.
4- Examine a mixture of bacteria (gram +ve and gram –ve)
5- Work in groups.
6- Present and interpret the results.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Quizzes		5%			Before & after midterm
Assignments		10%			
Mid-Term:		20%			1 Hour
Lab Work:		25%			
Final Exam:		40%			2 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0471482498	Black, J.G	**Microbiology : Principles and Explorations,** latest edition	Wiley
1842142194	Bottone	**An atlas of clinical microbiology of infectious Disease ,volume 1 : bacterial agent,** latest edition	CRC
0443070776	Greenwood, D., Slack, R.C.B., Peutherer, J.F	**Medical Microbiology A guide to microbial infections ,** latest edition	Churchill Livingstone

Useful websites

http;//mic.sgmjournals.org/
http://microbial.org/
http://www.epa.gov/nerlcwww/
http://www.academicinfo.net/microbia.html

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester: 28
Total Other Contact Hours per Semester: 28
Total Study Hours per Semester: 56

Lab Course

1- **Lab 1:**Practical instructions for the use of microscope and examination of living unstained organisms.

2- **Lab 2**Methods of making film or smear preparations and staining of films.

3- **Lab 3:**Simple staining.

4- **Lab 4:**Negative staining.

5- **Lab 5:**Gram's staining methods.

6- **Lab 6:**Staining of tubercle and other acid fast bacilli (Ziehl – Neelsen method).

7- **Lab 7:**Staining of spores.

8- **Lab 8:**Demonstration of capsules.

9- **Lab 9:**Examination of fungi.

10- **Lab 10:**Streaking and Serial dilution.

11- **Lab 11:**Examination of mixture of bacteria.

12- **Lab 12:**Culture media.

COURSE DESCRIPTION:

Course Code: MB201b **School:** Biotechnology (MSA)
Course Title: Immunology
Head of Department: Dr. Ali Diab **Prerequisites:** BIO102b, MB102b
Course Co-ordinator: Dr. Ahmed M. K. Nada
Level: 2 (1st semester) **Credit:** 3 **Subject Group:** Microbiology

AIMS:
The aims of the course are:

- To give an excellent idea about the history and the scope of Immunology
- To gain sufficient knowledge about the types of Immunity and the differences between them (Innate and Acquired Immunities)
- Understanding the meaning and the mechanism of phagocytosis and the inflammatory response
- To gain a deep information about the antigens and the differences between immunogens and haptens.
- Develop greater understanding about immune system in terms of its cellular and molecular aspects.
- Develop greater understanding about Immunoglobulin (structure, synthesis and function)
- To introduce students to the Monoclonal antibodies technology and strategy.
- Understanding the theories of immunity

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:
- The two different types of Immunity (examples and mechanisms).
- The role of the immune system in inflammation and response to infection is outlined.
- Explore the structure of the antigen and Immunogenicity, and to gain knowledge about the difference between immunogen and haptens
- Explore the immune system and assess antigen antibody formation
- Know about immunity various cellular and molecular components .
- The structure, function and synthesis of immunoglobulin.
- Sufficient theoretical background about isolation of Monoclonal antibodies
- The identification and the meaning of the theories of immunity

Skills:
- Identify the various cellular and molecular components.
- Use the library and internet resources to know about advanced autoimmunity and hypersensitivity.

- Carry out immunological tests and find out their application in the fast detection of microbes and compounds.

INDICATIVE CONTENT :(SYLLABUS)

1- The scope of immunology

2- Recognition process and immunity
   - Antibody specificity
   - Self and non self recognition

3- Immunity and molecular genetics

4- Innate immunity
   - Determinants of innate immunity
     i. Species and strain
     ii. Individual differences and influence of age
     iii. Nutritional factors and hormonal influences
   - Mechanisms of innate immunity
     i. Mechanical baniers and surface secretions
     ii. Bactericidal substances of the tissues and body fluids
     iii. Humoral factors and phagocytes
     iv. Normal bacterial flora and protection from infection
     v. Phagocytosis and the inflammatory response

5- Acquired immunity
   - Forms of response of acquired immunity
   - Features of the response
   - Mechanisms Of Acquired Immunity

6- Antigens
   - lmmunogens and haptens
   - Specificity and cross-reactions
   - Heterophile and Forssman antigens
   - Carbohydrate, lipids, nucleic acids and protein antigens

7- Tissues and cells of the immune system
   - Primary lymphoid tissue
   - Secondary lymphoid tissues

8- The cells concerned in the immune response

9- Theories of immunity
   - Directive theory
   - Selective theory

10- The immune response

11- Immune tolerance

12- The immunoglobulins

13- Monoclonal antibodies

Main Learning and Teaching Activities :(Strategies)

This course will be taught mainly through lectures, some subject matters will be discussed within discussion groups

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	Class Presentation
⇧			⇧	

Assessment strategy:

Assessment of the student's knowledge about:

1- Types of immunity (Innate and acquired); the differences between them on the levels of determinants and mechanisms.
2- The immune system, its types, responsible tissues and cells.
3- Antigens (immunogenicity and specificity)
4- Immunoglobulin and the nature of antigen antibody reaction.
5- The different immune responses and the mechanism of antibody synthesis.
6- The mean and the background of the two immune theories.
7- Theory and importance of monoclonal antibodies

Assessment of the student's ability to:

1- Verify the structures and characteristics of antigens and antibodies.
2- Identify the various cellular and molecular components.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Quizzes		5%			Before & after midterm
Assignment:		10%			
Mid-Term:		20%			1.5 Hour
Lab Work:		25%			
Final Exam:		40%			3 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0815341016	Charles Janeway, Paul Travers, Mark Walport, Mark J. Shlomchik "	**Immunobiology,** latest edition	Garland Publishing; 6th Bk&Cdr edition
1416023895	Abul K. Abbas, Andrew Lichtman	**Cellular and Molecular Immunology,** latest edition	W.B. Saunders Company

Useful websites

- www.jimmunol.org
- www.**immunology**link.com
- www.biology.arizona.edu/**immunology/immunology**.html
- www.blackwell-synergy.com/servlet/useragent?func=showIssues&code=imm

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester:	**28**
Total Other Contact Hours per Semester:	**28**
Total Study Hours per Semester:	**56**

COURSE DESCRIPTION:

Course Code: BCHM102b **School:** Biotechnology (MSA)
Course Title: Biochemistry 1 (Structure and Metabolism)
Head of Department: Dr.Ali Diab **Prerequisites:** CHM101B
Course Coordinator: Dr Ashraf Bakar
Level: 1 (2nd semester) **Credit:** 4 **Subject Group:** Biochemistry

Aims:

The aims of the course are to:

- Shed light on the biochemical properties of naturally occurring body constituents.
- Differentiate sub cellular structures and their biochemical functions.
- Develop greater understanding of the structural chemistry of proteins,.

Learning Outcomes:

Upon completion of the course, the student will be able to:

Knowledge:

- Recognize the biochemical functions of sub cellular organelles.
- Analyze the biochemical properties of naturally occurring body constituents.
- Relate to the biological processes taking place in vivo.
- Examine the structural chemistry of different body constituents.

Skills:

- Correlate biological changes to the structure of a constituent.
- Test for body constituents and contents in body fluid.

Indicative Contents: (Syllabus)

1- Solutions.
2- Acids-bases & Acid-base imbalance.
3- Carbohydrate Chemistry.
4- Lipid chemistry.
5- Proteins & plasma proteins.
6- Enzymes & isoenzymes.

Main Learning and Teaching Activities :(Strategies)

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	Class Presentation
⇧			⇧	

Assessment Strategy:

Assessment of the student's knowledge about:

1- Types of solutions, acid-base definition & acid-base imbalance.
2- Biochemical properties of carbohydrates, lipids, proteins and enzymes.

Assessment of the student's ability to:

1- Test for body constituents.
2- Evaluates the content in body fluid.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Quizzes		10%			Before & after midterm
Assignment:		5%			
Mid-Term:		20%			1.5 Hour
Lab Work:		25%			
Final Exam:		40%			3 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
O716743396	David L.Nelson, Michael M.Cox	Lehninger "Principles of Biochemistry" , latest edition	W.H.Freeman
81-8061-204	M.N.Chatterjea	Textbook for Dental/ Nursing/ Pharmacy students, latest edition.	Jaypee brothers Medical Publishers (P) Ltd.
0397510918	Pamela C. Champe, Richard A., Harvey	Lippincott's Illustrated Reviews" Biochemistry", latest edition	Lippincott Williams & Wilkins
8123914148	S.P.Singh	Textbook of Biochemistry, latest edition	CBS publisher & Distributer
0075612259	Robert L.Crat. Katherine J.Danniston, Joseph. T.Topping	Principles & Applications of Inorganic, Organic & Biological Chemistry, latest edition	Macgraw-Hill College

Useful websites

- http://www.biology.arizona.edu/biochemistry/biochemistry.html
- http://web.indstate.edu/thcme/mwking/home.html
- http://www.protein.bio.msu.su/biokhimiya/
- http://pubs.acs.org/journals/bichaw/bichaw.html
- http://web.indstate.edu/thcme/mwking/subjects.html

Learning Unit Contact Hours:

Per Week:

Lectures:	**3**	Hours
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester:	**42**
Total Other Contact Hours per Semester:	**28**
Total Study Hours per Semester:	**70**

Lab Course

Lab.1: Glassware and simple Laboratory instruments lab safety.

Lab.2: Reaction of Carbohydrates:

- Molisch's test.
- Iodine test.
- Fehling's test.
- Seliwanoff's test.
- Acid hydrolysis.
- Barfoed test.

Lab.3: A scheme for carbohydrate solution.

Lab.4: Unknown of carbohydrate solutions.

Lab.5: Tests of Lipids

- **Grease stain test.**
- **Reaction test.**
- **Iodine test.**
- **Copper acetate test.**

Lab.6: Color reaction of proteins:

- Biuret test.
- Heat coagulation test.
- Millon's test.
- Rosenheim's test.
- Picric acid test

Lab.7: Unknown for protein solution.

Lab.8: Scheme for protein, carbohydrate solution.

Lab.9: Lab reports.

Lab.10: Revision.

Lab.11: Final exam.

COURSE DESCRIPTION:

Course Code: BCHM201b **School:** Biotechnology (MSA)
Course Title: Biochemistry II
Head of Department: Dr. Ali Diab **Prerequisites:** BCHM102b
Course Coordinator: Dr Ashraf Bakkar
Level: 2 (1st semester) **Credit:** 3 **Subject Group:** Biochemistry

Aims:

The aim of the course is to:

- Investigate metabolism by examining its component pathways.
- Increase awareness to the new procedures and techniques applied in the evaluation of some metabolic disorders.

Learning Outcomes:

Upon completion of the course, the student will be able to:

Knowledge:

- Compare recent evaluation techniques of biological fluids constituents.
- Recognize and classify the different metabolic pathways of nutrients.
- Analyze glucose, proteins and lipids with the most recent applications.

Skills:

- Differentiate the different metabolic pathways of a given nutrient material.
- Evaluate body biological fluids by application of recent techniques.
- Apply knowledge about biological fluids constituent to different applications in life.

Indicative Content :(Syllabus)

1- Bioenergetics & oxidative phosphorylation.

2- Digestion & absorption of carbohydrate.

3- Metabolism of carbohydrate.

4- Digestion, absorption & re-synthesis of lipids.

5- Metabolism of lipids.

6- Digestion & absorption of amino acids & proteins.

7- Metabolic fate of ammonia.

8- Metabolism of bile pigments.

9- Metabolism of mineral & trace elements.

10- Vitamins.

Main Learning and Teaching Activities :(Strategies)

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	Class Presentation
⇧			⇧	

Assessment Strategy:

Assessment of the student's knowledge about:

1- Metabolism of carbohydrate, lipids and proteins.
2- Natural biological cycles occurring within the body.
3- Integration of Metabolism and clinical correlations.

Assessment of the student's ability to:

1- Evaluate body biological fluids by application of recent techniques.
2- Perform biochemical experiment.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Quizzes		5%			Before & after midterm
Assignment:		10%			
Mid-Term:		20%			1.5 Hour
Lab Work:		25%			
Final Exam:		40%			3 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0397510918	Pamela C. Champe, Richard A. Harvey Denise R. Ferrier	Lippincott's Illustrated Reviews: Biochemistry, latest edition	Lippincott Williams & Wilkins
O716743396	David L.Nelson, Michael M.Cox	Lehninger "Principles of Biochemistry", latest edition.	W.H.Freeman
1043-9811	Rober K.Murray, Daryl K.Granner, Peter A.Mayes	Harper's Illustrated Biochemistry, latest edition	Lange Medical Book/ MacGraw-Hill
81-8061-204	M.N.Chatterjea	Textbook of Biochemisatry for Dental/Nursing/Pharmacy students, latest edition	Jaypee brothers Medical Publishers (P) Ltd.

Useful websites

- http://www.biology.arizona.edu/biochemistry/biochemistry.html
- http://web.indstate.edu/thcme/mwking/home.html
- http://www.protein.bio.msu.su/biokhimiya/
- http://pubs.acs.org/journals/bichaw/bichaw.html
- http://web.indstate.edu/thcme/mwking/subjects.html

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hour
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester:	**28**
Total Other Contact Hours per Semester:	**28**
Total Study Hours per Semester:	**56**

Lab Course

Lab 1: Urine

- Physical properties of Urine.
- Normal constituents of urine**.**

Lab 2: Abnormal constituents of urine.

Lab. 3: Urine Lab Report

Lab 3: Colorimetry: principle and applications:

Lab 4: Estimation of plasma cholesterol.

Lab 5: Estimation of blood urea.

Lab 6: Estimation of Creatinine in blood by picric acid method.

Lab 7: Estimation of uric acid.

Lab 8: Separation of mixtures by means of column chromatography.

Lab 9: Separation of mixtures by means of paper chromatography**.**

Lab 10: Separation of mixtures by means of thin layer chromatography.

Lab 11: Separation of mixtures by means of gas chromatography.

Lab 12: Electrophoresis.

COURSE DESCRIPTION:

Course Code: BIO101b **School:** Biotechnology (MSA)
Course Title: Botany
Head of Department: Dr. Ali Diab **Prerequisites:** None
Course Co-ordinator: Dr Ali Diab
Level: 1 (1st semester) **Credit:** 3 **Subject Group:** Biology

AIMS:
The aims of the course are to:

- Provide the basic knowledge needed for botany science.
- Raise awareness of the students to plant cell physiology.
- Explore the plant morphology.
- Introduce students to the biotechnology field.
- Demonstrate application of plant biotechnology in agriculture.
- Prepare students for higher biotechnology courses in advanced levels.

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:

- Begin to recognize the complete plant morphology.
- Understand the plant cell physiology.
- Explore the plant cell anatomy.
- Differentiate between the structure of different plant tissue.
- Understand the different concepts of plant biotechnology.
- Demonstrate actual gene transfer to plants.
- Understand how to generate plants tolerant to biotic and a biotic stresses.

Skills:

- Identify different part of plant.
- Distinguish between different plant cell components microscopically.
- Ability to differentiate between the structure of different plant tissue.
- Preparing different sections (transverse and longitudinal) showing plant anatomy.
- Use the library and internet resources to develop independent study skills through assignments.

INDICATIVE CONTENT :(SYLLABUS)

1. Plant morphology and structure.
2. Plant Anatomy.
3. Prokaryotes and Eukaryotes.
4. Plant Tissues.
5. Flowers and flowering plants.
6. Plant Genetic Engineering.
7. Plant biotechnology.
8. Application of plant biotechnology in agriculture.

Main Learning and Teaching Activities :(Strategies)

This course will be taught through lectures and practical sessions**.** Principles and theory behind each practical session will be explained in lectures. Students will be asked to present written research assignments using the library and internet resources.

Weekly Lectures ⇧	Tutorials	Rounds	**Laboratory Work** ⇧	Class Presentation

Assessment strategy:

Assessment of the student's knowledge about:

1. Recognizing the complete plant morphology.
2. Understanding the plant cell physiology and anatomy.
3. Different plant tissue.
4. Understanding the different concepts plant biotechnology.
5. Flowering plants and flower part.

Assessment of the student's ability to:

1- Identify different part of plant.
2- Preparing different sections showing plant anatomy.
3- Differentiate between plant tissue.
4- Recognize the flowering parts.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Quizzes		10%			Before & After midterm
Assignments		5%			
Mid-Term:		20%			1.5 Hour
Lab Work:		25%			
Final Exam:		40%			3 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0805344160	Murray Nabors	**Introduction to Botany,** latest edition	Benjamin Cummings
0849316146	David W. Altman	**Plant Development and Biotechnology,** latest edition	CRC Press
1402027133	Henry Daniell	**Molecular Biology and Biotechnology of Plant Organelles : Chloroplasts and Mitochondria,** latest edition	Springer
0763715867	MartinJ Chrispeels	**Plants, Genes, and Crop Biotechnology,** latest edition	Jones and Bartlett Publishers, Inc.
0772285923	Mcgraw-Hill	**Principles of Botany,** latest edition	Gordon uno, Richard storey, Randy Moore

Useful Websites:

- www.botany.com
- www.botany.net

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester: 28
Total Other Contact Hours per Semester: 28
Total Study Hours per Semester: 56

Lab Course

Lab.1: Morphology of a typical seed plant and Seeds and germination

Lab.2: Seeds and Germination

Lab.3: Microscope: Structure and components of the plant cell

Lab.4: Introduction to flowering plant tissues

Lab.5: General characters of roots

Lab.6: General characters of stems

Lab.7: General characters of leaf

Lab.8: Flower anatomy

Lab.9: Plant biotechnology (DNA Isolation).

Lab.10: DNA electrophoresis and Visualization

Lab.11: Visit to Biotechnology Institute.

Lab. 12: Revision.

