Uni 100: Scientific Thinking Course Specification

(2025)

1. Basic Information

Course Title (according to the bylaw)	**Scientific Thinking**			
Course Code (according to the bylaw)	**Uni 100**			
Department/s participating in delivery of the course	**Department of Mathematics and Computer Science**			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2	**0**	**0**	**2**
Course Type	اجباري			
Academic level at which the course is taught	الفرقة/المستوي الاول			
Academic Program	**Microbiology and chemistry B.S.C program**			
Faculty/Institute	**Faculty of Science**			
University/Academy	**Benha University**			
Name of Course Coordinator	**Dr. Ahmed Mohamed**			
Course Specification Approval Date	**9/7/2025**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**Approved 18/6/2025 (Department council; meeting number, 37), and 09/7/2025 until 30/7/2025, (faculty council; meeting number, 515)**			

2. Course Overview (Brief summary of scientific content)

The course on Scientific Thinking aims to cultivate a comprehensive understanding of key theoretical concepts such as memory, thinking, and creativity. Students will delve into the nature of thinking, exploring its definition, characteristics, and various levels. This course distinguishes between different types of thinking creative, critical, and scientific highlighting their unique attributes and applications. Emphasis will be placed on developing cognitive and metacognitive thinking skills, empowering students to evaluate and enhance their own thinking processes. Through the exploration of measurement tools and strategies, students will learn how to assess and measure different aspects of thinking. Additionally, the course will introduce various programs dedicated to teaching and honing thinking skills, accompanied by effective teaching methods tailored to foster the development of these skills.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
1.1	Demonstrate comprehensive understanding of theories, concepts, principles, facts, and essential techniques related to microbiology and chemistry.	**a1**	Demonstrate a comprehensive understanding of theoretical concepts related to memory, thinking, and creativity.
		a2	Define and articulate the nature of thinking, including its characteristics and various levels.
		a3	Differentiate between creative, critical, and scientific thinking, understanding their distinct attributes and applications.
1.2	Acquire essential knowledge in mathematics, physics, biology, and other supporting sciences necessary for understanding the latest advances in microbiology and chemistry.	**a4**	Identify different cognitive and metacognitive thinking skills essential for effective thought processes.
		a5	Explain different cognitive and metacognitive thinking skills essential for effective thought processes.
2.2	Analyse, assess, and interpret quantitative and qualitative scientific data from various sources.	**b1**	Analyze and evaluate various thinking processes, applying critical thinking to problem-solving scenarios.
		b2	Engage in reflective thinking, evaluating and refining their thought processes based on feedback and self-assessment.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
4.3	Think independently, critically, and creatively to solve scientific and practical problems.	**d1**	Improved problem-solving abilities by applying diverse thinking strategies to real-world situations.
		d2	Enhanced communication skills through articulating complex thoughts and ideas effectively.
		d3	Increased self-awareness and self-regulation in managing their own thinking processes.
		d4	Demonstrate proficiency in using cognitive and metacognitive strategies to enhance their own thinking abilities.
		d5	Lifelong learning skills, fostering a disposition for continuous self-improvement and intellectual development.

4. Teaching and Learning Methods

1. Lectures
2. E-learning platform

5.Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	**Training** (Practical/Clinical/ .....)	**Self-learning** (Tasks/ Assignments / Projects/ ...)	**Other** (to be determined)
1	**Theoretical concepts (memory, thinking, creativity),**	2	2	0	0	0
2	**Introduction to the thinking skills**	2	2	0	0	0
3	**The nature of thinking (definition, characteristics, levels)**	2	2	0	0	0
4	**Types of thinking (creative, critical, scientific)**	2	2	0	0	0
5	**Types of thinking (creative, critical, scientific)**	2	2	0	0	0
6	**Cognitive thinking skills**	2	2	0	0	0
7	**Cognitive thinking skills**	2	2	0	0	0
8	Mid-term					
9	**Mta-cognitive thinking skills**	2	2	0	0	0
10	**Thinking measurement tools**	2	2	0	0	0
11	**Strategies used in the development of thinking skills**	2	2	0	0	0
12	**Strategies used in the development of thinking skills**	2	2	0	0	0
13	**Programs to teach thinking skills**	2	2	0	0	0
14	**Programs to teach thinking skills**	2	2	0	0	0
15	**Methods of teaching thinking skills.**	2	2	0	0	0

6.Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Mid-term exam	8th week	10	10%
2	Exam 2 ..... (Semester work)	-	-	-
3	Final Written Exam	Sixteenth week	60	60%
4	Final Practical/Clinical/… Exam	Fourteenth week	0	0%
5	Final Oral Exam	Fifteenth week	10	10%
6	Assignments / Project /Portfolio/ Logbook	Fourteenth week	20	20%
7	Field training	-	0	0%
8	Other (Mention)	-	0	0%

*** The methods mentioned are examples, the organization may add and/or delete**

7.Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	Course notes (The Department Notes)
	Other References	
	Electronic Sources (Links must be added)	
	Learning Platforms (Links must be added)	
	Other (to be mentioned)	
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	Data show
	Supplies	• Laptop, board, and markers.
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	

	Other (to be mentioned)	

*** The list mentioned is an example, the institution may add and/or delete depending on the nature of the course**

Name and Signature **Course Coordinator** **Dr. Ahmed Mohamed**	**Name and Signature** **Program Coordinator** **Dr. Mohamed atef**

Uni 115: English Language (1)

1.Basic Information

Course Title (according to the bylaw)	**English Language (1)**			
Course Code (according to the bylaw)	**Uni 115**			
Department/s participating in delivery of the course	**Language department- Faculty of Arts**			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2	**-**	**-**	**2**
Course Type	اجباري			
Academic level at which the course is taught	الفرقة/المستوي الاول			
Academic Program	**Microbiology and Chemistry BSc Program**			
Faculty/Institute	**Faculty of Science**			
University/Academy	**Benha University**			
Name of Course Coordinator	Dr. Ghada El-Sadek			
Course Specification Approval Date	**6/18/2025**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**Approved 18/6/2025 (Department council; meeting number, 37), and 09/7/2025 until 30/7/2025, (faculty council; meeting number, 515)**			

2.Course Overview (Brief summary of scientific content)

This course aims to improve students' skills in both written and spoken English, with a focus on using correct grammatical structures and appropriate verb tenses. It offers an integrated approach that combines speaking and writing skills for students of the Faculty of Science, helping them to understand and accurately use scientific terminology. In addition, the program ensures that students are familiar with correct spelling and the most commonly used words in scientific writing, thereby preparing them to produce accurate and professional scientific texts.