COURSE DESCRIPTION:

Course Code: BIO102B **School:** Biotechnology (MSA)
Course Title: Zoology
Head of Department: Dr. Ali Diab **Prerequisites:** None
Course Co-ordinator: **Dr Gehan Safwat**
Level: 1 (1st semester) **Credit:** 3 **Subject Group:** Biology

AIMS:
The aims of the course are to:

- Study animal cell.
- Illustrate the animal cell content and function.
- Begin to recognize the animal tissues, organs and systems.
- Describe the functional adaptation of animals.
- Introduce students to animal reproduction and embryonic development.

LEARNING OUTCOMES
Upon completion of the course, the student will be able to:

Knowledge:

- Explore the anatomy of animal cell.
- Identify different animal tissue.
- Understand the function of different organs.
- Develop greater understanding of the functional adaptation of animals.
- Begin to recognize the animal reproduction and embryonic development.

Skills:

- Identify different animal tissue and organs.
- Begin to develop lab skills in dissection backed up with knowledge about animal cell anatomy.
- Use the library and internet resources to develop independent study skills through assignments.

INDICATIVE CONTENT :(SYLLABUS)

1. The cell and its content.
2. Tissues.
3. Types of nutrition.
4. Body physiology.
5. Reproduction.
6. Embryonic development.
7. Evolution and diversity.
8. Echinoderms.
9. Ecology environmental relationships.

Main Learning and Teaching Activities :(Strategies)

This course will be taught through lectures and practical sessions**.** Principles and theory behind each practical session will be explained in lectures. Students will be asked to present written research assignments using the library and internet resources.

Weekly Lectures ⇧	Tutorials	Rounds	**Laboratory Work** ⇧	Class Presentation

Assessment Strategy:

Assessment of the student's knowledge about:

1- Animal cell anatomy and the different animal tissue.
2- Function of the animal organs and understand the functional adaptation of animals.
3- The classification of the animal kingdom and their taxonomy.
4- Animal reproduction and embryonic development.

Assessment of the student's ability to:

1- Identify different animal tissue and organs.
2- Develop lab skills in animal cell anatomy.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Quizzes		10%			Before & After midterm
Assignments		5%			
Mid-Term:		20%			1.5 Hour
Lab Work:		25%			
Final Exam:		40%			3 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0072933550	Stephen A Miller, John P Harley, Stephen Miller, John Harley	**Zoology,** latest edition	McGraw-Hill Science/Engineering/Math; 6 edition
0072930284	Jr., Cleveland P Hickman, Larry S Roberts, Allan Larson, Helen I'Anson, Jr., Cleveland Hickman, Larry Roberts, Allan Larson, Helen I'Anson	**Integrated Principles of Zoology,** latest edition	McGraw-Hill Science/Engineering/Math; 12 edition
0126575568	R. E. Spier, J. B. Griffiths	**Animal Cell Biotechnology,** latest edition	Academic Press; 6 edition

Useful Websites:

- www.ummz.lsa.umich.edu
- www.biologybrowser.org
- www.academicinfo.net/zoo.html

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester: 28
Total Other Contact Hours per Semester: 28
Total Study Hours per Semester: 56

Lab Course

Lab.1:

1. External features of Bufo.
2. Buccopharyngeal cavity.
3. Ventral muscles.
4. Connective tissues

Lab.2:

1. General viscera
2. Blood of man.
3. Blood of Bufo.
4. Muscles.

Lab.3:

1. Urinogenital system

Lab.4:

1. Circulatory system
2. Digestive organs

Lab.5:

1. Nervous system

Lab.6:

1. Skeletal system

Lab.7:

1. Testis
2. Amphioxus

Lab.8: Revision

Lab. 9: Revision.

COURSE DESCRIPTION:

Course Code: BIO201b **School:** Biotechnology (MSA)
Course Title: Cell Biology and physiology
Head of Department: Dr. Ali Diab **Prerequisites**: BIO101b, BIO102b
Course Co-ordinator: Dr Osama S S Hassan
Level: 2 (1st semester) **Credit:**4 **Subject Group:** Biology.

AIMS:
The aims of the course are:

- To introduce students to 'The Scientific Method' in the context of the evolution of cell biology and cell theory.
- To identify the cell as the principal building block of life and its classifications into different types.
- To clearly identify cell organelles in terms of both their histological structure and function.
- To clearly identify and illustrate the two kinds of cellular reproduction and the differences between them.
- To provide an overview into the specialization of cells into tissues and organs within the human body, with special focus on nervous tissue as the illustrated example.
- To provide core concepts underlying stem cell research and its applications.
- To provide an overview of programmed cell death and its function with relevance to different organ systems.
- To introduce biochemical process controls the physiology of the cell, tissues and the body.
- To explore the biochemical workings of the cell with reference to respiration and its three key pathways: glycolysis, the citric acid cycle, and oxidative phosphorylation.
- To explain photosynthesis the context of the ecosystem and its physiological relevance.
- To introduce cell-to-cell communication in multicellular and unicellular organisms.
- To educate students about plant responses to internal and external signals in relation to their growth and development.
- To educate students about the fundamental concepts underlying plant and animal nutrition.
- Raise awareness to; plant cell cycles, growth, development and photosynthesis.

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:

- Define and describe the History of Studying Cells.
- Studying Cells using the light microscope, the Transmission Electron Microscope (TEM) and the Scanning Electron Microscope (SEM)
- Eukaryotic Cell Structure and Cell Components
- Introduce student to movement of large and small molecules across membranes
- Explore the organelles involved in energy transformations.
- Demonstrate mitosis and meiosis
- Begin to recognize cellular respiration.
- Understand the electron transport during oxidative phosphorylation.
- Demonstrate Photosynthesis
- Understand how Photosynthesis converts light energy to the chemical energy of food
- Begin to recognize cell communication.
- Explore the plant nutrition
- Explore the animal nutrition
- Begin to recognize Plant Responses to Internal and External Signals.

Skills:

- Define the functions of different types of microscopes.
- Differentiate between eukaryotic and prokaryotic cells.
- Correlate between cellular and molecular functions of the cell.
- Identify the organelles involved in energy transformation.
- Demonstrate the animal cell cycle.
- Identify the mechanism of cellular respiration.
- Identify the different ways in the oxidative phosphorylation.
- Demonstrate the photosynthesis
- Define the cell communication.
- Define the plant nutrition
- Define the animal nutrition.
- Demonstrate the plant responses to internal and external signals.

Indicative Content: (SYLLABUS)

- The scientific method
- The evolution of cell biology and cell theory
- The structural and functional aspects of:
- Prokaryotes- classification and overview
- Eukaryotic- cell structure and components
- Structure and function of the cell membrane:
- Phospholipids and the fluid mosaic model
- Diffusion and its kinetics
- Osmosis and water balance in plant and animal cells

- The different types of active transport and their corresponding mechanisms with the Na^+ K^+ ATPase pump as the illustrated example.
- The principle underlying endocytosis and exocytosis with the assembly and disassembly of the clarithrin coat as the illustrated example**.**
- The eukaryotic cell- structure and function of:
- The cytoplasm
- The nucleus
- The endomembrane system
- The cytoskeletal system
- Cell junctions
- Cell signaling:
- Paracrine and autocrine signaling
- Illustrated example of bacterial cell signaling
- Types of membrane receptors and their corresponding intracellular signaling cascades- second messengers, protein phosphorylation
- The cell cycle and mitosis
- Stem cells
- Programmed cell death or apoptosis:
- The function of apoptosis
- Morphological changes that occur
- Apoptosis and cancer
- Apoptosis and the immune system
- Apoptosis and AIDs
- Apoptosis and organ transplants
- Apoptosis and plants
- Cellular respiration:
- Redox reactions
- Three key pathways: glycolysis, the citric acid cycle, and oxidative phosphorylation and how they are linked together
- Photosynthesis
- Autotrophs and heterotrophs
- The two processes of photosynthesis- the light reactions and the calvin cycle
- Alternative processes of carbon fixation- photorespiration
- Cell signaling
- Overview-signal transduction pathway, internal and external signals
- Stages of cell signaling are reception, transduction, and response
- Receptor super families
- Transduction- second messengers, protein phosphorylation
- Response- amplification and transcription
- Plant nutrition
- Micro- and macro-nutrients
- Soil texture and composition
- Nitrogen and its effect on plant growth- nitrogen fixation and metabolism
- Symbiotic nitrogen fixation
- Epiphytes, parasitic and carnivorous plants
- Animal Nutrition
- Dietary categories- herbivore, carnivore and omnivore
- Energy balance- under and over nourishment
- Carbon skeletons and essential nutrients- essential amino acids, minerals and vitamins

- Main stages of food processing- ingestion, digestion, absorption, and elimination
- The organs of the mammalian digestive system in the context of their food-processing functions
- Evolution of vertebrate digestive systems
- Symbiotic microorganisms and vertebrate nutrition
- Plant Responses to Internal and External Signals
- Overview of signal transduction
- Plant hormones and their function in growth, development, and responses to stimuli- auxins, tropism, apoptosis
- Plant responses to light- photomorphogenesis, cryptochromes, phytochromes
- Circadian rhythms in plants and other eukaryotes
- Plant responses to external stimuli
- Plant defenses against herbivores and pathogens

Main Learning and Teaching Activities :(Strategies)

This course will be taught through lectures and practical sessions**.** Principles and theory behind each practical session will be explained in lectures. Students will be asked to present written research assignments using the library and internet resources.

Weekly Lectures	**Tutorials**	Rounds	**Laboratory Work**	Class Presentation
⇧	⇧		⇧	

Assessment Strategy:

Assessment of the student's knowledge about:

1- The various types of cells and the precursor cells for each one.
2- Different cellular entities and their function.
3- Structure and function of lipids and proteins.
4- Biochemical functions of the cell.
5- Organs and there functions.
6- Catalysis mechanism of enzymes.
7- How the biochemical process controls the physiology of the cell, tissues and the body.
8- Plant cell cycles, growth, development and photosynthesis

Assessment of the student's ability to:

1- Define the function of cellular entities.
2- Differentiate between different cell organelles.
3- Correlate between cellular and molecular functions of the cell**.**
4- Identify structure of lipids and proteins.
5- Identify function of lipids and proteins.
6- Define the biochemical process of the cell.
7- Define the catalysis mechanism of enzymes.
8- Demonstrate the plant cell cycle.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Quizzes		10%			Before & After midterm
Assignments		5%			
Mid-Term:		20%			1.5 Hour
Lab Work:		25%			
Final Exam:		40%			3 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0805371710	Neil A. Campbell and Jane B. Reece	**Biology,** latest edition	Pearson Benjamin Cummings
0201338904	C.B. Hole	**Introduction to Cell Biology,** latest edition	Addison Wesley Publishing Company
0471465801	Gerald Karp	**Cell and Molecular Biology : Concepts and Experiments,** latest edition	John Wiley & Sons

Useful Websites:

- www.actionbioscience.org/ **(articles)**
- www.ntc-school.com/sec/science/cgi-bin/splitwindow.cgi?top=http://www.glencoe.com/sec/science/top2.html&link=http://micro.magnet.fsu.edu/cells/index.html
- www.cellbiology.yale.edu/cellbio/html/who/cellbio_yale.shtml **(images)**
- www.cbc.umn.edu/~mwd/cell.html
- micro.magnet.fsu.edu/cells/

Learning Unit Contact Hours:

Per Week:

Lectures:	**3**	Hours
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester: 42
Total Other Contact Hours per Semester: 28
Total Study Hours per Semester: 70

COURSE DESCRIPTION:

Course Code: CHM101b **School:** Biotechnology (MSA)
Course Title: General Chemistry
Head of Department: Dr.Ali Diab **Prerequisites:** None
Course Co-coordinator: Dr Saeed Saleh
Level: 1 (1st semester) **Credit:** 3 **Subject Group:** Chemistry

AIMS:
The aims of the course are:

- To begin to recognize how organic molecules are formed.
- To introduce the students to the properties of different organic classes.
- To raise awareness of how functional groups affect the properties of a molecule.
- To explore the different reaction mechanisms of some organic chemical reactions.
- To prepare students for higher organic chemistry courses in advanced levels.

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:

- Define organic molecules according to different functional groups.
- Understand the nomenclature rules of organic molecules.
- Begin to recognize the reaction mechanisms of some organic compounds.
- List different types of isomers.

Skills:

- Identify unknown organic compounds.
- Define the chemical properties for a given molecule considering its chemical structure.
- Convert different organic compounds into one another.
- Use nomenclature rules to identify unknown compounds.

INDICATIVE CONTENT :(SYLLABUS)

1. Functional groups of organic compounds.
2. Types of chemical bonds and its cleavage.
3. Types of different organic reactions.
4. Nomenclature of organic compounds according to IUPAC rules.
5. Structure and methods of preparation of different classes of organic compounds:
6. Saturated and unsaturated hydrocarbons.
7. Alkyl halides, alcohols, ethers, aldehydes, ketones and amines.
8. Carboxylic acids and their derivatives.
9. Isomerism.
10. Aromatic organic chemistry.

Main Learning and Teaching Activities :(Strategies)

This course will be heavily taught through lectures and practical sessions. The student will be responsible for construction of a portfolio and will be asked to do internet search covering a specific topic.

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	Class Presentation
⇧			⇧	

Assessment Strategy:

Assessment of the student's knowledge about:

1- Nomenclature of organic compounds.
2- Structures of different aliphatic organic compounds out aromatic compounds
3- Methods of preparation and chemical reactions of organic compounds.
4- Mechanisms of some important organic chemical reactions.

Assessment of the student's ability to:

1- Practically differentiate between organic compounds belonging to similar or different classes.
2- Complete pre-studied equations.
3- Convert one compound to another.
4- Identify unknown organic compounds of different functional groups.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Quizzes:		10%			Before & After midterm
Assignments:		5%			
Mid-Term:		20%			1.5 Hour
Lab Work:		25%			
Final Exam:		40%			3 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
013033832	Leroy G. Wale	**Organic Chemistry,** latest edition	Prentice Hall
0716743744	K. peter, C. Volhardt	**Organic Chemistry (Structure & Function),** latest edition	
131407481	Bruice, P.Y.	**Organic Chemistry,** latest edition	Prentice Hall
0131407481	Paula Yurkan's Bruice	**Organic Chemistry,** latest edition	Prentice Mall
136436692	Morrison, R.T and R.N	**Organic Chemistry,** latest edition	Prentice Mall
0471417998	T. W. Graham Solomons	**Organic Chemistry .** latest edition	Wiley
3540003525	Gallego	**Organic Reaction Mechanisms 40 solved cases,** latest edition	Springer

Useful websites

- www.netaccess.on.ca/~dbc/cic_hamilton/anal.html
- http://www.library.adelaide.edu.au/guide/sci/Chemistry/analyt.html
- http://ull.chemistry.uakron.edu/analytical/
- www-rohan.sdsu.edu/staff/drjackm/ chemistry/chemlink/analytic/analyt6.html
- www.wiley.co.uk/wileychi/ea

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester: 28
Total Other Contact Hours per Semester: 28
Total Study Hours per Semester: 56

Lab Course

Lab. 1: Safety in laboratories. Physical properties, chemical reaction, specific chemical tests and identification of functional groups of each of the following:

Lab. 2: Alcohols e.g.: Methanol-Ethanol-Glycerol.

Lab. 3: Aldehydes e.g. Formaldehyde-Acetaldehyde-Chloral hydrate.

Lab. 4: Ketones e.g. Acetone.

Lab. 5: Carboxylic acids e.g. Formic acid-Acetic acid-Lactic acid

Lab. 6: Carboxylic acids e.g. Oxalic acid-Citric acid-Tartaric acid

Lab. 7: Salts of carboxylic acids e.g. Ammonium formate- Sodium acetate-Potassium acetate

Lab. 8: Salts of carboxylic acids e.g. Ammonium oxalate- Potassium citrate- Sodium tartarate.

Lab. 9: Esters e.g. Ethyl acetate.

Lab. 10: Amides e.g. Formamide-Acetamide-Urea.

Lab.11: Halogen compounds e.g. Chloroform.

Lab. 12: Carbohydrates e.g. Glucose-Lactose-Starch

COURSE DESCRIPTION:

Course Code: CHM102b **School:** Biotechnology (MSA)
Course Title: Physical Chemistry
Head of Department: Dr. Ali Diab **Prerequisites:** None
Course Co-ordinator: Dr. Saeed Saleh
Level: 1 (2nd semester) **Credit:** 2 **Subject Group:** Chemistry

AIMS:
The aims of the course are:

- To introduce the students to the basic principles of chemical bonding and intermolecular forces.
- To explore the physical properties of gas, liquid and solid
- To describe the solutions properties.
- To provide the students with basic knowledge of thermal chemistry

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:
- Understand the basic knowledge of the states of matter.
- Begin to recognize chemical equilibrium and phase diagram.
- Have the concept of chemical bonding.
- Introduced to thermal chemistry.
- Understand the significance of the represented figures.

Skills:
- Identify the different behavior of the states of matter.
- Identify the different structure types of crystals.
- Present problem solving skills.
- Read and interpret figured data
- Use the library and internet resources.

INDICATIVE CONTENT :(SYLLABUS)

1. State of matter, gas, liquid and solid.
2. Chemical bonding and intermolecular forces
3. Solutions and their properties
4. Intermolecular forces, diploes, hydrogen bonding and interaction between molecules
5. Introduction to thermal chemistry.

Main Learning and Teaching Activities :(Strategies)

This course will be taught mainly through lectures and lab work, some subject matters will be discussed within discussion groups

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	Class Presentation
⇧			⇧	

Assessment strategy:

Assessment of the student's knowledge about:

1- Differences between gas, liquid and solid.
2- Chemical bonding.
3- Chemical bonding and intermolecular forces.
4- Thermal chemistry.