3.Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
1.1	Demonstrate comprehensive understanding of theories, concepts, principles, facts, and essential techniques related to microbiology and chemistry.	A1	Identify new scientific vocabulary
		A2	Memorize English grammar
		A3	To know how to translate from English into Arabic and vice versa as well as to know writing skills.
2.2	Analyse, assess, and interpret quantitative and qualitative scientific data from various sources.	B1	Collect the new vocabulary
		B2	Summarize the equivalents, opposites adjectives and nouns of the new words
4.2	Identify roles, responsibilities, task delegation, and performance indicators within team settings.	D2	Management, working in group & life-long learning

4.Teaching and Learning Methods

1- **Lecture and presentations**
2- **Practical section**
3- **Open discussions & Seminars**
4- **Self-learning Tasks**
5- **Problem Solving**

5.Course schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments / Projects/ ...)	Other (to be determined)
1	Reading comprehension part (1)	2	2	0		
2	Reading comprehension part (2)	2	2	0		
3	Reading comprehension part (3)	2	2	0		
4	Grammar part (1)	2	2	0		
5	Grammar part (2)	2	2	0		
6	Grammar part (3)	2	2	0		
7	Grammar part (4)	2	2	0		
8	Mid Term	0	0	0		
9	Grammar part (5)	2	2	0		
10	Translation part (1)	2	2	0		
11	Translation part (2)	2	2	0		
12	Writing skills part (1)	2	2	0		
13	Writing skills part (2)	2	2	0		
14	Writing skills part (3)	2	2	0		
15	Writing skills part (4)	2	2	0		

6.Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Assignment 1	Week 3	5	5%
2	Assignment 2	Week 6	5	5%
3	Assignment 3	Week 11	5	5%
4	Assignment 4	Week 14	5	5%
5	Midterm Exam	Week 8	10	10%
6	Final Oral Exam	Start of 17th week	10	10%
7	Final Written Exam	Week 16	60	60%

7.Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	-Carter, R., & McCarthy, M. (2021). Cambridge Grammar of English: A Comprehensive Guide (2nd.ed.). Cambridge University Press. -Harmer, J. (2020). The Practice of English Language Teaching (5th ed.). Pearson Education A well-regarded reference that focuses on teaching methods and language learning techniques.
	Other References	www.google.com
	Electronic Sources (Links must be added)	1. **https://www.sciencedirect.com** 2. **https://www.ekb.eg**
	Learning Platforms (Links must be added)	**https://elearning.bu.edu.eg** **https://ebook.bu.edu.eg/**
	Other (to be mentioned)	
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	- Data Show and Projector - Whiteboard - Laptop
	Supplies	Course handouts – Reference sheets
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	
	Other (to be mentioned)	

Course Coordinator

Dr. Ghada ElSadek

Program Coordinator

Dr. Mohamed atef

Uni 151: Human Rights and Anticorruption

1.Basic Information

Course Title (according to the bylaw)	**Human Rights and Anticorruption**			
Course Code (according to the bylaw)	**Uni 151**			
Department/s participating in delivery of the course	**Department of Geology**			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	1	**-**	**-**	**1**
Course Type	اجباري			
Academic level at which the course is taught	الفرقة/المستوي الاول			
Academic Program	**Microbiology and chemistry BSc Program**			
Faculty/Institute	**Faculty of Science**			
University/Academy	**Benha University**			
Name of Course Coordinator	Dr. Mohamed Afifi			
Course Specification Approval Date	**6/18/2025**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**Approved 18/6/2025 (Department council; meeting number, 37), and 09/7/2025 until 30/7/2025, (faculty council; meeting number, 515)**			

2.Course Overview (Brief summary of scientific content)

The program focuses on learning about rights law and studying human medicine, including topics such as dementia and its causes. It also emphasizes the study of international law, with particular attention to protecting the rights of the individual.

3.Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
1.8	. Recognize the diversity of different plants, animals and microorganisms and understand the principles of bio-diversity and conservation of natural resources.	A1	state human rights.
		A2	Explains the nature of the restrictions.
1.12	Gain knowledge of current scientific issues, biotechnological developments, and technological applications relevant to microbiology and chemistry.	A3	Describes what the collective rights
2.3	Construct integrated lines of reasoning to support hypotheses, confirm evidence, and interpret recent research advancements (e.g., microbial biotechnology, nanotechnology applications, environmental microbiology).	B1	Compares the application of human rights in Egypt in various fields.
		B2	Analyzes the social factors that stand in the way, without the actual application of human rights in our society
		B3	Puts imagine the implications of the application of human rights to professional practices in the future
4.4	Work cooperatively in teams; manage time; collaborate effectively; and communicate with clarity and professionalism.	d1	Analyzes of human rights.
		d2	Assesses the extent of the exercise of human rights in his social life.
4.5	Address community-related problems with sensitivity to ethics, cultural traditions, and societal needs.	d3	Issued the provisions of a window on the importance of human rights

4.Teaching and Learning Methods

6- **Lecture and presentations**
7- **Practical section**
8- **Open discussions & Seminars**
9- **Self-learning Tasks**
10- **Problem Solving**

5.Course schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching **(lectures/discussion groups/ .....)**	**Training** **(Practical/Clinical/ .....)**	**Self-learning** **(Tasks/ Assignments / Projects/ ...)**	**Other** **(to be determined)**
1	Introduction	**1**	**1**	**0**		
2	The concept of human rights	**1**	**1**	**0**		
3	The origins and evolution of human rights part1	**1**	**1**	**0**		
4	The origins and evolution of human rights part2	**1**	**1**	**0**		
5	The importance of human rights and the philosophical framework	**1**	**1**	**0**		
6	Sources of human rights law part1	**1**	**1**	**0**		
7	Sources of human rights law part2	**1**	**1**	**0**		
8	Types of Human Rights medication and meals part1	**1**	**1**	**0**		
9	Mid Term	**0**	**0**	**0**		
10	Types of Human Rights medication and meals part2	**1**	**1**	**0**		
11	The rights of women and children special needs Own	**1**	**1**	**0**		
12	The human right to a healthy environment	**1**	**1**	**0**		
13	Human Rights and Ethics part1	**1**	**1**	**0**		
14	Human Rights and Ethics part 2	**1**	**1**	**0**		
15	Human Rights and Ethics part 3	**1**	**1**	**0**		

6.Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Assignment 1	Week 3	5	5%
2	Assignment 2	Week 6	5	5%
3	Assignment 3	Week 11	5	5%
4	Assignment 4	Week 14	5	5%
5	Midterm Exam	Week 9	10	10%
6	Final Oral Exam	Start of 17th week	10	10%
7	Final Written Exam	Week 16	60	60%
Total			100	100%

7.Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	Kaufmann, D., & Vicente, P. C. (2021). *Corruption, Development, and Democracy: A Comparative Perspective* (2nd ed.). MIT Press.
	Other References	**Alston, P., & Robinson, M. (2021). *Human Rights and Development: Towards Mutual Reinforcement* (1st ed.). Oxford University Press.** **"الراصد" : شهرية. تصدر عن المشروع الاقليمي للوصل والمجتمع قضايا المرأة حول والمعلومات للوصل المشروع الاقليمي عن تصدر. شهرية : "الراصد" على والفرنسية باللغتين الانكليزية موجودة أخرى أعداد(المشرق والمغرب منطقتي في والتنمية**
	Electronic Sources (Links must be added)	3. **https://www.sciencedirect.com** 4. **https://www.ekb.eg** **2002 أيار عدد ."الراصد".) الكمبيوتر** * Journal of Human Rights Practice: Oxford Journals * Human Rights Law Review * Journal of Human Rights at the University of Connecticut * Canadian Journal of Human Rights * http://www.humanrights.com/ * http://www.hrw.org/

	Learning Platforms (Links must be added)	**https://elearning.bu.edu.eg** **https://ebook.bu.edu.eg/**
	Other (to be mentioned)	
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	- Data Show and Projector - Whiteboard - Laptop
	Supplies	Course handouts – Reference sheets
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	
	Other (to be mentioned)	

Course Coordinator

Dr. Mohamed Afifi

Program Coordinator

Dr. mohamed atef

Uni 105: Information Technology

1.Basic Information

Course Title (according to the bylaw)	**Information Technology**			
Course Code (according to the bylaw)	**Uni 105**			
Department/s participating in delivery of the course	**Department of Mathematics and Computer Science**			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2	**-**	**-**	**2**
Course Type	اختياري			
Academic level at which the course is taught	**First level** الفرقة/المستوي الاول			
Academic Program	**Microbiology and chemistry BSc Program**			
Faculty/Institute	**Faculty of Science**			
University/Academy	**Benha University**			
Name of Course Coordinator	**Dr. Eman Ibrahim**			
Course Specification Approval Date	**6/18/2025**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**Approved 18/6/2025 (Department council; meeting number, 37), and 09/7/2025 until 30/7/2025, (faculty council; meeting number, 515)**			

2.Course Overview (Brief summary of scientific content)

At the end of this course, the students must be able to use computer science applications to solve mathematical and statistical problems, apply computing knowledge and skills to find the solution of real-life problems, apply effectively information technology relevant to the field, and use such knowledge and understanding in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoff involved in design choices.

3.Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
1.12	Gain knowledge of current scientific issues, biotechnological developments, and technological applications relevant to microbiology and chemistry.	A1	Know the relevant theories and their applications.
		A2	Determine the processes and mechanisms supporting the structure.
		A3	Select the progress of the program-related knowledge.
		A4	Define the core ideas of mathematics and statistics.
		A5	Describe the principles of mathematical, statistical modeling an application.
2.3	Construct integrated lines of reasoning to support hypotheses, confirm evidence, and interpret recent research advancements (e.g., microbial biotechnology, nanotechnology applications, environmental microbiology).	B1	Make techniques and tools considering scientific ethics.
		B2	Solve problems using a range of formats and approaches.
		B3	Criticize the different methods use addressing subject related issues.
4.1	Use information and communication technology effectively for data handling, scientific writing, and digital communication.	d1	Compare between subject-related theories and assess their concepts and principles.
4.9	Adapt to new technologies, methodologies, and research trends in the constantly evolving field of microbiology and show a passion for continuous learning.	d2	Apply the knowledge and understanding of the mathematical and statistical processes for modeling of real-world problems.

4.Teaching and Learning Methods

11- **Lecture and presentations**

12- **Practical section**

13- **Open discussions & Seminars**

14- **Self-learning Tasks**

15- **Problem Solving**

5. Course schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	**Training** (Practical/Clinical/ .....)	**Self-learning** (Tasks/ Assignments / Projects/ ...)	**Other** (to be determined)
1	Introduction to computer	**2**	**2**	**0**		
2	INTERNET AND WEB	**2**	**2**	**0**		
3	word	**2**	**2**	**0**		
4	Information Technology and Network Types	**2**	**2**	**0**		
5	PowerPoint	**2**	**2**	**0**		
6	Operating Systems	**2**	**2**	**0**		
7	Number systems	**2**	**2**	**0**		
8	Mid Term	**0**	**0**	**0**		
9	Excel	**2**	**2**	**0**		
10	Database Fundamentals	**2**	**2**	**0**		
11	Database Approach	**2**	**2**	**0**		
12	Types of Data Models	**2**	**2**	**0**		
13	Relational Database Model	**2**	**2**	**0**		
14	Fundamental Concepts in the Relational Data Model	**2**	**2**	**0**		
15	Types of Attributes	**2**	**2**	**0**		

6.Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1written (Semester work) Mid-term	8th week	10	10%
2	Exam 2 ..... (Semester work)	-	-	-
3	Final Written Exam	Sixteenth week	60	60%
4	Final Practical/Clinical/… Exam	Fourteenth week	0	0%
5	Final Oral Exam	Fifteenth week	10	10%
6	Assignments / Project /Portfolio/ Logbook	Fourteenth week	20	20%