Assessment of the student's ability to:

1- Solve problems related to gases law.
2- Differentiate between different types of intermolecular forces.
3- Recognize the effect of the intermolecular forces.
4- Detect types of bonding and crystal structure.
5- Understand the phase diagram.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Quizzes:		5%			Before & after midterm
Assignment:		10%			
Lab work:		25%			
Mid-Term:		20%			1 Hour
Final Exam:		40%			2 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0471658022	Alberty, Robert A., Bawendi, Moungi Gabriel	**Physical Chemistry,** latest edition	John Wiley & Sons Inc
0812114388	Alfred Martin, Pilar Bustamante	**Physical Chemical Principles in Pharmaceutical Sciences,** latest edition	Lippincott Williams & Wikins

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**-**	Hours

Total Class Contact Hours per Semester:	**28**
Total Other Contact Hours per Semester:	**-**
Total Study Hours per Semester:	**28**

COURSE DESCRIPTION:

Course Code : PHY101b
Course Title : Physics
Head of Department: Dr. Ali Diab
Course Co-ordinator: Dr. Ibraheem Abdl hadi
Level : 1 (1st Semester) **Credit:** 2

School: Biotechnology (MSA)
Prerequisites: None
Subject Group: Physics

Aims:
The aims of the course are to:

- Introduce type forces and energy.
- Increase the knowledge of Newton's laws.
- Explore the fluid mechanics and properties of matter.
- Introduce temperature, heat and heat transfer
- Introduce students to sound waves
- Provide the basic knowledge about radioactivity.
- Demonstrate the mechanical properties of materials, temperature and heat.
- Provide the basic knowledge laser and x ray techniques.
-

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:
- Understand physics quantities and vectors.
- Demonstrate Newton's laws, force and energy.
- Begin to recognize the fluid mechanics and properties of matter.
- Explore sound and its propagation.
- Understand thermodynamic laws, temperature heat and heat transfer.
- Begin to recognize radioactivity
- Begin to recognize the modern techniques of laser and X- ray.

Skills:
- Define physical quantities and vectors.
- Identify Newton's laws.
- Carry out the fluid mechanics and properties of matter.
- Explore sound.
- Carry out thermodynamic laws, temperature, heat and heat transfer.
- Ability to use and treat with radioactive matters
- Application of new techniques of X- ray and Laser
- Use the library and internet resources to develop independent study skills through assignments.

NDICATIVE CONTENT: (SYLLABUS)

1- Forces and Energy.
2- Mechanical properties of materials.
3- Fluid mechanic laws.
4- Temperature and heat.
5- Heat transfer and thermodynamics laws.
6- X- rays
7- Radioactivity
8- Laser.
9- Sound waves

Main Learning and Teaching Activities (Strategies)

This course will be taught through lectures and practical sessions. Principles and theory behind each practical session will be explained in lectures . Students will be asked to present written research assignments using the library and internet resources.

Weekly	Tutorials	Rounds	**Laboratory Work**	Class Presentation
⇧			⇧	

Assessment strategy:

Assessment of the student's knowledge about:

1. Recognize physics quantities and vectors.
2. Understand the Newton's laws and thermodynamic laws.
3. Understand fluid mechanics and properties of matter, and temperature and heat.
4. Modern physics and its applications.

Assessment of the student's ability to :

1. Demonstrate physics quantities and vectors.
2. Explore Newton's laws and elasticity .
3. Carry out the fluid mechanics and properties of matter.
4. Understand sound and its nature & propagation.
5. Carry out thermodynamic laws, temperature & heat and heat transfer.
6. Understand radioactivity.
7. Understand application techniques of X- ray and Laser

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Quizzes		10%			Before & After midterm
Assignments		5%			
Mid-Term:		20%			1.5 Hour
Lab Work:		25%			
Final Exam:		40%			3 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0471151831	John D. Cutnell, Kenneth W. Johnson	**Physics,** latest edition	Wiley; 6 edition
0471134473	Karl F. Kuhn	**Basic Physics,** latest edition	Wiley; 2 edition

Useful Websites:

- www.physicscentral.com
- physicsweb.org/
- www.colorado.edu/physics/2000/index.pl
- www.physicsclassroom.com

Learning Unit Contact Hours:

Per Week:

Lectures:	1	Hours
Tutorials:	**1**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester: 14
Total Other Contact Hours per Semester: 42
Total Study Hours per Semester: 56

Lab Course

Lab.1 Measurements of short length using Vernier calliper.

Lab.2 Ohm’s Law

Lab.3 Kirchhoff’s Laws

Lab.4 Mapping of equipotent Lines of an electric field

Lab.5 viscosity

Lab.6 surface tension

Lab.7 Determination of the Coefficient Of Viscosity for Glycerin

Lab.8 Joule's Experiment

Lab.9 Simple pendulum

Lab.10 Specific heat of solid

Lab.11 Revision

Lab.12 Revision

COURSE DESCRIPTION:

Course Code: PHY102b **School:** Biotechnology (MSA)
Course Title: Biophysics
Head of Department: Dr. Aly Diab **Prerequisites:** PHY101b
Course Co-ordinator: Dr. Ibrahim Abdel Hady
Level: 1 (2nd semester) **Credit:** 2 **Subject Group:** Physics

AIMS:
The aims of the course are to:

- Introduce students to biological energy.
- Explore the elementary chemical thermodynamics.
- Raise awareness of the electron transport chains as proton pumps.
- Demonstrate application chemical potential; electrochemical potential; membrane potential; coupling between electron and proton transport.
- Understand the photochemical reaction centers.
- Understand the physical basics of electroporation.
- Explore the protein structure and protein modeling.
- Demonstrate the biomedical applications of liposomes.

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:
- Begin to recognize an overview and global perspective of biological energy.
- Understand the elementary chemical thermodynamics.
- Explore the electron transport chains as proton pumps.
- Demonstrate some application chemical potential; electrochemical potential; membrane potential; coupling between electron and proton transport.
- Understand the photochemical reaction centers.
- Understand the physical basics of electroporation
- Explore the protein structure and protein modeling.
- Demonstrate the biomedical applications of liposomes.

Skills:
- Identify different perspective of biochemical energy.
- Define the thermodynamic functions; equilibrium constant, pH, pK, enthalpy, entropy and free energy
- Making different application chemical potential; electrochemical potential; membrane potential; coupling between electron and proton transport.
- Understand the ATP synthesis and the ATP synthase.
- Use the library and internet resources to develop independent study skills through assignments.
- Show time management skills by working to deadlines

INDICATIVE CONTENT :(SYLLABUS)

1- Introduction to biological energy.
2- Elementary chemical thermodynamics.
3- Electron transport chains; overview and redox components.
4- Electron transport chains as proton pumps.
5- Chemical potential; electrochemical potential; membrane potential; coupling between electron and proton transport.
6- ATP synthesis and the ATP synthase.
7- Transport systems in bacteria and eukaryote cells, and the role in homeostasis.
8- Photosynthesis: overview, and light harvesting.
9- Photochemical reaction centers.
10- Kinetics and thermodynamics of reaction centers.
11- Photosystem II; Secondary acceptors and donors.
12- Physical basics of electroporation.
13- Protein structure and protein modeling.

Main Learning and Teaching Activities :(Strategies)

This course will be taught through lectures and practical sessions**.** Principles and theory behind each practical session will be explained in lectures. Students will be asked to present written research assignments using the library and internet resources.

Main Learning and Teaching Activities :(Strategies)

Weekly Lectures	**Tutorials**	Rounds	Laboratory Work	Class Presentation
⇧	⇧			

Assessment strategy:

Assessment of the student's knowledge about:

1- Assessment of the student's knowledge about:
2- Recognize the biological energy.
3- Understand the elementary chemical thermodynamics
4- Some application chemical potential; electrochemical potential; membrane potential; coupling between electron and proton transport.
5- Understand the electron transport chains as proton pumps
6- Understand the photochemical reaction centers.
7- Understand the physical basics of electroporation.
8- Recognize protein structure and protein modeling.
9- Understand biomedical applications of liposomes.

Assessment of the student's ability to:

1. Identify different perspective of biochemical energy.
2. Define the thermodynamic functions; equilibrium constant, pH, pK, enthalpy, entropy and free energy
3. Making different application chemical potential; electrochemical potential; membrane potential; coupling between electron and proton transport.

4. Understand the ATP synthesis and the ATP synthase.
5. Understand the photochemical reaction centers.
6. Understand the physical basics of electroporation.
7. Recognize protein structure and protein modeling.
8. Understand biomedical applications of liposomes.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Quizzes		20%			Before & after Midterm
Assignments		20%			
Mid-Term:		20%			1.5 Hour
Final Exam:		40%			2 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0471485381	Rodney M. J. Cotterill	**Biophysics : An Introduction,** latest edition	John Wiley & Sons; New Ed edition
3540670882	Roland Glaser	**Biophysics,** latest edition	Springer; 1 edition
0716743728	Philip Nelson	**Biological Physics : Energy, Information, Life,** latest edition	W. H. Freeman

Useful Websites:

- www.biophysics.org
- www.sciencedirect.com/science/journal
- www.ks.uiuc.edu

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**-**	Hours

Total Class Contact Hours per Semester: **28**
Total Other Contact Hours per Semester: **-**
Total Study Hours per Semester: **28**

COURSE DESCRIPTION:

Course Code: GEN201b **School:** Biotechnology (MSA)
Course Title: Introductory Genetics
Head of Department: Dr. Ali Diab **Prerequisites:** BIO101b, BIO102B
Course Co-ordinator: Dr. Ahmed M. K. Nada
Level: 2 (1st semester) **Credit:** 3 **Subject Group:** Genetics

AIMS:
The aims of the course are:

- To demonstrate the history of Genetics and the four major genetic subdivisions.
- To provide students with a strong basic knowledge about the Mendelian genetics (Mendelian inheritance lows and their exceptions and abnormalities).
- To introduce simple quantitative genetics.
- To underestimate the importance of sex when it comes to genetics.
- To provide students with a strong basic knowledge about the principle of molecular genetics (Central Dogma).
- To give the students a clear idea about the genetic counseling.
- To provide students with a knowledge about the different types of mutations and chromosomal disorders.
- To provide a clear link for the students between the principles and aims of the course and the other advanced courses dealing with the latest issues in genetics.

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:

- Discuss the meaning, definitions and the relation between the four major classes of Genetics.
- Appreciate classical Mendelian inheritance petterns.
- Appreciate the dynamic nature of genes in populations and understand how mutations influence evolution or diseases.
- Appreciate the penetration in the dominance genes and the influence of somatic genes and sex in this penetrance.
- Discuss the Sex-Determination Disorders in Humans and sex linked trait inheritance.
- Discuss the aspects of molecular genetics and how genes are replicated, transcripted and translated.
- Appreciate genetic counseling, meaning, applications and importance.
- To gain knowledge about different types of gene mutations and chromosomal mutations with reflect to the medical disorders caused by these mutations.

- To gain simple information about the hottest ten issues recently discussed in the genetic field.

Skills:

- Execute and analyze genetic concepts and interactive experiments.
- Recognize the usefulness, and limitations, of the advances in human genetics research.
- Perform experiments related to genetics.
- Present and interpret genetic data.

INDICATIVE CONTENT :(SYLLABUS)

1 **History of genetics**
2 **Mendel's Peas Plan: Discovering the Laws of Inheritance**
   - Dominance and Monohybrid cross
   - Multiple-Loci Crosses
   - Finding Unknown Alleles
   - Incomplete dominance
   - Codominance
   - Quantitative inheritance, Multiple alleles
   - Lethal alleles
   - Genes linked together
3 **The Subject of Sex**
   - Sex-Determination Disorders in Humans
   - Sex-linked Inheritance
   - Sex-influenced traits
4 **DNA: The Genetic Material**
   - Discovering DNA
   - The structure of DNA
   - DNA Replication
5 **RNA: Like DNA but Different**
   - Transcription: Copying DNA's Message into RNA's Language
   - Translating the Genetic Code
   - Meeting the Translating Team
6 **Genetic Counseling**
   - Getting to Know Genetic Counselors
   - Building and Analyzing a Family Tree
   - Genetic Testing
7 **Mutation and Inherited Diseases**
   - Starting Off with Types of Mutations
   - Facing the Consequences of Mutation
   - The chemistry of mutation
8 **Chromosome Disorders**
   - Studying Chromosomes
   - Counting Up Chromosomes
   - Chromosome Disorders
9 **Ten of the Hottest Issues in Genetics**
   - Pharmacogenomics
   - Stem Cell Research

— Genetics of Aging
— Proteomics
— Bioinformatics
— Nanotechnology
— Gene Chips
— Evolution of Antibiotic Resistance
— Genetics of Infectious Disease
— Bioterrorism

Main Learning and Teaching Activities :(Strategies)

This course will be taught mainly through lectures, some subject matters will be discussed within discussion groups

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	Class Presentation
⇧			⇧	

Assessment strategy:

Assessment of the student's knowledge about:

1- The meaning and the relation between the four major classes of Genetics.
2- Mendel lows.
3- Sex-Determination disorders in humans and sex linked trait inheritance.
4- The aspects of molecular genetics and how genes are replicated, transcripted and translated.
5- Genetic counseling, meaning, applications and importance.
6- Gene and chromosomal mutations.

Assessment of the student's ability to:

1- Carry out Conventional genetic tests.
2- Carry out Phenotype analysis and Chromosome analysis.
3- Present and interpret genetic data.
4- Calculate inheritance ratios

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Quizzes		5%			Before & after midterm
Assignment:		10%			
Mid-Term:		20%			1.5 Hour
Lab Work:		25%			
Final Exam:		40%			3 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0632044381	Sandra Pennington	**Introduction to Genetics,** latest edition	Blackwell Publishers
0824779177	Regenauer, Achim	**Genetics Basis for medicine in the 21st century,** latest edition	Munich Reinsurance Company

Useful websites

- www.**genetics**.wisc.edu/**course**s/466/summer2002/**course**info.html
- www.cbs.dtu.dk/staff/dave/roanoke/**genetics**.html
- www.msu.edu/**course**/zol/341/snapshot.afs/sears/genhard.htm

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester: 28
Total Other Contact Hours per Semester: 28
Total Study Hours per Semester: 56

COURSE DESCRIPTION:

Course Code: GEN202b
Course Title: Microbial Genetics
Head of Department:Dr.Ali Diab
Course Co-ordinator: Dr. Ahmed Nada
Level: 2 (2nd semester)

School: Biotechnology (MSA)

Prerequisite: GEN201b, MB 201b

Subject Group: Genetics

AIMS:
The aims of the course are:

- Learn and apply a range of microbial laboratory techniques used in biotechnology
- Expand student understanding fundamental and advanced concepts of microbial genetics including, but not limited to:
    - DNA structure, packaging, replication, and gene expression
    - DNA damage and mutagenesis
    - Mobile genetic elements
    - Genetic exchange, bacteriophage genetics, and genetic engineering
    - Yeast genetics and its significance in biotechnology

LEARNING OUTCOMES
Upon completion of the course the student will be able to:

Knowledge:

- Acquire knowledge and critical understanding of concepts and principles of many specialist techniques for modern microbiology
- Understand the mechanistic basis and biological significance of genetic exchange between bacteria
- Understand how bacteria respond genetically to environmental stresses
- Illustrate the importance and role of mobile genetic elements in the genome
- Understand yeast genome architecture, and its significance in biotechnology
- Understand the application of the discussed concepts towards isolating, characterizing, and creating mutants

Skills:

- Develop and modify media for the selection of microorganism mutants
- Begin to manipulate microbial genomes by transduction, transformation, and/or conjugation
- Understand and perform step by step processes involved in genomic and plasmid DNA isolation.
- Be able to construct physical and genetic maps from experimental data.
- Present genetic data to an educated audience.
- Develop advanced problem solving skills in the laboratory environment.

INDICATIVE CONTENT: (SYLLABUS)

- Bacterial Genetics: genome structure, transformation, transduction, recombination, plasmids, cloning, and its advantages or applications.
- Viral Genetics: including the types of viruses based on its genetic material, and in-depth understanding of bacteriophage lambda.
- Yeast Genetics: Using yeast as a model to illustrate genetic differences between prokaryotic and eukaryotic genomes, YACs, and its applications in biotechnology.
- Understanding how mutations are classified and induced using microbe models.
- Develop an understanding of transposable elements and its application in biotechnology.

MAIN LEARNING AND TEACHING ACTIVITIES: (STRATEGIES)

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	Class Presentations
⇧			⇧	

ASSESSMENT STRATEGY:

Assessment of the student's knowledge about:

- Bacterial genome structure
- Role of conjugation in transferring genes and increasing bacterial genetic diversity
- Transposable elements in prokaryotes and eukaryotes
- Impact of mutagens, and the role of mutations
- Yeast genome structure
- YAC's role in biotechnology and molecular biology
- Types of Viral genomes
- Applications of microbial genetics in biotechnology

Assessment of student's ability to:

- Perform simple experiments involving bacterial conjugation.
- Understand simple mutagenesis experiments and the use of marker or reporter genes
- Perform simple bacterial transformation.
- Perform plasmid and genomic DNA isolation

Methods of Assessment	Grading Mode	Weighting	Minimum Pass Mark	Words Length	Outline Detail
Project Assignments Quizzes Mid-term Lab Work Final Exam		 10% 5% 20% 25% 40%			 1.5 Hours 3 Hours

Key Texts:

ISBN	Author	Title	Publisher
0-471-22197	Uldis N.Streips Ronald E.Yasbin	Modern Microbial Genetics, latest edition	Wiley-Liss

Useful Websites
www.ncbi.nlm.nih.gov
www.ebi.ac.uk

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**4**	Hours

Total Class Contact Hours per Semester : 28
Total Other Contact Hours per Semester: 56
Total Study Hours per Semester: 84

COURSE DESCRIPTION:

Course Code: GEN301b **School:** Biotechnology (MSA)
Course Title: Molecular Genetics and genetic engineering
Head of Department: Dr. Ahmed M K Nada **Pre-requisites:** GEN201b, BT203b
Course Co-ordinator: Dr. Gihan safwat
Level: 3 (1st semester) **Credit:** 4 **Subject Group:** Genetics

AIMS:
The aims of the course are:

- To acquire the students with a good basic grounding in the molecular structure, organization, and function of the genetic material in different organisms.
- To distinguish between different types of molecular markers..
- To critically appraise the different methods used in molecular mapping.
- To study the applications of genetic analysis in different organisms.