7.Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	Roy, Shambhavi; Daniel, Clinton; and Agrawal, Manish, "Fundamentals of Information Technology" (2023). FUNDAMENTALS OF INFORMATION TECHNOLOGY E. Petroutsos, Mastering Database Programming with Visual Basic 6: SYBEX Inc., 1999.
	Other References	Roy, Shambhavi; Daniel, Clinton; and Agrawal, Manish, Digital Information Technology Course Introduction (Preface)" (2023).
	Electronic Sources (Links must be added)	
	Learning Platforms (Links must be added)	
	Other (to be mentioned)	
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	- Data Show and Projector - Whiteboard - Laptop
	Supplies	Course handouts – Reference sheets
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	
	Other (to be mentioned)	

Course Coordinator

Dr. Eman Ibrahim

Program Coordinator

Dr. Mohamed atef

Uni 142: History of Science

1.Basic Information

Course Title (according to the bylaw)	**History of Science**			
Course Code (according to the bylaw)	**Uni 142**			
Department/s participating in delivery of the course	**Department of Geology**			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2	**-**	**-**	**2**
Course Type	اختياري			
Academic level at which the course is taught	**First level** الفرقة/المستوي الاول			
Academic Program	**Microbiology and chemistry BSc Program**			
Faculty/Institute	**Faculty of Science**			
University/Academy	**Benha University**			
Name of Course Coordinator	**Dr. Mohamed Afifi**			
Course Specification Approval Date	**6/18/2025**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**Approved 18/6/2025 (Department council; meeting number, 37), and 09/7/2025 until 30/7/2025, (faculty council; meeting number, 515)**			

2.Course Overview (Brief summary of scientific content)

The objective of this course is to enable the student to learn the history of science.

3.Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
1.12	Gain knowledge of current scientific issues, biotechnological developments, and technological applications relevant to microbiology and chemistry.	A1	يتعرف الطالب علي العلم ومناهج العلوم والبحث العلمي
		A2	يدرس الطالب مراحل تطور العلوم
2.2	Analyse, assess, and interpret quantitative and qualitative scientific data from various sources.	B1	يدرس الطالب نماذج من علماء العصر الاغريقي واالعرب والنهضة الاوربية
4.2	Identify roles, responsibilities, task delegation, and performance indicators within team settings.	D1	القدرة علي البحث من خلال الشبكة العنكبوتية
4.8	Demonstrate neatness, accuracy, organization, and aesthetic sense in scientific and professional tasks.	D2	السلوك الأخلاقي والتفكير المرتبط بالمجتمع

4.Teaching and Learning Methods

16- **Lecture and presentations**
17- **Practical section**
18- **Open discussions & Seminars**
19- **Self-learning Tasks**
20- **Problem Solving**

5.Course schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	**Training** (Practical/Clinical/ .....)	**Self-learning** (Tasks/ Assignments / Projects/ ...)	**Other** (to be determined)
1	مقدمة عن العلم ومناهج البحث العلمي	**2**	**2**	**0**		
2	تطور البحث العلمي	**2**	**2**	**0**		
3	تطور العلوم عبر الحضارات	**2**	**2**	**0**		
4	الحضارة الاغريقية	**2**	**2**	**0**		
5	الحضارة الاسلامية	**2**	**2**	**0**		
6	الحضارة الاوربية	**2**	**2**	**0**		
7	تطور العلوم من العصور الاوربية الحديثة	**2**	**2**	**0**		
8	نماذج من علماء العصر الاغريقي	**2**	**2**	**0**		
9	Mid Term	**0**	**0**	**0**		
10	نماذج من علماء العصر العرب(1)	**2**	**2**	**0**		
11	نماذج من علماء العصر العرب(2)	**2**	**2**	**0**		
12	نماذج من علماء عصر النهضة الاوربية(1)	**2**	**2**	**0**		
13	نماذج من علماء عصر النهضة الاوربية(2)	**2**	**2**	**0**		
14	نماذج من علماء عصر النهضة الاوربية(3)	**2**	**2**	**0**		
15	نماذج من علماء عصر النهضة الاوربية(4)	**2**	**2**	**0**		

6.Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	**Assignment 1**	**Week 3**	**5**	**5%**
2	**Assignment 2**	**Week 6**	**5**	**5%**
3	**Assignment 3**	**Week 11**	**5**	**5%**
4	**Assignment 4**	**Week 14**	**5**	**5%**
5	**Midterm Exam**	**Week 9**	**10**	**10%**
6	**Final Oral Exam**	**Start of 17th week**	**10**	**10%**
7	**Final Written Exam**	**Week 16**	**60**	**60%**

7.Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	**6-1 Course notes:** **تاريخ العلم 1543-2001 محور العدد الجديد من سلسلة عالم المعرفة تأليف : جون غريبين وترجمة شوقي جلال** **6-2 Required books:** تاريخ العلوم اختراعات واكتشافات وعلماء تأليف كلود بريزنسكي الطبعة الاولي 2015 رقم الايداع 2013/14537
	Other References	www.google.com
	Electronic Sources (Links must be added)	5. **https://www.sciencedirect.com** 6. **https://www.ekb.eg**
	Learning Platforms (Links must be added)	**https://elearning.bu.edu.eg** **https://ebook.bu.edu.eg/**
	Other (to be mentioned)	
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	- Data Show and Projector - Whiteboard - Laptop
	Supplies	Course handouts – Reference sheets
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	
	Other (to be mentioned)	

Course Coordinator

Dr. Mohamed Afifi

Program Coordinator

Dr. Mohamed atef

Uni 152:Healthy Nutrition Course Specification

(2025)

1.Basic Information

Course Title (according to the bylaw)	**Healthy Nutrition**			
Course Code (according to the bylaw)	**Uni 152**			
Department/s participating in delivery of the course	**Zoology Department**			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2	0	0	2
Course Type	**اختياري**			
Academic level at which the course is taught	**الفرقة/المستوي الاول**			
Academic Program	**Microbiology & chemistry BSc Program**			
Faculty/Institute	**Science**			
University/Academy	**Benha University**			
Name of Course Coordinator	**Dr. Doaa Sabry Ibrahim**			
Course Specification Approval Date	**7/9/2025**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Faculty council, 9/7/2025 until 30/7/2025 Meeting number 515			

2.Course Overview (Brief summary of scientific content)

By the end of the course the student will be up to date knowledge about constitute of adequate healthy diet and giving information about making healthier and safer food choices.