LEARNING OUTCOMES:
Upon completion of the course the student will be able to:

Knowledge:

- Develop deeper understanding of the Genomes: chromosomes, plasmids and genes.
- Recognize the mechanisms of genetic recombination.
- Distinguish between different mechanisms of genetic recombination and genome mapping.
- Enumerate the different applications of genetic analysis.
- Compare some of the applications of gene mapping.
- Different types of molecular markers

Skills:

- Apply DNA recombination and genetic mapping in locating genes.
- Carry out gene isolation from complex genomes.
- Design and Identify molecular markers
- Analyze genetic traits using molecular marker

INDICATIVE CONTENT: (SYLLABUS)

1- Genomes: chromosomes, plasmids and genes.
2- Mechanisms of genetic recombination.
3- Molecular markers and genome mapping.
4- Applications of genetic analysis.
5- Isolating genes from complex genomes.
6- Transposon tagging of eukaryotic genes.

Main Learning and Teaching Activities :(Strategies)

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	Class Presentation
⇧			⇧	

Assessment Strategy:

Assessment of the student's knowledge about:

1- Different DNA, RNA and Chromatin structures.
2- Genetic mapping and gene isolation.
3- Transposon tagging of eukaryotic genes.
4- The useful applications of genetic analysis and DNA recombination techniques.
5- Different types of molecular markers

Assessment of the student's ability to:

1- Identifying the entire genome DNA structures; chromosomes, genes & plasmids, (the whole recipe).
2- Recognize the use of “genetic maps” to locate genes by statistical analyses, PCR, RT-PCR, RFLP and DNA sequencing.
3- Isolate genes from complex genomes.
4- Perform genetics analysis of different traits.

Assessments Details

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Project		10%			
Assignments		5%			
Mid-Term:		20%			1.5 Hour
Lab Work:		25%			
Final Exam:		40%			3 Hours

Key Texts:

ISBN Number	Author	Title	Publisher
0471156760	Roger L. Miesfeld	**Applied Molecular Genetics,** latest edition	Wiley-Liss
B0009ZHJWS	Jack K. Pasternak	**An Introduction to Human Molecular Genetics: Mechanisms of Inherited Diseases,** latest edition	Wiley-Liss
0130428116	Peter Sudbery	**Human Molecular Genetics,** latest edition	Prentice Hall
0387547304	V. E. A. Russo	**Development: The Molecular Genetic Approach,** latest edition	Springer-Verlag Telos

Useful websites

- www.jbc.org/cgi/content/abstract/280/11/9848
- www.bd.trdf.co.il/database/ search/search_result.asp?cls=c1
- www.dicoland.com/en/biology/ glossary-of-molecular-genetics-and-genetic-engineering-2587

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**4**	Hours

Total Class Contact Hours per Semester: 28
Total Other Contact Hours per Semester: 56
Total Study Hours per Semester: 84

COURSE DESCRIPTION:

Course Code: GEN302b **School:** Biotechnology (MSA)
Course Title: Complex Genome Analysis
Head of Department: Dr. Ahmed M K Nada **Pre-requisite:** BT204b, BT 202b
Course Co-ordinator: Dr. Osama Saad
Level: 3 (2nd semester) **Credit:** 3 **Subject Group:** Genetics

AIMS:
The aims of the course are to:

- Develop deeper understanding about genetic analysis and manipulation of plants.
- Study the importance of transgenic plants in the production of recombinant products.
- Acquire knowledge about inheritance and expression of chimeric genes in plants.
- Delve into the principles underlying the mode of inheritance and frequency of human genetic diseases.
- Distinguish between the molecular pathology of some common human genetic diseases.
- Formulate methods of treatment of genetic diseases.
- Provide an understanding of the molecular basis of human "genetic diseases".

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:

- Identify the use of agrobacterium and it's interaction with plants.
- Critically appraise the importance of transgenic plants for the production of recombinant products.
- Discuss the concepts of reverse genetics, genetic and physical makers, mapping of genetic disorders, radiation hybrids, *insitu*-hybridisation, co-inheritance studies and linkage analysis.
- Raise the students awareness to recent molecular methods used in detection of genetic disease.

Skills:

- Differentiate between different genetic analysis and plant manipulation.
- Numerate the methods used to test for known mutations and how to scan for unknown mutations.
- Appraise the Human genome project; DNA sequencing. Genetic mapping and the relating of genes to common traits.
- Assess human genetic disorders and their molecular pathology, based on the findings collected from case studies.

INDICATIVE CONTENT :(SYLLABUS)

Genetic analysis and manipulation of plants:

1. Agrobacterium and it's interaction with plants.
2. Ti-plasmid-based vectors and plant transformation.
3. Plant transformation with microprojectiles.
4. Inheritance and expression of chimeric genes in plants.
5. Insect/ viral/ herbicide resistant plants.
6. Transgenic plants for the production of recombinant products.
7. GM plants for fuel and food production.

Genetic analysis of man:

1. Introduction to genetic diseases: modes of inheritance, allele/ disease frequencies, etc.
2. Human genome project, current program, historical prospective.
3. Some case studies detailing the molecular pathology of some common human genetic diseases.
4. Molecular methods used in detection of genetic disease.
5. Social and ethical issues raised in the above studies.

Main Learning and Teaching Activities :(Strategies)

This course will be taught through lectures and practical sessions.
The underlying principles and theory behind each practical session will be explained in lectures.
Students will be asked to present written research assignments using the library and internet resources.

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	Class Presentation
⇧			⇧	

Assessment Strategy:

Assessment of the student knowledge about:

1. Different types of genetic analysis and techniques for manipulation of plants.
2. Use of agrobacterium, and different techniques of plant transformation.
3. Details of inheritance and expression of chimeric genes in plants.
4. Differentiation between insect, viral and herbicide resistant plants.
5. Genetic diseases: modes of inheritance, allele/ disease frequencies
6. Molecular pathology of some common human genetic diseases.

Assessment of the student's ability to:

1. Design experimental approach to modify plant cells
2. Use molecular techniques to manipulate gene exxpression
3. Diagnose common human genetic diseases, through case studies.
4. Recognize the importance of transgenic plants in resistance of insects, viruses and extreme weather conditions.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Project:		10%			
Assignment:		5%			
Mid-Term:		20%			1.5 Hour
Lab Work:		25%			
Final Exam:		40%			3 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0121878708	David N. Cooper	**Human Gene Evolution (Human Molecular Genetics),** latest edition	Academic Press; 1st edition
0471156760	Roger L. Miesfeld	**Applied Molecular Genetics,** latest edition	Wiley-Liss
0815341822	Tom Strachan, Andrew Read	**Human Molecular Genetics,** latest edition	Garland Science/Taylor & Francis Group
0521587840	Stephen H. Howell	**Molecular Genetics of Plant Development,** latest edition	Cambridge University Press
1891786032	Jack J. Pasternak	**An Introduction to Human Molecular Genetics: Mechanisms of Inherited Diseases,** latest edition	Wiley-Liss
0195104862	Hans D. Ochs	**Primary Immunodeficiency Diseases: A Molecular and Genetic Approach,** latest edition	Oxford University Press

Useful websites

- www.uku.fi/laitokset/neuro/44the.html
- www.elsevier.com/wps/product/cws_home/622920
- www.hhmi.org/research/investigators/ginsburg.html
- hum-molgen.org/
- www.molgen.mpg.de/research/ropers/
- www.amazon.com/exec/obidos/ tg/detail/-/0471474266?v=glance

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester:	**28**
Total Other Contact Hours per Semester:	**28**
Total Study Hours per Semester:	**56**

COURSE DESCRIPTION:

Course Code: GEN303b **School:** Biotechnology (MSA)
Course Title: Proteomics and Protein engineering
Head of Department : Dr. Ahmed M K Nada **Pre-requisite:** GEN201b, BT202b
Course Co-ordinator: Dr. Ahmed M. K. Nada
Level: 3 (2nd semester) **Credit:** 3 **Subject Group:** Genetics

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AIMS:
The aims of the course are:

- To understand the meaning of Genomics as the scientific study of genome.
- To implement upon the role genes play, individually and collectively, in determining structure, directing growth and development, and controlling biological functions.
- To Identify Proteomics as the study of structure, function, location and interaction of proteins within and between cells.
- To appreciate the dire importance of combining structural, functional genomics and proteomics to truly understand the relationship between genes, protein production, and traits.

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:

- Explore the physical aspects of the genome.
- Develop the concepts and principles underlying the human genome project and plant genome program.
- Differentiate between the different structures of the proteome.
- Understand the function of proteins.
- Correlate the shape of proteins to their functionality.
- Identify genetic markers for plant breeding purposes.
- Explore the environmental impacts on gene expression.

Skills:

- Demonstrate the construction concepts of various genome maps and large scale sequencing.
- Develop diagnostic tests for plant, animal and human diseases.
- Determining three-dimensional structure of proteins

INDICATIVE CONTENT :(SYLLABUS)

1. Physical aspects of the genome.
2. Construction and study of various types of genome maps and large scale sequencing.
3. The human genome project and the plant genome program.
4. Structural genomics and gene discovery, isolation, localization and characterization.
5. Developing diagnostic tests for plant, animal and human diseases.
6. Finding genetic markers for plant breeding purposes.
7. Developing therapeutics, such as DNA vaccines or gene therapy.
8. Environmental impacts on gene expression.
9. Protein complex structures and amino acids.
10. Protein shapes as affecting its function.
11. Amino acid sequencing.
12. Cellular proteome changes in response to environmental and neighboring cells conditions.
13. Cataloging the proteins produced by different cells.
14. Discovering the function of a protein.
15. Determining three-dimensional structure of proteins.
16. Protein crystallography.

Main Learning and Teaching Activities :(Strategies)

Students will be asked to present written research assignments using the library and internet resources.

Weekly Lectures ⇧	Tutorials	Rounds	**Laboratory Work** ⇧	Class Presentation

Assessment Strategy:

Assessment of the student's knowledge about:

1. Physical aspects of the genome.
2. Protein and amino acid structure, sequencing and the relationship between protein shape and function.
3. Impact of the environment on the cellular proteome and gene expression.
4. Fundamentals and concepts of protein crystallography.
5. Developing diagnostic tests for plant, animal and human diseases.
6. Concepts and theories underlying the basics of the human genome project and the plant genome program.

Assessment of the student's ability to:

1. Finding genetic markers for plant breeding purposes.
2. Develop diagnostic tests for plant, animal and human diseases.
3. Construction and study of various types of genome maps and large scale sequencing.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Term paper		10%			
Assignments:		5%			
Lab Work:		25%			
Mid-Term:		20%			1 Hour
Final Exam:		40%			2 Hours

Indicative Texts:

ISBN Number	Author	**Title**	Publisher
0805347224	A. Malcolm Campbell, Laurie J. Heyer	**Discovering Genomics, Proteomics, and Bioinformatics,** latest edition	Benjamin Cummings; Bk&CD-Rom edition
0812693744	M L Rantala, Authur J Milgram	**Cloning for & against,** latest edition	Open court publishing company
1574910167	Kenneth E, Uincent L Wu	**Biotechnology & biopharmaceutical manufacturing, processing & preservation (drug manufacturing technology series, Vol. 2),** latest edition	CRC Press
074 8407634	Karen Harper, Angelika Zeiler	**Recombinant antibodies, Application in plant science & plant pathology ,** latest edition	CRC Press
0824778960	Uincent H L Lee	**Peptide & Protien drug delivery,** latest edition	Marcel Dekker
1560327219	Thomas john A	**Biotechnology & safety assessment ,** latest edition	CRC Press

Useful Links:
DNA
http://www.accessexcellence.org/RC/VL/GG/structure.html
Gene transcription
http://users.rcn.com/jkimball.ma.ultranet/BiologyPages/T/Transcription.html
Mutation
http://www.biology-online.org/2/8_mutations.htm
Genetic code
http://psyche.uthct.edu/shaun/SBlack/geneticd.html

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester:	**28**
Total Other Contact Hours per Semester:	**28**
Total Study Hours per Semester:	**56**

COURSE DESCRIPTION:

Course Code: GEN304b **School:** Biotechnology (MSA)
Course Title: Pharmacogenomics
Head of Department: Dr. Ahmed Nada **Prerequisites:** GEN201b
Course Co-ordinator: Dr. Amr Ageez
Level: Elective **Credit:** 4 **Subject Group:** Genetics

AIMS:
The aims of the course are:

- To increase the awareness of the students to the importance of Phamacogenomics as a rapidly growing field of biotechnology.
- To understand the different methods used to analyze the huge amount of information that is being gathered about human gene sequences and genetic diseases.
- To emphasize upon the integration of basic and applied research in human and microorganism gene mapping.

LEARNING OUTCOMES:
The course outcomes for what students should know include:

- What genes are and how they are organized and regulated;
- How alleles segregate in and among populations;
- Environmental and genetic factors that affect development of the phenotype, including drug response;
- How polymorphisms arise and, and how gene linkage and human gene mapping are used to identify candidate genes;
- How human genetic variation affects drug metabolism, activation, and disposition;
- The advantages, limitations, and dangers of predictive testing for genetic disease and drug response;
- How to navigate among the many comprehensive genomic databases and resources on the Internet;
- The genomic technologies employed in drug discovery and development.

INDICATIVE CONTENT :(SYLLABUS)

1. Introduction to Pharmacogenomics
2. Human Polymorphisms, frequencies, significance and populations
3. Basic Pharmacology
4. Informatics in PGX
5. Methods for genomic variation discovery & genotyping
6. Technologies for the Analysis of Single Nucleotide Polymorphisms
7. Positional Cloning and Disease Gene Identification
8. Interethnic Differences in Drug Response
9. Compare Individual and Ethnic Differences in Drug Metabolism
10. Cancer pharmacogenomics Pathways of drug metabolism
11. Pharmacogenomics and the Treatment of Neurological Disease

Main Learning and Teaching Activities :(Strategies)

This course will be taught through lectures and practical sessions. The student will be asked to prepare a portfolio and to do internet search covering a specific topic.

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	Class Presentation
⇧			⇧	

Assessment strategy:

Assessment of the student's knowledge about:

1. Understanding of the human genome map.
2. Relating genes to traits.
3. Basics of developing and designing new medicines by setting new therapeutic targets.

Assessment of the student's ability to:

1. Detect molecular variation.
2. Know how polymorphisms arise and, and how gene linkage and human gene mapping are used to identify candidate genes;.
3. Understand specific examples of ethnic difference in drug metabolism.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Project:		10%			
Assignments:		5%			
Mid-Term:		20%			1.5 Hour
Lab Work:		25%			
Final Exam:		40%			3 Hours

Indicative Texts:

- **Pharmacogenomics**, Second Edition, Edited by W. Kalow, U. Meyer and R. Tyndale © 2005 by Taylor & Francis Group, LLC
- **Pharmacogenomics**: The Search for Individualized Therapies.Edited by J. Licinio and M.-L. Wong Copyright © 2002 Wiley-VCH Verlag GmbH & Co. KGaA

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**4**	Hours

Total Class Contact Hours per Semester:	**28**
Total Other Contact Hours per Semester:	**56**
Total Study Hours per Semester:	**84**

COURSE DESCRIPTION:

Course Code: GEN402b **School:** Biotechnology (MSA)
Course Title: Molecular and Genetic Diagnosis
Head of Department: Dr Ahmed M K Nada **Pre-requisite:** BIO201b, GEN301b
Course Co-ordinator: Dr Amr Ageez
Level: 4 (2nd semester) **Credit:** 3 **Subject Group:** Genetics

AIMS:
The aims of the course are to:

- Evaluate the application of genetic susceptibility
- Critically appraise the clinical impact of genetic susceptibility.
- Emphasize the usefulness of molecular and genetic tools in the diagnosis of disease.
- Understand the nature of genetic diseases.
- Imagine new trends use in treatment of cancer.

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge

- Describe the role of imaging methods in general in the diagnosis and treatment evaluation of genetic diseases.
- Identify MRI and MRS parameters of particular usefulness to characterize inherited metabolic brain diseases.
- Describe some cases of these diseases where unambiguous diagnosis is possible on the basis of MRI and/or MRS approaches.
- Explain how the study of transgenic animals with missing or modified proteins may help understand the nature of genetic diseases.
- Describe what the potentials of MR are to characterize the phenotype of these animals.

Skills:

- Know how to use MRI and MRS parameters in molecular and genetic diagnosis.
- Understand Interfaces of Genetic Diagnosis and Treatment with Imaging Methods.
- Be aware of Role of Magnetic Resonance in Transgenic Animal Models.
- Perform different genetic testing

INDICATIVE CONTENT :(SYLLABUS)

1. Application of Genetic Susceptibility Information.
2. Pre-implantation genetic diagnosis.
3. Genetic testing.
4. Examples of drugs diagnosed by genetic methods.
5. How is PGD performed?
6. Does PGD respect the value and status of the human embryo?
7. Clinical Impact of Genetic Susceptibility Information.

Main Learning and Teaching Activities :(Strategies)

This course will be taught mainly through lectures and practical sessions, some subject matters will be discussed within discussion groups.

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	Class Presentation
⇧			⇧	

Assessment Strategy:

Assessment of the student knowledge about:

1. Definition and concept of Preimplantation Genetic Diagnosis (PGD).
2. How is PGD performed.
3. Certain disabling conditions can be detected by PGD.
4. Diseases diagnosed by molecular and genetic ways.

Assessment of the student's ability to:

1- Define and recognize the concept of Preimplantation Genetic Diagnosis (PGD).
2- Detect disabling conditions by the use of PGD.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Project:		10%			
Assignment:		5%			
Lab work		25%			
Mid-Term:		20%			1 Hour
Final Exam:		40%			2 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0748407332	Davies, Kevin	**Cracking the Genome: Inside the Race to Unlock Human DNA,** latest edition	Free Press
0824779177	Regenauer, Achim	**Genetics Basis for medicine in the 21st century,** latest edition	Munich Reinsurance Company

Useful websites

- www.**genetics**.wisc.edu/**course**s/466/summer2002/**course**info.html
- www.cbs.dtu.dk/staff/dave/roanoke/**genetics**.html
- www.msu.edu/**course**/zol/341/snapshot.afs/sears/genhard.htm

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester: 28
Total Other Contact Hours per Semester: 28
Total Study Hours per Semester: 56

COURSE DESCRIPTION:

Course Code: MARK302b **School:** Biotechnology (MSA)
Course Title: Management & Marketing in Biotechnology
Head of Department: Samya El shekh **Pre-requisite:** None
Course Co-ordinator: Samya El shekh
Level: 3 (2nd semester) **Credit:** 2 **Subject Group:** Marketing/IPR

AIMS:
The aims of the course are:

- To enable students to gain an understanding of the major decisions faced by managers in their efforts to balance the organization's objectives against the needs and opportunities in the global marketplace.
- To relate theory to practice through the use of an individual or group project throughout the course where students perform a market analysis of a particular Biotechnology product and promotion.
- To give students an understanding of the critical issues in marketing and to equip them with concepts and models relevant to these issues.
- To acquire an understanding of basic marketing concepts which is essential for all areas of business, especially such relevant issues as product innovation, product launch, and the marketing mix.

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:
- Monitoring and reviewing marketing and promotion concepts.
- Observe and reflect on proper methods for new product distribution and promotion.
- Understand the concept of personnel management and professional relationship.

Skills:
- Perform promotion staff training, target setting and payment policies.
- Perform and supervise promotion, advertising and distribution.
- Present a case study.
- Show time management.

INDICATIVE CONTENT :(SYLLABUS)

1. **Introduction**: Definitions; micro and macro marketing; the marketing concept; market opportunity analysis; target market selection; marketing mix development; special consideration of service marketing.
2. **Environmental Opportunities and Constraints**: Environmental scanning and analysis; demography, economics, science and technology, social values and beliefs, political and legal environment, competitive environment.
3. **Target Markets - Segmentation and Evaluation**: Strategies for market segmentation, bases for market segmentation; evaluating marketing and forecasting sales.
4. **Marketing Research and Information Management**: Scope of marketing research; classifications of marketing research; stages in the research process; designing the research; gathering research data; the scope of marketing information systems.
5. **Consumer and Organizational Buying Behavior**: The buying decision process; person specific, psychological and social influences on the buying decision process; dimensions of organizational buying.
6. **Developing the Marketing Mix**: Detailed examination of examination of product price, distribution and promotional strategies. Focus on product launch, innovation and product life cycle.
7. **International Marketing**: International marketing environment; developing international marketing involvement; globalization versus customized marketing strategies; strategic adaptation of marketing mixes.

Main Learning and Teaching Activities :(Strategies)

This course will be taught through lectures.
Tutorials will be placed on the University web site.
Students will be asked to present written research assignments using the library and internet resources.

Weekly Lectures ⇧	Tutorials	Rounds	Laboratory Work	Class Presentation

Assessment Strategy:

Assessment of the student's knowledge about:

1. The thorough understanding of the whole entire concepts of marketing.
2. New product development, distribution and advertising.
3. Methods of advertising, promotion and product selling.
4. Different aspects of International Marketing.

Assessment of the student's ability to:

1. Evaluate different segments of the market.
2. Environmental scanning and analysis.
3. Design marketing plan.
4. Design promotion strategy.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Case study:		20%			
Assignments:		20%			
Mid-Term:		20%			1 Hour
Final Exam:		40%			2 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0395906253	Jay Conrad Levinson	**Guerrilla Marketing : Secrets for Making Big Profits from Your Small Business (Guerrilla Marketing),** latest edition	Houghton Mifflin;
0072553391	Roger A. Kerin, Eric N Berkowitz, Steven W. Hartley, William Rudelius, Roger Kerin, Eric Berkowitz, Steven Hartley, William Rudelius	**MP Marketing with Student CD-ROM & PowerWeb,** latest edition	McGraw-Hill/Irwin
0130336297	Philip Kotler	**Marketing Management,** latest edition	Prentice Hall

Useful websites

http://www.camfoundation.com/olduser/main.htm
http://www.aded.org/start.asp

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**-**	Hours

Total Class Contact Hours per Semester:	**28**
Total Other Contact Hours per Semester:	
Total Study Hours per Semester:	**28**

COURSE DESCRIPTION:

Course Code: MARK401b **School:** Biotechnology (MSA)
Course Title: Intellectual Property Protection
Head of Department: Dr Ahmed M K Nada **Pre-requisite:** BT301b
Course Co-ordinator: Dr Hesham El-Shishtawi
Level: 4 (1st semester) **Credit:** 2 **Subject Group:** Marketing/IPR

AIMS:
The aims of the course are to:

- Allow students to know about intellectual properties.
- It gives some information about ways of exchange materials and ideas between scientists.
- Study the types of licensing agreements.
- Show an understanding of enforcement of intellectual property rights.
- Increase the student's awareness to technological and legal developments in Intellectual property.

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:
- Identify the properties of intellectual communications.
- Understand the trade secret definition.
- Increase awareness about mechanism for applying intellectual properties.

Skills:
- Know the way to apply proper scientific communication.
- Present a case study.
- Working in groups.
- Fill application for patents.
- Distinguish between different types of patents.

INDICATIVE CONTENT :(SYLLABUS)

1- Definition of intellectual properties.
2- International agreements and treaties for intellectual protection (IP).
3- Implementation of copyright, trademark and patency.
4- What is trade secret.
5- The interrelationship between intellectual property and biodiversity.
6- Plant variety protection and UPOV treaty.
7- Public distribution of intellectual property.
8- Type of licensing agreements.
9- Role of IP in technology transfer.

Main Learning and Teaching Activities :(Strategies)

This course will be taught through lectures. Tutorials will be placed on the University web site. Students will be asked to present written research assignments using the library and internet resources.

Weekly Lectures ⇧	Tutorials	Rounds	Laboratory Work	Class Presentation

Assessment Strategy:

Assessment of the student's knowledge about:

1. Intellectual properties.
2. Types of licensing agreements.
3. Trade secret.

Assessment of the student's ability to:

1. Implement copyright, trademark and patency laws.
2. Protect plant variety and apply UPOV treaty.
3. Recognize type of license agreements.
4. Understand role of IP in technology transfer.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Term paper:		20%			
Assignments:		20%			
Mid-Term:		20%			1 Hour
Final Exam:		40%			2 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0471209422	Alexander I. Poltorak, Paul J. Lerner	**Essentials of Intellectual Property,** latest edition	Wiley
0314235191	Arthur R. Miller, Michael H. Davis	**Intellectual Property: Patents, Trademarks, and Copyright (Nutshell Series),** latest edition	West Group Publishing
0974878812	Gregory K. Leonard; Lauren J. Stiroh (Editor)	**Economic Approaches to Intellectual Property Policy, Litigation, and Management,** latest edition	NERA Economic Consulti

Useful websites

- www.wipo.int/
- www.intelproplaw.com/
- www.ipmall.fplc.edu/
- www.patents.com/

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**-**	Hours

Total Class Contact Hours per Semester: 28
Total Other Contact Hours per Semester:
Total Study Hours per Semester: 28

COURSE DESCRIPTION:

Course Code: MARK402b **School:** Biotechnology (MSA)
Course Title: Business Communication
Head of Department: Samya El Shekh **Prerequisites:** None
Course Coordinator: Samya El Shekh
Level: 4 (2nd semester) **Credit:** 2 **Subject Group:** Marketing

AIMS:
The aims of the course are to:

1. Develop student's abilities in analytical thinking and clear expression.
2. Focus on the process of planning, preparing, and executing a professional communications plan.
3. Have the ability to write a series of business documents and give several oral presentations.
4. Reduce the resistance, fear, and complacency inherent to the introduction of technology in the work place.

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:

- Be competent in exploring his interest in hospitality management.
- Deep his understanding of leadership and twenty-first-century hospitality—a multi-trillion dollar industry that encompasses far more than just serving people..
- Manage time, plan ahead and prioritize activities.
- Appreciate the efforts and experiences needed in the execution of research topics.

Skills:

- Prepare and present business documents and discuss a wide variety of hospitality management issues
- Focusing on the critical areas of: Marketing, Finance, Human resources, and Information technology in hospitality-related organizations.
- Be analytical in their way of thinking and have clear expressions.

INDICATIVE CONTENT :(SYLLABUS)

1. Managerial communication.
2. Business writing.
3. Techniques in persuasion.
4. An identification of cultural issues that may make communication difficult.
5. International business, management, marketing.

Main Learning and Teaching Activities :(Strategies)

This course will be taught mainly through lectures, some subject matters will be discussed within discussion groups

Weekly Lectures	Tutorials	Rounds	Laboratory Work	Class Presentation

⇧

Assessment Strategy:

Assessment of the student's knowledge about:

1. Hospitality management, focusing on the critical areas of: Marketing, Finance and human resources.
2. Planning, preparing, and executing professional communications.

Assessment of the student's ability to:

1. Identify cultural issues that may make communication difficult.
2. Develop persuasive techniques.
3. Understand International business, management, and marketing.
4. Improve their business writing skills

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Project:		25%			
Assignments:		15%			
Mid-Term:		20%			1 Hour
Final Exam:		40%			2 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0324185359	Mary Ellen Guffey	**Essentials of Business Communication,** latest edition	South-Western Educational Publishing
0131184598	Deborah Roebuck	**Improving Business Communication Skills,** latest edition	Prentice Hall
0072946571	Raymond V. Lesikar, Marie E. Flatley	**Basic Business Communication: Skills for Empowering the Internet Generation (Basic Business Communication),** latest edition	Irwin/McGraw-Hill

Useful websites

- bcq.theabc.org/
- www.writerswrite.com/buscomm/
- www.bcr.com/
- www.bena.com/ewinters/xculture.html

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	**-**	Hours

Total Class Contact Hours per Semester: 28
Total Other Contact Hours per Semester:
Total Study Hours per Semester: 28

COURSE DESCRIPTION:

Course Code: BCE202b
School: Biotechnology (MSA)
Course Title: Biochemical Engineering
Head of Department: Dr. Ali Diab
Prerequisites: BCHM201b
Course Co-ordinator: Dr. Ashraf Bakkar
Level: 2 (2nd semester)
Credit: 2
Subject Group: Biochemical Engineering & Instrumentation

AIMS:
The aims of the course are to:

- Provide an introduction to the basic science and technology needed for the principles and practices of industrial applications of biotechnology.
- Introduce the students to special topics in biopharmaceutical production such as vaccine manufacture, plant cell culture, transgenic plants and tissue engineering on industrial scale.
- Topics include fermentation and cell culture, bioseparations, monitoring and control, waste water treatment, microbial growth, bioreactor design, product recovery and bioproducts.
- Prepare students to develop scientific report-writing skills.

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:

- Begin to recognize the principles and practices of industrial applications of biotechnology.
- Understand the basic knowledge required for biotechnology industries for developing, designing and operating advanced production plant and processes.
- Promote progress in the development of biological processes associated with everything from raw materials preparation to product recovery relevant to industries.
- Demonstrate how to develop scientific report-writing skills.

Skills:

- Identify and characterize instrumentation for biochemical engineering.
- Apply micro-, cell and molecular biology and biochemistry techniques important to biotechnology and bioreactor systems.
- Develop engineering analyses and design of bioreactors for enzyme, microbial, and plant cells.
- Produce a well-structured laboratory report, adhering to a standard scientific format.

INDICATIVE CONTENT :(SYLLABUS)

- Fermentation Process, microorganisms, raw materials
- Scaling up fermentation process
- Fermentation methods
- Design of Bioreactors
- Types of Bioreactors
- Downstream processing
- Techniques used for separation of particles
- Liquid-Liquid Extraction
- Biotechnology of Wastewater Treatment
- New integrated treatment systems
- New Trends in Testing Wastewater Quality
- Bioengineering aspects of bioreactor application in plant propagation
- Bioreactor engineering for recombinant protein production using plant cell suspension culture
- Report writing -standard format for the presentation of scientific reports.

Main Learning and Teaching Activities :(Strategies)

This course will be taught through lectures and practical sessions. Principles and theory behind each practical session will be explained in lectures. Visits will be made to different locations of biotechnological industries. Students will be asked to present written research assignments using the library and internet resources.

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	Class Presentation
⇧			⇧	

Assessment strategy:

Assessment of the student's knowledge about:

1. The principles and practices of biochemical engineering.
2. The basic process engineering and instrumentation.
3. Practical applications of biotechnology.
4. How to develop scientific report-writing skills.

Assessment of the student's ability to:

- Identify and characterize different types of instrumentation.
- Apply micro-, cell and molecular biology and biochemistry techniques important to biotechnology and bioreactor systems.
- Develop engineering analyses and design of bioreactors for enzyme, microbial, and plant cells.
- Produce a well-structured laboratory report, adhering to a standard scientific format.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Quizzes		5%			Before & After midterm
Assignments		10%			
Mid-Term:		20%			1.5 Hour
Lab Work:		25%			
Final Exam:		40%			3 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0824700996	Harvey W. Blanch	**Biochemical Engineering,** latest edition	Marcel Dekker
	Gupta S.D. and Ibaraki Y.	**Focus on biotechnology: Plant tissue culture engineering. Vol.6,** latest edition	Springer, The Netherlands
0070032122	James Edwin Bailey, David F. Ollis	**Biochemical Engineering Fundamentals,** latest edition	McGraw-Hill Science/Engineering/Math; 2nd edition
	Kirsi-Marja Oksman-Caldentey, Wolfgang H. Barz.	Plant Biotechnology and Transgenic Plants, latest edition	Marcel Dekker, Inc. New York, Basel.
0815514077	Henry C. Vogel, Celeste C. Todaro	**Fermentation and Biochemical Engineering Handbook,** latest edition	Noyes Publications; 2nd edition

Useful Websites:

- www.sciencedirect.com/science/journal
- sol.rutgers.edu
- www.cbe.**engineering**.uiowa.edu

Learning Unit Contact Hours:

Per Week:

Lectures:	**2**	Hours
Tutorials:	**-**	Hours
Lab Work:	-	Hours

Total Class Contact Hours per Semester: **28**

Total Other Contact Hours per Semester: **-**

Total Study Hours per Semester: **28**

COURSE DESCRIPTION:

Course Code: BCE301b **School:** Biotechnology (MSA)
Course Title: Instrumentation for Biotechnologists
Head of Department: Dr. Ahmed M K Nada **Prerequisites: BCE202b**,
Course Co-ordinator: Dr Amr Ageez
Level: 3 (1ST semester) **Credit:** 2 **Subject Group:** Biochemical Engineering and Instrumentation

AIMS:
The aims of the course are to:

- Introduce students to various analytical instrument used in biological analysis.
- Provide the students with hands-on experience on handling and use of Spectrophotometers, Gas Chromatographs, HPLC, Atomic Absorption Spectrometers, etc…

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:
- Understand the theories underlying the functionality and specificity of analytical instruments used in biological analysis.
- Comprehend the instrumentation involved in the different methods of advanced biological analysis.
- Interpret spectral data of a certain molecule and recognize the correlation between different spectroscopic data to the molecular structure of different compounds.

Skills:
- Deduce the purity of a natural product or synthetic compound.
- Determine the presence of certain chemicals, whether they are natural or synthetic, in a mixture.
- Correlate the obtained spectral data for structural elucidation of an unknown material.

INDICATIVE CONTENT :(SYLLABUS)

A. Theory and operation of:
   1- Spectrophotometers.
   2- Gas chromatographs (Gas/liquid) (GC).
   3- High Pressure Liquid Chromatographs (HPLC).
   4- Atomic Absorption Spectrophotometers.
   5- Mass Spectrometers (GCMS).
   6- Electrophoresis (Vertical & Horizontal)

7- Amino acid analyzer
8- Oligosynthesizer
9- Automated DNA Sequencer
10- Real time PCR
11- PCR
12- Micro-array spotter
13- ELISA Scanner

B. Determination of alcohols in beverages by Gas Chromatography.
C. Determination of Absorbance Spectrum of pigments and other materials using single and double bean spectrophotometers.
D. Determination of mineral elements by Atomic Absorption.
E. Separation of gas mixtures using thermal conductivity detectors.
F. Determination of Caffeine in beverages using HPLC.

Main Learning and Teaching Activities :(Strategies)

This course will be heavily taught through lectures and practical sessions. The student will be responsible for construction of a portfolio as he will be asked to do internet research covering a specific topic.

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	Class Presentation
⇧			⇧	

Assessment strategy:

Assessment of the student's knowledge about:

1- The theory behind the instrumentation and applications of GC, HPLC, NMR and spectroscopic methods.
2- Concepts and principles of atomic absorption/emission spectroscopy and fluorescence/ phosphorescence techniques.