3.Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
1.12	Structure and functions of living cells, cell organelles and biomolecules, as well as the action of different types of physiological regulators in living organisms, and their application in biotechnology.	a1	Identify basic knowledge of principles nutrition
		a2	Define of the different terminologies concerning the subject of nutrition.
		a3	Explain objectives of dietary allowances and standards
		a4	Identify the main component of normal balanced diet.
		a5	The principles of the update USDA food pyramid, published in 2005.
		a6	Recognize negative impact of diet imbalance on health.
		a7	Enumerate the characteristic and factors affecting the prevalence and incidence of malnutrition.
		a8	Identify the nutritional needs of vulnerable groups.
2.4	Risks and biohazards associated with biotechnological application and the relevant ethical and legal issues.	b1	Discuss effect of food components on health and performance of people.
		b2	Analyze the nutritive value of food elements.
		b3	Calculate daily requirement of different nutrients for individuals in different age groups.
		b4	differentiate between mal and under nutrition

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
4.6	6 Acquire self-learning and life-long learning skills to remain updated with scientific and technological advancements.	**d1**	formulate food for healthy and sick persons

4.Teaching and Learning Methods

1. Self-learning
2. E-learning
3. Presentations
4. Seminars and Discussion

5.Course schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	**Training (Practical/ Clinical/ .....)**	**Self-learning (Tasks/ Assignments/ Projects/ ...)**	**Other (to be determined)**
1	Basic knowledge of principles nutrition and the different terminologies concerning the subject of nutrition	**2**	**2**	**0**		
2	Dietary allowances and standards and the main component of normal balanced diet.	**2**	**2**	**0**		
3	Describing the principles of the update USDA food pyramid, published in 2005.	**2**	**2**	**0**		
4	negative impact of diet imbalance on health	**2**	**2**	**0**		
5	The characteristic and factors affecting the prevalence and incidence of malnutrition.	**2**	**2**	**0**		
6	The characteristic and factors affecting the prevalence and incidence of malnutrition.	**2**	**2**	**0**		
7	The nutritional needs of vulnerable groups.	**2**	**2**	**0**		
8	Effect of food components on health and performance of people.	**2**	**2**	**0**		
9	Mid-Term exam	**-**	**-**	**-**		
10	The nutritive value of food elements.	**2**	**2**	**0**		

11	Daily requirement of different nutrients for individuals in different age groups.	**2**	**2**	**0**		
12	Difference between mal and under nutrition.	**2**	**2**	**0**		
13	Health measures related to level of prevention according to individual and community health needs.	**2**	**2**	**0**		
14	Formulate food for healthy and sick persons.	**2**	**2**	**0**		
15	Revision	**2**	**2**	**0**		

6.Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Mid-Term Exam	**9**	**10**	**10%**
2	Assignments / Project /Portfolio/ Logbook	**From first week to 14**	**20**	**20%**
3	Final Practical/Clinical/… Exam	**------**	**-------**	**-------**
4	Final Oral Exam	**15th week**	**10**	**10%**
5	Final Written Exam	**16th week**	**60**	**60%**
	Field training	**-**	**-**	**-**
	Other (Mention)	**-**	**-**	**-**

*** The methods mentioned are examples, the organization may add and/or delete**

7.Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	Course notes Lecture and practical notes approved by Zoology Department**.**
	Other References	كتاب التغذية العلاجية- د. منى خليل عبد القادر -2013- الناشر: مجموعة النيل العربية كتاب أسس التغذية الصحية للبالغين - أ.د حسين رزق-2002-الجمعية المصرية لارتفاع ضغط الدم.
	Electronic Sources (Links must be added)	www.nni.org.eg www.altibbi.com

	Learning Platforms (Links must be added)	Thinqi+ E book plateform of benha university
	Other (to be mentioned)	**Whitney, E., & Rolfes, S. R. (2022).** Understanding Nutrition (16th ed.). Cengage Learning. **Wardlaw, G. M., & Smith, A. M. (2021).** Contemporary Nutrition: A Functional Approach (6th ed.). McGraw-Hill Education. **Mahan, L. K., Raymond, J. L., & Escott-Stump, S. (2020).** Krause's Food & the Nutrition Care Process (15th ed.). Elsevier.
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	Data show – Power Points – videos.
	Supplies	Markes- board- labtop
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	Praxilaps
	Other (to be mentioned)	

*** The list mentioned is an example, the institution may add and/or delete depending on the nature of the course**

Name and Signature
Course Coordinator
Dr. Doaa Sabry Ibrahim

Name and Signature
Program Coordinator
Dr. Mohamed atef

Bot 100: General botany (1) Course Specification (2025)

1. Basic Information

Course Title (according to the bylaw)	**General botany (1)**			
Course Code (according to the bylaw)	**Bot 100**			
Department/s participating in delivery of the course	**Botany and microbiology department**			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	1	**2**	**-**	**2**
Course Type	اجباري			
Academic level at which the course is taught	الفرقة/المستوي الاول			
Academic Program	**microbiology and chemistry B.SC.**			
Faculty/Institute	**Faculty of science**			
University/Academy	**Benha university**			
Name of Course Coordinator	**Asst. Prof. Dr. Ahmed Esmael**			
Course Specification Approval Date	**7/1/2025**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department Council Date: 21/7/2025 Facility Council meeting number (515): 9/7/2025 and Emergency session (516) 28/7/2025			

2. Course Overview (Brief summary of scientific content)

By finishing this course the graduate will be able to understand the systematic position of prokaryotic and eukaryotic organisms. Identification of many organisms, including vital functions of certain structures of microorganisms and eukaryotic plants.