Assessment of the student's ability to:

1- Obtain the spectroscopic data from different sources, and combine the data to differentiate between different and similar compounds.
2- Utilize different spectroscopic and chromatographic instruments for analytical study of pharmaceutical and chemical compounds.
3- Separate a mixture of related or unrelated chemical compounds.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Project		10%			
Assignments		5%			
Mid-Term:		20%			1.5 Hours
Lab Work:		25%			
Final Exam:		40%			3 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
0849383471	John G. Webster	**The Measurement, Instrumentation and Sensors Handbook,** latest edition	CRC Press
136436692	Raymond S Poon	**Biotechnology instrumentation: Creating a product niche in a dynamic industry (Report / Business Intelligence Program, SRI International),** latest edition	Prentice Hall
0071447849	R. S. Khandpur	**Biomedical Instrumentation,** latest edition	McGraw-Hill Professional

Useful websites

- www.process**instrumentation**.com/html/**biotechnology**.html
- www.cato.com/biotech/bio-prod.html
- www.analytica-world.com/id/22572/CMEntries_ID/
- ase.tufts.edu/bulletin/bioengineering.html

Learning Unit Contact Hours:

Per Week:

Lectures:	**1**	Hours
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester: 14
Total Other Contact Hours per Semester: 28
Total Study Hours per Semester: 42

COURSE DESCRIPTION:

Course Code: SEM202b **School:** Biotechnology (MSA)
Course Title: Literature Survey
Head of Department: Dr Ali Diab **Pre-requisites:** None
Course Co-ordinator: Dr. Osama S S Hassan
Level: 3 (1st semester) **Credit:** 1 **Subject Group:** Seminar and Research

AIMS:
The aims of the course are:

- To develop the ability to access relevant up-to-date, scientific information from the primary literature.
- To train students on the use of biological abstract current advances, and to access information on a given subject.
- To provide the understanding and the ability to extract appropriate information from selected journal articles etc. and understand its relative importance.
- To collate information and write a comprehensive review on a given subject.
- Develop the ability to present, interpret and evaluate published scientific research.

LEARNING OUTCOMES:
Upon completion of the course, the students will be able to:

Knowledge:
- Analyze different methods of interpretation and organizing of research data results.
- Appraise the importance of modern information database systems.
- Identify different data libraries as Medline and CDC.

Skills:
- Work independently and in a research team to analyze and interpret data; to present results in a clear and concise manner, and use information sources – library, computer etc.
- Develop logical arguments based on the analysis and interpretation of data obtained from published results.
- Write and present a review paper on any given topic.

INDICATIVE CONTENT: (SYLLABUS)

1. The student chooses a certain topic from a list submitted by various academic staff in one of the biotechnology fields biochemistry, genetics, microbiology, biomedical and protein chemistry area
2. Students would be doing an extensive literature survey using biological abstract, current advances, medline and databases.
3. The student will be required to do literature search, writing and preparing the presentation.
4. The student subsequently submits a typed report of the search for inspection by two internal and two external examiners.

Main Learning and Teaching Activities :(Strategies)

Weekly Lectures	**Tutorials**	Rounds	Laboratory Work	**Class Presentation**
	⇧			⇧

Assessment Strategy:

Assessment of the students' knowledge about:

1. Writing review papers.
2. Organizing data, and proper presentation of such review papers.

Assessment of the students' ability to:

1. Survey different articles on scientific topics.
2. Presenting and summarizing research findings
3. Prepare technical reports.
4. Work within a team and improve their interpersonal skills.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Draft:		25%			
Poster:		5%			
Presentation:		25%			
Review Paper :		45%			

Key Texts:

ISBN Number	Author	Title	Publisher
0471421812	Anderson, J. Poole, M.	**Assignment & Thesis Writing ,** latest edition	Wiley
0321112040	Silyn-Roberts, H.	**Writing for Science,** latest edition	Longman
02013405042	Oshima, Alice, Hogue, Ann	**Medieval British Literature,** latest edition	Addison Wesley
0521328691	John Swales	**Genre Analysis: English In Academic & Research Settings,** latest edition	Cambridge University Press
0891180966	ASA, CSSA, SSSA	**Publications Handbook and Style manual,** latest edition	Library of Congress Cataloging in Publication Data

Useful Tools:

http://www.devry-phx.edu/irnresrc/dowsc/
http://www.owl.english.purdue.edu/

Learning Unit Contact Hours:

Per Week:

Lectures:	1	Hours
lab:	-	Hours

Total Class Contact Hours per Semester:	-
Total Other Contact Hours per Semester	14
Total Study Hours per Semester	14

COURSE DESCRIPTION:

Course Code: SEM302b **School:** Biotechnology (MSA)
Course Title: Industrial Project
Head of Department: Dr. Ahmed M K Nada **Pre-requisites:** SEM202b
Course Coordinator: Dr. Gehan Safwat
Level: 3rd (2nd Semester) **Credit:** 2 **Subject Group**: Research & Seminar

AIMS:
The aims of the course are**:**

- To enable students to undertake a survey project and design experiment in an area of industrial biotechnology
- To develop the ability to access relevant up-to-date, scientific information from the primary literature.
- To collate information and write a comprehensive review on a given subject.
- To develop their ability to detect and solve industrial problems.

LEARNING OUTCOMES:
Upon completion of this course, students will be able to:

Knowledge:

- Identify problems facing some biotechnological industries.
- Appreciate the efforts and experiences needed to solve some industrial problems.
- Appraise some model systems used in biotechnological industries.
- Evaluate the results of a new research and interpret the appropriate results into a research project or manuscript to be presented.

Skills:

- Acquire searching, writing and problem-solving skills.
- Design appropriate experimental or data collection techniques.
- Acquire scientific presentation skills, both oral and written, whether as a seminar or a research report.
- Work independently and apply their knowledge and skills to the solution of a specific theoretical problem.
- Critically assess research results and the work of others i.e. published material.
- Present clear oral presentations with appropriate and adequate use of supporting visual aid material.

INDICATIVE CONTENT: (SYLLABUS)

1. The students will visit some biotechnological industrial firms, such as Agricultural Genetic Engineering Research institute, Mubarak City for scientific research, Ainshams Genetic Engineering Research Institute, and some other firms. The students will be exposed to some of the scientific problems in these industries and will be asked to propose a solutions.
2. The student will subsequently submit a typed report explaining the visit and proposing the solution for a given research problem for inspection by international and two external examiners (from the visited firms).

Main Learning and Teaching Activities :(Strategies)

Supervision is arranged to ensure that the student progresses at an appropriate pace through his/her project and also draws upon his/her own initiative and store of relevant knowledge. Students will be expected to make full use of computing facilities, library and other facilities.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Written report		70%		5000	Students will present a written report of the theoretical background, the problem encountered and the proposed scientific solution in the form of a presentation & discussion. The specific allocation of marks will depend upon: 1. Clarity and understanding of the problem encountered. 2. The applicability of the proposed solution 3. The organization and the adequate discussion of the presented problem
Oral Presentation		30%			

Assessment will focus upon:

- The general organization of the report and quality of the written English.
- A clear and concise abstract.
- The extent of the student's achievement of the original or modified objective(s) of the report.
- The critical evaluation of data or a critical review of theoretical bachground of the encountered problem.
- The critical discussion of proposed solution leading to appropriate conclusions.
- Evidence of professional standards applied throughout the report (i.e. documentation standards).
- Provision and evidence of the use of appropriate references and bibliography.
- The accuracy and technical merit of the report.
- The merit of the written report and oral presentations in addressing the encountered problem

The project supervisor will prepare a report on the project which will include an assessment of the difficulty of the project, the student's approach to it, the accuracy and reliability of the results and conclusions and the quality of the final report.
The student's project as written report and oral presentations will be made available for the external examiners.

Indicative Texts:
A range of appropriate research literature to cover the topic of the project.

COURSE DESCRIPTION:

Course Code: RS 400 and RS 401 **School:** Biotechnology (MSA)
Course Title: Research Project
Head of Department: Dr. Ahmed M K Nada **Pre-requisites:** BT301b
Course Coordinator: Dr. Ayman Diab
Level: 4: 1st (RS 400) and 2nd Semester (RS401) **Credit:** 11
Subject Group: Research & Seminar

Objective:
The students are required to do two separate research projects one through the 1st and another one in the 2nd semesters. The students will have the opportunity to choose from the following subjects: -

S/N	Course Code	Course Title
1	**RS400b & RS401b**	**Project** **Select one topic only per semester:** • Industrial Biotechnology • Environmental Biotechnology • Agricultural Biotechnology (Plant) • Agricultural Biotechnology (Animal) • Medical Biotechnology

AIMS:
The aims of the course are**:**

- To enable students to undertake a research project in an area of biotechnology
- To develop laboratory skills to become independent in designing and executing experiments.
- To develop their ability to present, interpret and discuss research results, having students acquire the ability to design and execute research experiment.
- To provide hands-on experience with routine laboratory equipment.
- To acquire a practical understanding of experimentation to complement lectures, have capability of working independently and in a research team**.**

LEARNING OUTCOMES:
Upon completion of this course, students will be able to:

Knowledge:

- Appreciate the efforts and experiences needed in the execution of seminars or research topics.
- Investigate new subjects through designing and executing research experiments.
- Evaluate the results of a new search and interpret the appropriate results into a research project or manuscript to be presented.

Skills:

- Acquire searching, writing and problem-solving skills.
- Design appropriate experimental or data collection techniques.
- Acquire scientific presentation skills, both oral and written, whether as a seminar or a research report.
- Work independently and apply their knowledge and skills to the solution of a specific theoretical problem.
- Critically assess research results and the work of others i.e. published material.
- Use all relevant literature sources to carry out a detailed search into a general topic and a specific scientific problem.
- Prepare a detailed and structured report on the project.
- Present clear oral presentations with appropriate and adequate use of supporting visual aid material.
- Manage their time, plan ahead and prioritize their activities.

INDICATIVE CONTENT: (SYLLABUS)

1. The students will spend 20 hours per week for a twelve week period undertaking the project; the students will present their results at a series of seminars to an audience of the peers and academic staff.
2. The student will subsequently submit a typed report of the research for inspection by international and two external examiners.

Main Learning and Teaching Activities :(Strategies)

Supervision is arranged through faculty members and external advisor to ensure that the student progresses at an appropriate pace through his/her project and also draws upon his/her own initiative and store of relevant knowledge. Students will be expected to make full use of computing facilities, laboratories, special purpose equipment, library and other facilities in the university or in external biotechnological institutes. It will be the responsibility of the project supervisor to ensure that students do not devote a disproportionate amount of time and effort to their project work, at the expense of their other academic work.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Pages	Outline Details
Written report		50%		20-40	Students will present a written report of the theoretical or practical work & literature search together with a critical evaluation of the work & results in the form of a presentation & discussion. The specific allocation of marks will depend upon: 1. The nature of the project & programme, & will be detailed in Guidelines issued at the start of each session. 2. The successful completion of the research and evaluation of their theoretical and practical work.
Practical work		30%			Supervision of successive result achievement.
Oral Presentation		20%			

Assessment will focus upon:

- The general organization of the report and quality of the written English.
- A clear and concise abstract.
- The extent of the student's achievement of the original or modified objective(s) of the report.
- The critical evaluation of data or a critical review of theoretical published work.
- The critical discussion of results leading to appropriate conclusions.
- Evidence of professional standards applied throughout the report (i.e. documentation standards).
- Provision and evidence of the use of appropriate references and bibliography.
- The accuracy and technical merit of the report.
- The merit of the written report and oral presentations in addressing non-technical issues.

The project supervisor will ensure that the student has access to the lab space, chemicals, equipments and any resources that might be needed by the student in order to complete his/her research. The project supervisor is also required to prepare a report on the project which will include an assessment of the difficulty of the project,

the student's approach to it, the accuracy and reliability of the results and conclusions and the quality of the final report.
The student's project as written report and oral presentations will be made available for the external examiners.

Indicative Texts:
A range of appropriate research literature to cover the topic of the project.

COURSE DESCRIPTION:

Course Code: BT311b **School:** Biotechnology (MSA)
Course Title: Molecular Biology of Cancer
Head of Department: Dr. Ahmed M K Nada **Prerequisite:** BIO201b
Course Co-ordinator: Dr. Ashraf Bakkar
Level: 3 (1st semester) **Credit:** 3 **Subject Group:** Genetics

AIMS:
The aims of the course are:

- To acquaint the students to genesis and evolution of the malignant process
- To teach molecular basis of lymphoid malignancies
- To explore the Oncogenes and tumor suppressor genes
- To understand the mechanisms of invasion and metastasis
- To emphasize on the Extracellular matrix and tumor cell adhesion molecules
- To introduce the students to the molecular methods in the diagnosis of cancer.

LEARNING OUTCOMES:
Upon completion of the course, students will be able to:

Knowledge:

- Explore the molecular basis of lymphoid malignancies
- Acquire knowledge and understanding of Cytogenetics of cancer
- Identify Oncogenes and tumor suppressor genes.
- Recognize the Inherited malignancies

Skills:

- Perform Light and immunofluorescence analysis
- Detect minimal residual disease in malignant disorders
- Identify, use and analyze tumor markers.
- Perform Immunohistochemical and chromosomal analysis.
- Apply molecular methods for detection of cancer cells

INDICATIVE CONTENT: (SYLLABUS)

1. Genesis and evolution of the malignant process.
2. Environmental factors in carcinogenesis (chemical, radiation, viral)
3. Inherited malignancies.
4. Cytogenetics of cancer.
5. Mechanisms of invasion and metastasis.
6. Extracellular matrix and tumor cell adhesion molecules.
7. Oncogenes and cancer.
8. Tumor suppressor genes.
9. Molecular methods in the diagnosis of cancer (FISH, PCR, Southern blot).
10. Detection of minimal residual disease in malignant disorders.
11. Molecular basis of lymphoid malignancies.

Main Learning and Teaching Activities :(Strategies)

Weekly Lectures	**Tutorials**	Rounds	Laboratory Work	Class Presentation
⇧	⇧		⇧	

Assessment Strategy:

Assessment of the student's knowledge about:

3- Different methods used detection of cancer.
4- Environmental factors in carcinogenesis (chemical, radiation, viral).
5- Inherited malignancies and Cytogenetics of cancer
6- Molecular basis of lymphoid malignancies.
7- Oncogenes and tumor suppressor genes.

Assessment of the student's ability to:

3- Design an experiment to detect cancer.
4- Identify different carcinogenic factors
5- Use different molecular methods for detection of cancer.
6- Detect minimal residual disease in malignant disorders
7- Identify the most suitable methods for detection cancer disease

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Term paper:		10%			
Assignments:		5%			
Lab work		25%			
Mid-Term:		20%			1.5 Hour
Final Exam:		40%			3 Hours

Useful Websites:

- http://www.manu.edu.mk/rcgeb/tempus/Molecularbasisofcancer.html
- http:// www.bridgew.edu/newsevnt/BridRev/Archives/98Dec/cancer.htm
- http:// www.ucsf.edu/daybreak/2000/03/30_cancer.html

Indicative Texts:

ISBN Number	Author	Title	Publisher
0721672914	John Mendelsohn, John Mendelsohn, W. B. Saunders, Peter M. Howley Mark A. Israel Lance A. Liotta	Molecular Basis of Cancer, latest edition	C V Mosby Co (07/01/2001)

Learning Unit Contact Hours:

Per Week:

Lectures and Tutorials: **2 Hours**
Lab Work: 2 **Hours**

Total Class Contact Hours Per Semester: 28
Total Other Contact Hours Per Semester: 28
Total Study Hours Per Semester: 56

COURSE DESCRIPTION:

Course Code: MB303b **School:** Biotechnology (MSA)
Course Title: Advanced Immunology
Head of Department: Dr. Ahmed M K Nada **Pre-requisite:** MB201B
Course Co-ordinator: Dr. Ahmed M K Nada
Level: Elective **Credit:** 4 **Subject Group:** Biotechnology

AIMS: The aims of the course are to :

- Provide an overview of the immune system
- Describe the cellular and non-cellular factors brought into play to deal with bacterial and non-bacterial insults to the body.
- Emphasis the microvascular and cellular events associated with both acute and chronic inflammatory responses.
- Provide a basis for explaining many of the current therapeutic strategies adopted for dealing with chronic, immune-based conditions
- Identify novel targets that offer potential for innovative drug design.
- Keep the students abreast of some of the latest reports and current views (often conflicting), that may influence decisions in years to come, on treatment strategies for chronic disorders of the immune system.

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:
- Recognize the immune system and its interaction with the cardiovascular and nervous system.
- Critically appraise the methods available to investigate inflammatory processes.
- Understand the role of cytokines in physiological and pathophysiological processes.
- Identify the mechanism of action of conventional drugs for the treatment of chronic inflammatory responses and future strategies for treating common and rare immunological conditions.

Skills:
- Understand the employment of biotechnology in the context of drug design disorders of immunological origin.
- Understand factors influencing the design of clinical trials.
- Employ critical appraisal skills to assess the appropriateness and applicability of current research surrounding immune disorders and their corresponding treatments.

INDICATIVE CONTENT (SYLLABUS):

1. Introduction and General Overview of the Immune System, Inflammation & Immune Modulation

As indicated above, this course will link knowledge on the workings of the immune system, and associated pathophysiology, with the treatment of a number of conditions.

2. Inflammation and the Cardiovascular System

Life-threatening consequences of the interaction between immune and cardiovascular systems, as exemplified by septic shock, an example of 'whole-body' response to an inflammatory insult, and atherosclerosis and stroke, as examples of localized responses to injury, will be considered. In considering the cellular and molecular basis of inflammation, in the context of future treatment strategies, a significant part of this component of the course will be directed towards understanding the role of cytokines and cell adhesions molecules. Finally, the potential value of statins for these conditions, as related to their interaction with inflammatory mediators, will be outlined.

3. Inflammation in the Respiratory and Musculoskeletal system

Osteoarthritis, asthma and rheumatoid arthritis will be considered in detail. In the past five years, novel treatment strategies have been devised targeting the pathology of these disorders. In the case of rheumatoid arthritis, the recent introduction of drugs designed to interfere with the action of the cytokine tumor necrosis factor (TNFα) represents a very good example of the shift from symptomatic treatment to one dealing with the underlying pathology. As for asthma, the recent evidence for clinical efficacy of agents that inhibit the action of leukotrienes will be addressed. In addition, other targets identified from studies into basic neural and humoral mechanisms controlling airway resistance will be addressed.

3. AIDS/HIV & Transplantation

A clinical perspective on HIV and AIDS and the treatment regimen currently adopted will be outlined. Therapeutic suppression of the immune system with immunosuppressant drugs, to prevent rejection of transplanted kidneys, will be also be covered.