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
1.2	Acquire essential knowledge in mathematics, physics, biology, and other supporting sciences necessary for understanding the latest advances in microbiology and chemistry	a1	Define viruses in terms of structure, prevalence, and importance
1.4	Show familiarity with biological and microbiological terminology, nomenclature, and contemporary classification systems based on modern trends and molecular approachesc	a2	Determine prokaryotes and eukaryotes
1.8	Show familiarity with biological and microbiological terminology, nomenclature, and contemporary classification systems based on modern trends and molecular approaches	a3	Record benefits of microorganisms
2.3	Construct integrated lines of reasoning to support hypotheses, confirm evidence, and interpret recent research advancements (e.g., microbial biotechnology, nanotechnology applications, environmental microbiology)	b1	interpret , evaluate, and critique scientific information using evidence-based reasoning and recent developments in microbiology and chemistry
2.4	Interpret data related to microorganisms and their impact on health, the environment, and industry	b2	Evaluate the interrelationships between microorganisms, plants and their ecosystems and predict their responses to environmental changes.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
3.9	Prepare, stain, and examine slides for microscopic identification of various microbial types	c1	Collect information and design hypothesis for experiments.
4.3	Think independently, critically, and creatively to solve scientific and practical problems	d1	Implement tools for prokaryotes and eukaryotes
4.8	Demonstrate neatness, accuracy, organization, and aesthetic sense in scientific and professional tasks	d2	Adopt light microscope technology to identify the microorganisms

4. Teaching and Learning Methods

1- lectures
2. practical work
3. Self- learning (visit to library)
4. Group Discussions.
5. Visual presentations

5.Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	**Training** (Practical/Clinical/ .....)	**Self-learning** (Tasks/ Assignments / Projects/ ...)	**Other** (to be determined)
1	Introduction and plant kingdom	**3**	**1**	**2**	**-**	**-**
2	Properties and structure of viruses	**3**	**1**	**2**	**-**	**-**
3	Types and life cycles of viruses	**3**	**1**	**2**	**-**	**-**
4	Properties and structure of bacteria	**3**	**1**	**2**	**-**	**-**
5	Reproduction of bacteria	**3**	**1**	**2**	**-**	**-**
6	Classification and economic importance and of algae	**3**	**1**	**2**	**-**	**-**
7	Shapes of algae	**3**	**1**	**2**	**-**	**-**
8	**Midterm exam and revision**	**0**	**0**	**0**	**-**	**-**
9	Reproduction in algae	**3**	**1**	**2**	**-**	**-**
10	Properties and structure of fungi	**3**	**1**	**2**	**-**	**-**
11	Reproduction in some fungal species	**3**	**1**	**2**	**-**	**-**
12	Reproduction in some fungal species	**3**	**1**	**2**	**-**	**-**
13	Characters of archegoniate	**3**	**1**	**2**	**-**	**-**
14	Reproduction of archegoniate	**3**	**1**	**2**	**-**	**-**
15	Revision	**3**	**1**	**2**	**-**	**-**

6.Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Midterm exam	**8**	**5**	**5%**
2	Assignments / Project /Portfolio/ Logbook	**11**	**15**	**15%**
3	Final Practical/Clinical/… Exam	**16**	**25**	**25%**
4	Final Oral Exam	**16**	**5**	**5%**

5	Final Written Exam	**From week 17**	**50**	**50%**

*** The methods mentioned are examples, the organization may add and/or delete**

7.Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	**Course notes**
	Other References	Simpson, M. G. (2019). *Plant systematics*. Academic press. Singh, G. (2019). *Plant systematics: an integrated approach*. CRC Press.
	Electronic Sources (Links must be added)	https://www.algaebase.org
	Learning Platforms (Links must be added)	**Thinqi+ E book platform of benha university**
	Other (to be mentioned)	Bobik TA (May 2006). "Polyhedral organelles compartmenting bacterial metabolic processes". Applied Microbiology and Biotechnology. 70 (5): 517–25. doi:10.1007/s00253-005-0295-0. PMID 16525780. S2CID 8202321. *Kosugi Y, Matsuura N, Liang Q, Yamamoto-Ikemoto R (October 2020).* *"Wastewater Treatment using the "Sulfate Reduction,* *DenitrificationAnammox and Partial Nitrification (SRDAPN)"* *Process". Chemosphere. **256**:127092.* *Bibcode:2020Chmsp.25627* *092K. doi:10.1016/j.chemosphere.2020.127092.* *PMID 32559887.* *S2CID 219476361.* Gabaldón T (October 2021). "Origin and Early Evolution of the Eukaryotic Cell". *Annual Review of Microbiology*. **75** (1): 631– 647. doi:10.1146/annurev-micro-090817-062213. PMID 34343017. S2CID 236916203. Archived from the original on 19 August 2022. Retrieved 19 August 2022.

Sanderson K (June 2022). "Largest bacterium ever found is surprisingly complex". *Nature*. doi:10.1038/d41586-022-01757-1. PMID 35750919. S2CID 250022076.
Cheek M, Nic Lughadha E, Kirk P, Lindon H, Carretero J, Looney B, et al. (2020). "New scientific discoveries: Plants and fungi". *Plants, People, Planet*. **2** (5): 371–388. doi:10.1002/ppp3.10148. hdl:1854/LU-8705210.**102**
Gow NA, Latge JP, Munro CA, Heitman J (2017). "The fungal cell wall: Structure, biosynthesis, and function". *Microbiology Spectrum*. **5** (3). doi:10.1128/microbiolspec.FUNK-0035-2016. hdl:2164/8941. PMID 28513415. S2CID 5026076.
Fisher MC, Garner TW (2020). "Chytrid fungi and global amphibian declines". *Nature Reviews Microbiology*. **18** (6): 332–343. doi:10.1038/s41579-020-0335-x. hdl:10044/1/78596. PMID 32099078. S2CID 211266075.
Hambugala KM, Daranagama DA, Phillips AJ, Kannangara SD, Promputtha I (2020). "Fungi vs. fungi in biocontrol: An overview of fungal antagonists applied against fungal plant pathogens". *Frontiers in Cellular and Infection Microbiology*. **10**: 604923. doi:10.3389/fcimb.2020.604923. PMC 7734056. PMID 33330142.
Dolja VV, Koonin EV (November 2011). "Common origins and host dependent diversity of plant and animal viromes". *Current Opinion in Virology*. **1** (5): 322–31. doi:10.1016/j.coviro.2011.09.007. PMC 3293486. PMID 22408703.
Lampejo T (July 2020). "Influenza and antiviral resistance: an overview". *European Journal of Clinical Microbiology & Infectious Diseases*. **39** (7): 1201–1208. doi:10.1007/s10096-020-