4. Vaccine

The employment of gene therapy and the latest biotechnological advances in vaccine design.

Main Learning and Teaching Activities (strategies):

This course will be taught mainly through lectures, some subject matters will be discussed within discussion groups

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	Class Presentation
⇧	⇧		⇧	⇧

Assessment Strategy:

Assessment of the student knowledge about:

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Term paper		10%			
Assignment		5%			
Practical exam		25%			
Mid-Term:		20%			1 Hour
Final Exam:		40%			3 Hours

Indicative Texts:

ISBN Number	Author	Title	Publisher
	Kuby	Immunology- excellent textbook covering basic immunology and the immunological aspects of various diseases (eg. Rheumatoid Arthritis, AIDS, transplantation and the use of vaccines). The book also provides details of numerous related web sites that facilitate student-centered learning., latest edition	W.H. Freeman & Company, New York
	John Forman and Maureen Dale, Tai-Ping D Fan,	Textbook of Immunopharmacology, latest edition	
	H. Rang, Maureen Dale and James Ritter	Pharmacology, latest edition	Churchill Livingston. London

Useful websites
General Immunology: www.whfreeman.com/immunology (Very good on basic immunology and self test)

Learning Unit Contact Hours:

Per Week:

Lectures:	**3**	Hours
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester:	**42**
Total Other Contact Hours per Semester:	**28**
Total Study Hours per Semester:	**70**

COURSE DESCRIPTION:

Course Code: BT304b **School:** Biotechnology (MSA)
Course Title: Food Biotechnology
Head of Department: Dr. Ahmed M K Nada **Prerequisite:** BT202b
Course Co-ordinator: Dr Osama S S Hassan
Level: Elective **Credit:** 4 **Subject Group:** Biotechnology

AIMS:
The aims of the course are:

- To acquaint the students to the many ways of how to improve the processing of raw materials into final products: natural flavors and colors; and new production aids, such as enzymes and emulsifiers.
- To teach applications of improved starter cultures; waste treatment options; more options for assessing food safety during the process.
- To discuss "greener" manufacturing processes; and biodegradable plastic wrap that kills bacteria.
- To understand the factors that will improve the quality, nutritional value and safety of the crop plants and animal products; that are the basis of the food industry.
- To emphasize on the benefits of the next wave of biotechnology crops, involving improvements in food quality and safety and how to provide consumers with foods designed specifically to be healthier and more nutritious.
- To critically appraise the value of economical impact of commercial-scale production of the natural and highly marketable biotechnological products.

LEARNING OUTCOMES:
Upon completion of the course, students will be able to:

Knowledge:

- Explore the structure and function of microbes and their relevance in production of useful fermentation products.
- Acquire knowledge and understanding of how to change the characteristics of the raw material inputs so that they are more attractive and more amenable to processing.
- Identify industrial processes and regulations.
- Recognize the importance of fermentors which are resistant to viral infection through the use of recombinant biotechnology.

Skills:

- Design a laboratory process to improve raw materials.
- Apply and assess quality control in production of food biotech products
- Apply industrial standards in improving food fermentors
- Identify different types of food additives and processing Aids
- Develop enhanced and acceptable food products.

INDICATIVE CONTENT: (SYLLABUS)

1. Introduction to Food Biotechnology.
2. Improving the Raw Materials.
3. Health and Nutritional Benefits.
4. Product Quality.
5. Safety of the Raw Materials.
6. Food Processing.
7. Improving Food Fermentors.
8. Food Additives and Processing Aids.
9. Food Safety Testing.

Main Learning and Teaching Activities :(Strategies)

Weekly Lectures	**Tutorials**	Rounds	Laboratory Work	Class Presentation
⇧	⇧		⇧	

Assessment Strategy:

Assessment of the student's knowledge about:

1. Different methods used in food processing.
2. Safety measures of food testing and processing.
3. Types of food additives and processing aids
4. Methods used by biotechnologist to improve food products.

Assessment of the student's ability to:

1. Design an experiment to improve food product.
2. Distinguish between different types of food Additives and Processing Aids
3. Use different biotechnological methods in improving the Raw Materials.
4. Recognize different parts of the fermentor its function

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Term paper:		10%			
Assignments:		5%			
Lab work		25%			
Mid-Term:		20%			1.5 Hour
Final Exam:		40%			3 Hours

Useful Websites:

- http://www.ific.org/food/biotechnology/index.cfm
- http://www.ific.org
- http://www.foodfuture.org.uk

Indicative Texts:

ISBN Number	Author	Title	Publisher
1566768926	Gustavo F. Gutierrez-Lopez, Emma V. Nathan	Food Science and Food Biotechnology, latest edition	CRC Pr I Llc (02/01/2003)
0521266319	Roger Angold, Gordon A. Beech, John Taggart	Food Biotechnology (Cambridge Studies in Biotechnology), latest edition	Cambridge University Press

Learning Unit Contact Hours:

Per Week:

Lectures and Tutorials: **3 Hours**
Lab Work: 2 **Hours**

Total Class Contact Hours Per Semester: 42
Total Other Contact Hours Per Semester: 28
Total Study Hours Per Semester: 70

COURSE DESCRIPTION:

Course Code: BT306b **School:** Biotechnology (MSA)
Course Title: Environmental Biotechnology
Head of Department: Dr. Ali Diab **Pre-requisites:** BT202b
Course Co-ordinator: Dr. Ali Diab
Level: Elective **Credit:** 4 **Subject Group:** Biotechnology

AIMS:
The aims of the course are:

- To raise the students awareness of applications of biotechnology in management of environmental problems.
- To builds on the principles of biotechnology for enhanced plant production through biological insecticides, herbicides resistance, mineral cycling, conservation of genetic resources and biological nitrogen fixation
- To discuss the biotechnological processes for pollution control, bioremediation of toxicants and treatment of domestic and industrial wastes.
- To raise the students' awareness of soil, water and air microbiota.
- To discuss the problems associated with sulpher oxidation and sulpher producing bacteria.
- To understand the relation between sulpher bacteria and prevent the release of the green house gases.
- To introduce the students to mining microbiology.

LEARNING OUTCOMES:
Upon completion of the course the student will be able to:

Knowledge:
- Introduce student to environmental biotechnology
- Raise the students awareness to environmental pollution
- Recognize the bioremediation of inorganic pollutants (heavy metals and radio nuclides)
- Develop deeper understanding of phytoremediation
- Explore the field of agriculture biotechnology for safe environment.
- Discuss the concepts of improvement of plant and animals methods and application of plant improvement.
- Explore the field of intellectual property rights and environmental biotechnology.
- Production of methane, greenhouse effect and ozone hole.
- To gain information about environmental aspects of sulpher pollution.

Skills:
- Appraise the basic concept of environment and its components.
- Numerate the definitions and facts of biotechnology for environment.
- Perform characteristics; microbial metabolism in relation to waste treatment
- Appraise the bioremediation of organic pollutants.

- Design Bioremediation experiments
- Practice safe and Environmental friendly biotechnological research

INDICATIVE CONTENT: (SYLLABUS)

7- Introduction to environmental biotechnology
8- Basics of microbiology in relation to environment
9- Environmental pollution
10- Bioremediation of inorganic pollutants
11- Bioremediation of organic pollutants
12- Phytoremediation
13- Agriculture biotechnology for safe environment
14- Ethical issues in environmental biotechnology
15- Intellectual property rights and environmental biotechnology

Main Learning and Teaching Activities :(Strategies)

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	Class Presentation
⇧	⇧		⇧	

Assessment Strategy:

Assessment of the student's knowledge about:

6- Basic concept of environment and its components.
7- Sources of various pollutions and their environmental impact.
8- Microbial interaction with metallic elements.
9- Molecular mechanism of metal resistance.
10- Aerobic and anaerobic degradation of organic pollutants
11- Use of plants for removal of organic and metallic pollutants
12- Methods and application of plant improvement
13- Release of genetically modified organisms
14- IPR for microorganisms and for environmental biotechnology processes.

Assessment of the student's ability to:

3- Identifying the concepts of environment and its components
4- Recognize the source of pollution and their environmental impact.
5- Develop greater understanding molecular mechanism of metal resistance.
6- Fundamentals of clean technology.
7- Integrate pest management and bio-control of plant diseases.
8- Use the application of plant improvement
9- Develop greater understanding IPR for microorganisms

Assessments Details

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Term paper		10%			
Assignments		5%			
Mid-Term:		20%			1.5 Hour
Lab Work:		25%			
Final Exam:		40%			3 Hours

Key Texts:

ISBN Number	Author	Title	Publisher
0072345535	Bruce E. Rittmann, Perry L. McCarty	**Environmental Biotechnology: Principles and Applications ,** latest edition	McGraw-Hill Science/Engineering/Math
1-898486-30-1 (hbk)	Nuzhat Ahmed, Fouad M. Qureshi, and Obaid Y. Khan	**Industrial and Environmental Biotechnology,** latest edition	Horizon Scientific Press

Useful websites

- www.filebox.vt.edu/cals/cses/chagedor/glossary.html
- www.deb.uminho.pt/Fontes/enviroinfo/biotechnology.htm
- www.neeri.nic.in/EBtech.html

Learning Unit Contact Hours:

Per Week:

Lectures:	**3**	Hours
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester: 42
Total Other Contact Hours per Semester: 28
Total Study Hours per Semester: 70

COURSE DESCRIPTION:

Course Code: BT307b **School:** Biotechnology (MSA)
Course Title: Nanotechnology
Head of Department: Dr Ahmed M K Nada **Prerequisite:** BT202b
Course Co-ordinator: Dr Ola Mohamed
Level: Elective **Credit:** 4 **Subject Group:** Biotechnology

AIMS:
The aims of the course are:

- to introduce the emerging field of nanosciences.
- To understand the future realities in the nanosciences.
- Discuss the industrial and business applications of nanotechnology.
- To emphasizing skills and values related to the field.

LEARNING OUTCOMES:
Upon completion of the course, students will be able to:

Knowledge:
- To gain knowledge on nanotechnology principles and industry applications.
- Understand the nanoscale paradigm.
- Apply key concepts in materials science, chemistry, physics, biology and engineering to the field of nanotechnology.
- Identify current nanotechnology solutions in design, engineering and manufacturing.
- Gain enough information about the history of nanotechnology

Skills:

- The skills needed to plan and carry out large-scale projects logically and efficiently.
- The skills needed to report and present results in a professional manner.
- The ability to evaluate research and academic publications.
- The ability to work independently with research.

INDICATIVE CONTENT: (SYLLABUS)

- Introduction to Nanoscience
- Synthesis of Nanomaterials
- Analysis of Nanomaterials
- Nanolithographic Techniques
- Spectroscopy of Nanomaterials
- Thin Film Science
- Computational Methods in Materials Science
- Introduction to Quantum Computing
- Biological Nanomaterials
- Topics in Nanomaterials
  Quantum Algorithms
- Quantum Cryptography and Error Correction
- Advanced Studies in Nanoscience
- Nanoscience Research Project

Main Learning and Teaching Activities :(Strategies)

Weekly Lectures	**Tutorials**	Rounds	Laboratory Work	Class Presentation
⇧			⇧	

Assessment Strategy:

Assessment of the student's knowledge about:

- nanotechnology principles and its applications.
- nanoscale paradigm.
- The key concepts in materials science, chemistry, physics, biology and engineering to the field of nanotechnology.
- About the current nanotechnology solutions in design, engineering and manufacturing.
- about the history of nanotechnology

Assessment of the student's ability to:

- plan and carry out large-scale projects logically and efficiently.
- report and present results in a professional manner.
- to evaluate research and academic publications.
- The ability to work independently with research.

- **Assessment Details:**

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Term paper:		10%			
Assignments:		5%			
Lab work		25%			
Mid-Term:		20%			1.5 Hour
Final Exam:		40%			3 Hours

Useful Websites:

- http://www.nano.uoguelph.ca/files/nanoscience_course_descriptions.pdf
- https://onderwijsaanbod.kuleuven.be/opleidingen/e/CQ_50269006.htm
- http://www.emm-nano.org/wp-content/uploads/EMMNano-brochure.pdf

Indicative Texts:

ISBN Number	Author	Title	Publisher
978-953-307-202-9	Boreddy Reddy	**Advances in Diverse Industrial Applications of Nanocomposites**	InTech Press

Learning Unit Contact Hours:

Per Week:

Lectures and Tutorials: **3 Hours**
Lab Work: 2 **Hours**

Total Class Contact Hours Per Semester: 42
Total Other Contact Hours Per Semester: 28
Total Study Hours Per Semester: 70

COURSE DESCRIPTION:

Course Code: BT312b **School:** Biotechnology (MSA)
Course Title: DNA Forensics
Head of Department: Dr Ahmed M K Nada **Prerequisite:** BT202b
Course Co-ordinator: Dr Amany Abdel Hakeem
Level: Elective **Credit:** 4 **Subject Group:** Biotechnology

AIMS:
The aims of the course are:

- to understand the principles of DNA technology and its applications on forensic sciences.
- to clarify the terminology and the mail techniques that used in forensic and analysis.
- To be familiar with molecular biological tools and techniques used to perform DNA profiles
- database analysis following DNA forensics applications

LEARNING OUTCOMES:
Upon completion of the course, students will be able to:

Knowledge:
- Understand and appreciate the scope of forensic biology.
- Understand and appreciate the scope, diversity and utility of a variety of DNA typing techniques.
- Perform the primary technique used in Forensic DNA analysis
- identify the equipment and prepare its use to undertake the investigation

Skills:

- consider the health and safety requirements and what precautions need to be taken
- identify the area of the scene, mark it out and protect it to preserve the scene
- handle, package and record evidence
- preserve evidence ensuring its integrity and preventing contamination or degradation
- record relevant information accurately and comprehensively use visual examination and measurement for comparative analysis
- Perform post-PCR Processing.

INDICATIVE CONTENT: (SYLLABUS)

- Introduction
- History & Basic Genetics
- Dealing with Samples
- PCR Fundamentals
- Advanced PCR
- STR markers
- DNA Statistics
- DNA Databases
- Forensic Challenges
- Non-human DNA
- Sampling Strategies
- Sequencing Alignment

Main Learning and Teaching Activities :(Strategies)

Weekly Lectures	**Tutorials**	Rounds	Laboratory Work	Class Presentation
⇧			⇧	

Assessment Strategy:

Assessment of the student's knowledge about:

- Understand and appreciate the scope of forensic biology.
- Understand and appreciate the scope, diversity and utility of a variety of DNA typing techniques.
- Perform the primary technique used in Forensic DNA analysis
- identify the equipment and prepare its use to undertake the investigation

Assessment of the student's ability to:

- consider the health and safety requirements and what precautions need to be taken
- identify the area of the scene, mark it out and protect it to preserve the scene
- handle, package and record evidence
- preserve evidence ensuring its integrity and preventing contamination or degradation
- record relevant information accurately and comprehensively use visual examination and measurement for comparative analysis
- Perform post-PCR Processing.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Term paper:		10%			
Assignments:		5%			
Lab work		25%			
Mid-Term:		20%			1.5 Hour
Final Exam:		40%			3 Hours

Useful Websites:

- https://ag.purdue.edu/entm/pdfs/Syllabi/ENTM-218-2013.pdf
- http://www.nlm.nih.gov/visibleproofs/education/dna/
- http://www.sfu.museum/forensics/trim/s/cms_page_media/157/TeachersGuide.pdf
- http://www.edu.gov.mb.ca/k12/cur/science/found/c_topics30s/forensics_unit.pdf

Indicative Texts:

ISBN Number	Author	Title	Publisher
978-0-8493-0233-6	Norah Rudin and Keith Inman	**An Introduction to Forensic DNA Analysis, latest edition**	CRC Press

Learning Unit Contact Hours:

Per Week:

Lectures and Tutorials: **3 Hours**
Lab Work: 2 **Hours**

Total Class Contact Hours Per Semester: 42
Total Other Contact Hours Per Semester: 28
Total Study Hours Per Semester: 70

COURSE DESCRIPTION:

Course Code: BT402b **School:** Biotechnology (MSA)
Course Title: Stem Cell Technology
Head of Department: Dr Ahmed M K Nada **Prerequisite:** BT202b
Course Co-ordinator: Dr Hesham Eissa
Level: Elective **Credit:** 4 **Subject Group:** Biotechnology

AIMS:
The aims of the course are:

- proper training in the rapidly expanding scientific arena of Stem Cell Technology.
- training in life sciences in the diverse aspects of cell culture, tissue engineering, and clinical requirements
- issues required to have a career in the field of regenerative medicine/tissue engineering.