		03840-9. PMC 7223162. PMID 32056049 Chapman, V. J., Chapman, D. J., Chapman, V. J., & Chapman, D. J. (1973). Algal Physiology. The Algae, 465-480.**103** Alam, M. A., Xu, J. L., & Wang, Z. (Eds.). (2020). Microalgae biotechnology for food, health and high value products (pp. 81- 123). Singapore:: Springer. Botany, An introduction to plant Biology, 2/e. James D. Mauseth, Jones and Bratlett publishers Inc. 1998. Green Plants. Their origin and Diversity. Bell P. and Hemsley, A. Cambridge University Press. 2000. General Botany. Khalil, A., Amin, A., Younis, A. and Naguib, M. Cairo University press. 1978. Vanderpoorten, A., & Goffinet, B. (2009). Introduction to Bryophytes. Cambridge: Cambridge University Press. Reece, Jane B. and Meyers, Noel. and Urry, Lisa A. and Cain, Michael L. and Wasserman, Steven A. and Minorsky, Peter V. and Jackson, Robert B. and Cooke, Bernard J. and Campbell, Neil A. Campbell biology, Pearson Frenchs Forest, NSW 2015 1.المكتبة االكاديمية .قاسم فؤاد السحار .تقسيم النبات
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	**Labtop- microphone – data show – paper progector**
	Supplies	**Marker – board**
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	**Visual lab**
	Other (to be mentioned)	

*** The list mentioned is an example, the institution may add and/or delete depending on the nature of the course**

Name and Signature
Course Coordinator

Asst. Prof. Dr. Ahmed Esmael

Name and Signature
Program Coordinator

Asst. prof. Dr. Mohamed atef

CHM 100: General chemistry (1)

1.Basic Information

Course Title (according to the bylaw)	**General Chemistry (1)**			
Course Code (according to the bylaw)	**CHM 100**			
Department/s participating in delivery of the course	**Department of Chemistry**			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (Tutorial)**	**Total**
	2	**2**	**1**	3
Course Type	اجباري			
Academic level at which the course is taught	**First level** الفرقة/المستوي الاول			
Academic Program	**Microbiology and chemistry BSc Program**			
Faculty/Institute	**Faculty of Science**			
University/Academy	**Benha University**			
Name of Course Coordinator	**Prof. Dr. Eman Abdallah**			
Course Specification Approval Date	**6/18/2025**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**Approved 18/6/2025 (Department council; meeting number, 37), and 09/7/2025 until 30/7/2025, (faculty council; meeting number, 515)**			

2.Course Overview (Brief summary of scientific content)

This course aims to provide students with a foundational understanding of key inorganic and physical chemistry concepts. It enables them to study theories of atomic structures, stoichiometry, moles, chemical formula, chemical equation and types of isotopes. The students learn the electronic configuration of elements and the position of elements in the periodic table. Students will also learn Schrodinger equation and the quantum numbers. Students will also gain insight into different types of chemical bonding, Lewis's structure, valence-shell electron-pair repulsion (VSEPR) theory, geometrical hybridization of molecules and other theories. It explores the different states of matter, stoichiometry, including the behavior of gases through gas laws. The students learn the relationship between particle-wall collisions and pressure, the speed of molecules, the rate of diffusion, and the Dalton law of partial pressures. The students learn the intermolecular spaces between molecules, attractive forces between molecules in solids and liquids. The course contains the introduction of thermochemistry: forms of energy: kinetic, potential, thermal, chemical, and nuclear. It contains energy conservation and its principles, exothermic and endothermic reactions, enthalpy change of a chemical reaction, Hess' law, heat capacity, and the energy of bond formation and breaking. Additionally, the program helps students differentiate between acidic and basic radicals, enhancing their analytical and practical chemistry skills.

3.Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
1.1	Demonstrate comprehensive understanding of theories, concepts, principles, facts, and essential techniques related to microbiology and chemistry.	**a1**	Identify chemical formulae of inorganic and units of parameters
		a2	Define the chemical concepts of inorganic and physical chemistry
		a3	Explain the moles, stoichiometry, chemical formula, chemical equation and isotopes
		a4	To Know the types of quantum numbers and electron configuration of elements
		a5	Define stoichiometry, speed of molecules, the rate of diffusion, and the Dalton law of partial pressures
		a6	Define thermochemistry
1.2	Acquire essential knowledge in mathematics, physics, biology, and other supporting sciences necessary for understanding the latest advances in microbiology and chemistry	**a7**	Understand the types of bonds and theories of chemical bonding
		a8	Recognize Lewis's structure, geometrical and hybridization of molecules
		a9	Explain valence-shell electron-pair repulsion (VSEPR) theory
1.10	Identify the constitution, properties, and synthetic pathways of chemical compounds and predict their behavior based on structural characteristics	**a10**	Describe the relationship between particle-wall collisions and pressure
		a11	Identify attractive forces between solids and liquids
		a12	Describes the energy changes during chemical reactions
2.2	Analyze, assess, and interpret quantitative and qualitative scientific data from various sources	**b1**	Differentiate between the different inorganic reagents that use in the identification of the properties of inorganic compounds.
		b2	Point out different properties of inorganic compounds
2.6	Interpret scientific data presented in graphs, figures, tables, spectroscopic charts, and other formats as well as chemical composition	**b3**	Determine the different shapes of different inorganic materials
		b4	Point out specific hazardous materials inside the laboratory
		b5	Identify the acid and base radical of inorganic compounds
3.2	Use modern laboratory instruments, equipment, and technologies safely and efficiently in chemical and microbiological investigations	**c1**	Compare atomic weight, molecular weight, and moles of inorganic molecules.
		c2	Report types of isotopes, quantum numbers and electron configuration of elements
		c3	Understand forms of energy: kinetic, potential, thermal, chemical, and nuclear
		c4	Discover standard enthalpy, exothermic and endothermic reactions

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
		c5	Design the Lewis's structure, chemical formula and composition of inorganic molecules
3.4	Handle chemical materials and biological samples safely, considering their physical, chemical, and biological hazards	**c6**	Design the Lewis's structure, chemical formula and composition of inorganic molecules
		c7	Discover different bonds in inorganic compounds
		c8	Report, geometrical, shape and hybridization of molecules
4.8	Demonstrate neatness, accuracy, organization, and aesthetic sense in scientific and professional tasks	**d1**	Effectively manages tasks, time, and resources.
		d2	Search for information and engage in life-long self learning discipline.
		d3	Collaborate effectively with teamwork members.