LEARNING OUTCOMES:
Upon completion of the course, students will be able to:

Knowledge:
- Aspects of basic molecular and developmental biology relevant to stem cell science
- Origins and diversity of embryonic stem cell types.
- The current role of stem cells in clinical applications, tissue engineering, commerce and basic research
- Principles of embryonic and adult stem cell derivation, culture, differentiation, transfection, tissue engineering and exploitation

Skills:

- Demonstrate proper aseptic technique in laminar flow hood and laboratory bench
- Demonstrate skills in culturing and maintaining mammalian cells including stem cells
- Demonstrate and apply knowledge of fluorescent markers and stains in cell biology research
- Demonstrate and apply knowledge of methods of quantitating and analyzing cellular proteins
- Demonstrate and apply knowledge of methods of quantitating and analyzing cellular nucleic acids

INDICATIVE CONTENT: (SYLLABUS)

1. Introduction to Developmental Biology
2. Introduction to Stem Cells
3. Hayflick Limit and Henrietta Lacks
4. Directed Differentiation (Cardia)
5. Directed Differentiation (Neural)
6. What's In the Dish?
7. Stem Cell Policy
8. Clinical Applications
9. Patient Perspectives
10. Activities Preview

Main Learning and Teaching Activities :(Strategies)

Weekly Lectures	**Tutorials**	Rounds	Laboratory Work	Class Presentation
⇧			⇧	

Assessment Strategy:

Assessment of the student's knowledge about:

- Aspects of basic molecular and developmental biology relevant to stem cell science
- Origins and diversity of embryonic stem cell types.
- The current role of stem cells in clinical applications, tissue engineering, commerce and basic research
- Principles of embryonic and adult stem cell derivation, culture, differentiation, transfection, tissue engineering and exploitation

Assessment of the student's ability to:

- use laminar flow hood and laboratory bench
- culture and maintain mammalian cells including stem cells
- perform fluorescent markers and stains in cell biology research
- quantitate and analyze cellular proteins
- quantitate and analyze cellular nucleic acids

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Term paper:		10%			
Assignments:		5%			
Lab work		25%			
Mid-Term:		20%			1.5 Hour
Final Exam:		40%			3 Hours

Useful Websites:

- http://www.oulu.fi/spareparts/ebook_topics_in_t_e_vol4/abstracts/bajada.pdf
- http://www.eurostemcell.org/files/Stem-Cell-Report-Trends-and-Perspectives on-the-Evolving-International-Landscape_Dec2013.pdf
- http://www.public.iastate.edu/~ethics/StemCellCaseStudyRevised.pdf

Indicative Texts:

ISBN Number	Author	Title	Publisher
978-981-4317-70-2	Michal K Stachowiak and Emmanuel S Tzanakakis	Stem Cells From Mechanisms to Technologies	World Scientific

Learning Unit Contact Hours:

Per Week:

Lectures and Tutorials: **3 Hours**
Lab Work: 2 **Hours**

Total Class Contact Hours Per Semester: 42
Total Other Contact Hours Per Semester: 28
Total Study Hours Per Semester: 70

COURSE DESCRIPTION:

Course Code: BT322b **School:** Biotechnology (MSA)
Course Title: Bioremediation of contaminated sites
Head of Department: Dr Ali Diab **Prerequisite:** BT306b
Course Co-ordinator: Dr Ali Diab
Level: Elective **Credit:** 4 **Subject Group:** Biotechnology

AIMS:
The aims of the course are:

1. Develop understanding of integrated approaches to remediating contaminated sites.
2. Develop the ability to screen, choose and design appropriate technologies for remediation by applying fundamental knowledge of biological, chemical and physical processes.
3. Improve your skills in communication, teamwork and analysis.

LEARNING OUTCOMES:
Upon completion of the course, students will be able to:

Knowledge:

1. Identify which pollutants are of greatest concern, describe the principles of various physical and chemical remediation technologies and relate selection of these technologies to the properties of contaminants.
2. Determine what is needed for site characterization, explain the relevance to selection of appropriate remediation strategies, determine when bioremediation is an appropriate technology and its advantages and limitations.
3. Describe the interactions between contaminants, soil, presence of a NAPL phase, water and microorganisms and explain how these impact the fate of the contaminant and its bioavailability for biodegradation.
4. Calculate the C:N:P and terminal electron acceptor requirements for biodegradation, interpret the electron tower and energy gained from coupling appropriate half reactions and describe the biodegradation of specific contaminants such as linear alkanes, BTEXs, PAHs, and chlorinated compounds such as PCE and PCBs.
5. Explain how to apply culturable and non-culturable techniques for bioassessment and biotreatability studies.

Skills:

1. How to apply bioremediation in the field
2. Limitations to bioremediation
3. Use of microbial inoculants for bioremediation
4. Assessing the potential and success for bioremediation

5. Bioremediation case studies.

INDICATIVE CONTENT: (SYLLABUS)

- Introduction
- Laws, Regulations and Remediation
- Risk Assessment
- Remedial Options
    - **a.** Introduction
    - **b.** Administrative Options
    - **c.** Groundwater
        - **i.** Plume Containment
        - **ii.** Pump and Treat
        - **iii.** Source Control
        - **iv.** Permeable Reactive Barriers
        - **v.** Monitored Natural Attenuation
    - d. Soils/Sludges
        - **i.** Excavation
        - **ii.** Landfill
        - **iii.** Containment
        - **iv.** Solidification/Stabilization
        - **v.** Chemical treatment
        - **vi.** Surfactant extraction
        - **vii.** Soil vapor extraction
        - **viii.** Bioremediation
        - **ix.** Phytoremediation
        - **x.** Thermal Processes
        - **xi.** Soil Washing

Main Learning and Teaching Activities :(Strategies)

Weekly Lectures	**Tutorials**	Rounds	Laboratory Work	Class Presentation
⇧			⇧	

Assessment Strategy:

Assessment of the student's knowledge about:

6. Types of pollutants
7. Site characterization,
8. the interactions between contaminants, soil, presence of a NAPL phase, water and microorganisms
9. Explain how to apply culturable and non-culturable techniques for bioassessment and biotreatability studies.

Assessment of the student's ability to:

1. to apply bioremediation in the field
2. Use of microbial inoculants for bioremediation
3. Assessing the potential and success for bioremediation
4. Bioremediation case studies.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Term paper:		10%			
Assignments:		5%			
Lab work		25%			
Mid-Term:		20%			1.5 Hour
Final Exam:		40%			3 Hours

Useful Websites:

- https://www.google.com.eg/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0CCsQFjAAahUKEwiZqoX_gcPHAhWEVhQKHRjJCDQ&url=https%3A%2F%2Fsecure.oregonstate.edu%2Fap%2Fcps%2Fdocuments%2Fview%2F99730&ei=5rvbVZmfHIStUZiSo6AD&usg=AFQjCNH-_hKvBFgB_4VyBwbqcgrO8K7TFQ&sig2=FaTFy_V71jNf1sjzxSrLXQ

Indicative Texts:

ISBN Number	Author	Title	Publisher
1-55581-239-2	RM Atlas, J Philp	Bioremediation. applied microbial solutions for real-world environmental cleanup	cabdirect

Learning Unit Contact Hours:

Per Week:

Lectures and Tutorials: **3 Hours**
Lab Work: 2 **Hours**

Total Class Contact Hours Per Semester: 42
Total Other Contact Hours Per Semester: 28
Total Study Hours Per Semester: 70

COURSE DESCRIPTION:

Course Code: BT309b **School:** Biotechnology (MSA)
Course Title: Molecular drug design
Head of Department: Dr. Ahmed M K Nada **Prerequisites:** GEN304b
Course Co-ordinator: Dr. Amr Ageez
Level: 4 (1st semester) **Credit:** 4 **Subject Group:** Biotechnology

AIMS:
The aims of the course are:

- To increase the awareness of the students to the importance of drug design and gene therapy as a rapidly growing field of biotechnology.
- To understand the different methods used to analyze the huge amount of information that is being gathered about human gene sequences and genetic diseases.
- To emphasize upon the integration of basic and applied for creation of strategies for drug design.

LEARNING OUTCOMES:
The course outcomes for what students should know include:

- What are the modern methods of the drug design;
- How databases is used to model a pathways, cells, and diseases;
- Mining methods to get the information about pathway or a disease by using databases;
- Application of using modeling in drug design;
- Different strategies of using RNA molecules in gene therapy;
- The advantages, limitations, and dangers of using RNA in gene therapy;
- Different strategies in the design of antiviral drugs, HIV will be used as model for testing these strategies;
- The use of genetically altered mice as a model for gene therapy.

INDICATIVE CONTENT :(SYLLABUS)

1. Modern methods of drug discovery.
2. The use of screens in drug discovery.
3. Modeling pathways, cells, whole organs, and diseases.
4. Database as a foundation for systems biology.
5. Use of high-throughput data in drug discovery.
6. Use of RNA molecules in gene therapy.
7. Different strategies in the design of antiviral drugs.
8. Genetically altered mice as a model for gene therapy.

Main Learning and Teaching Activities :(Strategies)

This course will be taught through lectures and practical sessions. The student will be asked to prepare a portfolio and to do internet search covering a specific topic.

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	Class Presentation
⇧			⇧	

Assessment strategy:

Assessment of the student's knowledge about:

1. Understanding of the drug design strategies.
2. Using nucleic acids in molecular medicine.
3. Basics of gene therapy and designing new medicines by setting new therapeutic targets.

Assessment of the student's ability to:

1. Methods to detect molecular target and link this target to a disease.
2. Know how to design a medicine based on your knowledge of the targets.
3. Understand specific examples of drug design startagies.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Project:		5%			
Assignments:		10%			
Mid-Term:		20%			1.5 Hour
Lab Work:		25%			
Final Exam:		40%			3 Hours

Indicative Texts:

- Drug discovery handbook Edited by SHAYNE COX GAD, PH.D., D.A.B.T.
- Gad Consulting Services Cary, North Carolina, Copyright © 2005 by John Wiley & Sons, Inc.
- An introduction to molecular medicine and gene therapy" Edited by Thomas F. Kresina, PhD, Copyright © 2001 by Wiley-Liss, Inc

Learning Unit Contact Hours:

Per Week:

Lectures:	**3**	Hours
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester:	**42**
Total Other Contact Hours per Semester:	**28**
Total Study Hours per Semester:	**70**

COURSE DESCRIPTION:

Course Code: BT310b **School:** Biotechnology (MSA)
Course Title: Host plant resistant
Head of Department: Dr. Ali Diab **Pre-requisite:** BT301b
Course Co-ordinator: Dr. Osama S S Hassan
Level: Elective **Credit: 4** **Subject Group:** Biotechnology

AIMS:
The aims of the course are to:

- Providing origins of agriculture and crops evaluation
- Develop deeper understanding about plant – pathogen interactions.
- Develop deeper understanding about plant – arthropod interactions.
- Study the mechanisms of plant tolerance and resistance to pathogens and arthropod.
- Acquire knowledge about plant breeding programs and germplasm collections.
- Delve into the principles of molecular biology and tissue culture techniques tools to overcome pathogens and pest resistant.
- Distinguish between the molecular pathology of some common plant diseases.
- Formulate molecular breeding programs of treatment of plant diseases and pest resistant.

LEARNING OUTCOMES:
Upon completion of the course, the student will be able to:

Knowledge:

- Discuss the concepts of crop production and tolerance to insects and pathogens.
- Emphasis host plant resistant in economic crops.
- Identify the use of biotechnology to track the interaction between plant and pathogens and pests.
- Critically emphasis the importance of transgenic plants for the production of recombinant products.
- Discuss the concepts of reverse genetics, genetic and physical makers, mapping, and plant genome analysis.
- Discuss the ways of the construction of germplasm banks and seeds storage.

Skills:

- Develop molecular crop breeding programs against pests and pathogens.
- Numerate the methods used to overcome pests and pathogen.
- Appraise the crop genome sequencing initiatives and analysis of the published information regarding model plants genome sequencing..

INDICATIVE CONTENT :(SYLLABUS)

Genetic analysis and manipulation of plants:

8. Origin of agriculture and crop evolution.
9. Basics of plant breeding and using of biotechnology tools in plant tolerance and resistance.
10. Plant diseases symptoms and the plant pathogen interaction
11. Arthropod – plant interaction.
12. Insect/ viral/ herbicide resistant plants.
13. Molecular breeding for disease and nematode resistance in important crops
14. Molecular breeding for insect resistance in important crops
15. GM plants to improve the quantity and quality of food and feed production.
16. Model plants genome sequences and analysis through the genome initiative projects.
17. Some case studies detailing the molecular breeding for some common crops diseases.
18. Social and ethical issues raised in the above studies.

Main Learning and Teaching Activities :(Strategies)

This course will be taught through lectures and dry laboratory sessions.
The underlying principles and theory behind each practical session will be explained in lectures.
Students will be asked to present written research assignments using the library and internet resources.

Weekly Lectures	Tutorials	Rounds	**Laboratory Work**	**Class Presentation**
⇧			⇧	⇧

Assessment Strategy:

Assessment of the student knowledge about:

7. Different types of molecular plant breeding programs and techniques.
8. Use of biotechnology tools in crop genetic transformation.
9. Gene flow and breeding depression in plants.
10. Differentiation between insect, viral and herbicide resistant plants.
11. Pest – plant interaction
12. pathogen – plant interaction

Assessment of the student's ability to:

5. Design molecular plant breeding programs.
6. Use molecular techniques to evaluate transgenic expression
7. Use of the tissue culture techniques to develop regeneration systems for economical important crops.
8. Recognize the importance of germplasm collection and banks.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Words Length	Outline Details
Presentation:		10%			
Take home exam:		5%			
Mid-Term:		20%			1.5 Hour
Lab Work:		25%			
Final Exam:		40%			3 Hours

Indicative Texts:

ISBN Number	Author	Date	Title	Publisher
082470990X	S. Sadasivam, B. Thayumanavan, Sadasivam Sadasivam	2003	**Molecular Host Plant Resistance To Pests (books In Soils, Plants, And The Environment)**	Crc Press
9780851989631	N Panda	1995	**Host Plant Resistance to Insects**	CABI
0521587840	Stephen H. Howell	1998	**Molecular Genetics of Plant Development**	Cambridge University Press
9780851996868	O Koul	2004	Integrated Pest Management: Potential, Constraints and Challenges	CABI

Useful websites

- http://ipmworld.umn.edu/chapters/eigenbr.htm
- http://ipmnet.org/cicp/tactics/crop_resistance.htm
- http://ipmworld.umn.edu/chapters/teetes.htm
- http://entnemdept.ufl.edu/fasulo/woodypest/hpr.htm
- http://www.springerlink.com/content/pm2p16h8kj687443/

Learning Unit Contact Hours:

Per Week:

Lectures:	**3**	Hours
Tutorials:	**-**	Hours
Lab Work:	**2**	Hours

Total Class Contact Hours per Semester: 28
Total Other Contact Hours per Semester: 28
Total Study Hours per Semester: 56

COURSE DESCRIPTION:

Course Code: RS400b and RS401b **School:** Biotechnology (MSA)
Course Title: Research Project
Head of Department: Dr. Ahmed M K Nada **Pre-requisites:** SEM302b
Course Coordinator: Dr. Ayman Diab
Level: 4: 1st (RS400b) and 2nd Semester (RS401b) **Credit:** 5
Subject Group: Research & Seminar

Objective:
The students are required to do two separate research projects one through the 1st and another one in the 2nd semesters. The students will have the opportunity to choose from the following subjects: -

S/N	Course Code	
1	**RS400b & RS401b**	• Industrial Biotechnology • Environmental Biotechnology • Agricultural Biotechnology (Plant) • Agricultural Biotechnology (Animal) • Medical Biotechnology
		• Pharmaceutical Biotechnology

AIMS:
The aims of the course are**:**

- To enable students to undertake a research project in an area of biotechnology
- To develop laboratory skills to become independent in designing and executing experiments.
- To develop their ability to present, interpret and discuss research results, having students acquire the ability to design and execute research experiment.
- To provide hands-on experience with routine laboratory equipment.
- To acquire a practical understanding of experimentation to complement lectures, have capability of working independently and in a research team**.**
- To teach the students how to write a scientific thesis.

LEARNING OUTCOMES:
Upon completion of this course, students will be able to:

Knowledge:

- Appreciate the efforts and experiences needed in the execution of seminars or research topics.
- Investigate new subjects through designing and executing research experiments.
- Evaluate the results of a new search and interpret the appropriate results into a research project or manuscript to be presented.

Skills:

- Acquire searching, writing and problem-solving skills.
- Design appropriate experimental or data collection techniques.
- Acquire scientific presentation skills, both oral and written, whether as a seminar or a research report.
- Work independently and apply their knowledge and skills to the solution of a specific theoretical problem.
- Critically assess research results and the work of others i.e. published material.
- Use all relevant literature sources to carry out a detailed search into a general topic and a specific scientific problem.
- Prepare a detailed and structured report on the project.
- Present clear oral presentations with appropriate and adequate use of supporting visual aid material.
- Manage their time, plan ahead and prioritize their activities.

INDICATIVE CONTENT: (SYLLABUS)

3. The students will spend 20 hours per week for a twelve week period undertaking the project; the students will present their results at a series of seminars to an audience of the peers and academic staff.
4. The student will subsequently submit a typed report of the research for inspection by international and two external examiners.

Main Learning and Teaching Activities :(Strategies)

Supervision is arranged through faculty members and external advisor to ensure that the student progresses at an appropriate pace through his/her project and also draws upon his/her own initiative and store of relevant knowledge. Students will be expected to make full use of computing facilities, laboratories, special purpose equipment, library and other facilities in the university or in external biotechnological institutes. It will be the responsibility of the project supervisor to ensure that students do not devote a disproportionate amount of time and effort to their project work, at the expense of their other academic work.

Assessment Details:

Methods of Assessment	Grading Mode	Weighting %	Minimum Pass Mark	Pages	Outline Details
Written report		50%			Students will present a written report of the theoretical and practical work & literature search together with a critical evaluation of the work & results in the form of a presentation & discussion. The specific allocation of marks will depend upon: 3. The nature of the project & programme, & will be detailed in Guidelines issued at the start of each session. 4. The successful completion of the research and evaluation of their theoretical and practical work.
Practical work		30%			Supervision of successive result achievement.
Oral Presentation		20%			

Assessment will focus upon:

- The general organization of the report and quality of the written English.
- A clear and concise abstract.
- The extent of the student's achievement of the original or modified objective(s) of the report.
- The critical evaluation of data or a critical review of theoretical published work.
- The critical discussion of results leading to appropriate conclusions.
- Evidence of professional standards applied throughout the report (i.e. documentation standards).
- Provision and evidence of the use of appropriate references and bibliography.
- The accuracy and technical merit of the report.
- The merit of the written report and oral presentations in addressing non-technical issues.

The project supervisor will ensure that the student has access to the lab space, chemicals, equipments and any resources that might be needed by the student in order to complete his/her research. The project supervisor is also required to prepare a report on the project which will include an assessment of the difficulty of the project, the student's approach to it, the accuracy and reliability of the results and conclusions and the quality of the final report.
The student's project as written report and oral presentations will be made available for the external examiners.

Indicative Texts:
A range of appropriate research literature to cover the topic of the project.