4.Teaching and Learning Methods

- **Lecture and presentations**
- **Practical section**
- **Open discussions & Seminars**
- **Self-learning Tasks**
- **Problem Solving**

Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups)	**Training (Practical)**	**Self-learning (Tasks/ Assignments)**	**Other (to be determined**
1	Introduction to inorganic and physical chemistry and the units of inorganic and physical parameters	**5**	**2**	**-**	**-**	**-**
	Lab orientation and safety rules and identify acid base radicals		**-**	**3**		
2	Stoichiometry, moles, chemical formula, atomic, and molecular weight	**5**	**2**	**-**	**-**	**-**
	Detection of acid radicals (Anions) of group I		**-**	**3**		
3	Chemical formula and chemical equation,	**5**	**2**	**-**	**-**	**-**
	Detection of acid radicals (Anions) of		**-**	**3**		
4	Theories of atomic structures,	**5**	**2**	**-**	**-**	**-**
	Detection of acid radicals (Anions) of		**-**	**3**		
5	Theories of atomic structures,	**5**	**2**	**-**	**-**	**-**
	Detection of acid radicals (Anions) of		**-**	**3**		
6	Atomic spectra and isotopes,	**5**	**2**	**-**	**-**	**-**
	Detection of basic radicals (cations) of group I		**-**	**3**		
7	Quantum numbers	**5**	**2**	**-**	**-**	**-**
	Detection of basic radicals (cations) of group II		**-**	**3**		
8	**Mid-Term Exam**					
9	Electron configuration of elements,	**5**	**2**	**-**	**-**	**-**
	Detection of basic radicals (cations) of group III		**-**	**3**		
10	Chemical bonding	**5**	**2**	**-**	**-**	**-**
	Detection of basic radicals (cations) of group IV		**-**	**3**		
11	Chemical bonding	**5**	**2**	**-**	**-**	**-**
	Detection of basic radicals (cations) of group V		**-**	**3**		
12	Valence-shell electron-pair repulsion (VSEPR) theory and Lewis's structure	**5**	**2**	**-**	**-**	**-**

	Detection of basic radicals (cations) of group VI		-	3		
13	Valence-shell electron-pair repulsion (VSEPR) theory and Lewis's structure	5	2	-	-	-
	Detection of basic radicals (cations) of groups		-	3		
14	Geometrical, shape and the hybridization of molecules	5	2	-	-	-
	Detection of basic radicals (cations) of groups		-	3		
15	Geometrical, shape and the hybridization of molecules	5	2	-	-	-
	Revision and general scheme		-	3		

6.Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Semester work	Fifth week	15	15%
2	Mid-Term Exam	8th week	5	5%
3	Final Written Exam	seventeenth week	50	50%
4	Final Practical Exam	Sixteenth week	25	25%
5	Final Oral Exam	Sixteenth week	5	5%
Total			100	100%

7.Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	**1 Course notes** Lecture notes approved by Chemistry Department. **2 Required books** **Zumdahl, S. S., & Zumdahl, S. A.** (2021). *Chemistry: An Atoms First Approach* (9th ed.). Cengage Learning. **3 Recommended books** **Petrucci, R. H., Herring, F. G., Madura, J. D., & Bissonnette, C.** (2021). *General Chemistry: Principles and Modern Applications* (11th ed.). Pearson.
	Other References	**4 Periodicals, Web sites, etc** *CRC Handbook of Chemistry and Physics: 97th ed. Call Number: QD65 .H3 Boca Raton, FL: CRC Press, 2016* Inorganic Chemistry (ACS) http://www.public.asu.edu/~jpbirk/CHM-115_BLB/Chpt24/

		http://ocw.mit.edu/courses/chemistry/5-112-principles-of-chemical-science-fall-2005/
	Electronic Sources (Links must be added)	The Egyptian Knowledge Bank https://www.ekb.eg/web/gu https://en.wikipedia.org/wiki/Periodic_table?wprov=srpw1_5
	Learning Platforms (Links must be added)	https://benhasci.ekb.eg/ https://ebook1.bu.edu.eg/
	Other (to be mentioned)	
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	Microphone in lectures and Data show
	Supplies	White board
	Electronic Programs	Microsoft office
	Skill Labs/ Simulators	Laboratories with enough chemicals and equipments
	Virtual Labs	Praxilabs
	Other (to be mentioned)	

Course Coordinator
Prof. Dr. Eman Abdallah

Program Coordinator
Dr. Mohamed atef

Com 104: Introduction to Databases Course Specification (2025)

1.Basic Information

Course Title (according to the bylaw)	**Introduction to Databases**			
Course Code (according to the bylaw)	**Com 104**			
Department/s participating in delivery of the course	**Department of Mathematics and Computer Science**			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2	**2**	**0**	**3**
Course Type	اجباري			
Academic level at which the course is taught	الفرقة/المستوي الاول			
Academic Program	**Microbiology and chemistry BS.C program**			
Faculty/Institute	**Faculty of Science**			
University/Academy	**Benha University**			
Name of Course Coordinator	**Dr. Eman Ibrahim & Dr. Ahmed Mohamed**			
Course Specification Approval Date	**9/7/2025**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**Department Council Date: 21/7/2025 Faculity Council meeting number (515): 9/7/2025 And Emergency session (516) 28/7/2025**			

2.Course Overview (Brief summary of scientific content)

At the end of this course, the students must be able to Understand basic database concepts and architecture, apply relational database theory, design normalized relational databases, write SQL queries, use a database management system (DBMS), understand database design and implementation issues, and develop simple database applications.

3.Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
1.2	Acquire essential knowledge in mathematics, physics, biology, and other supporting sciences necessary for understanding the latest advances in microbiology and chemistry.	**a1**	Identify the purpose and advantages of database systems.
		a2	Describe the architecture and functions of DBMS.
		a3	Explain key concepts in relational databases and data modeling.
2.2	Analyse, assess, and interpret quantitative and qualitative scientific data from various sources.	**b1**	Analyze real-world data requirements and design suitable data models.
		b2	Apply normalization techniques to remove data anomalies.
2.6	Interpret scientific data presented in graphs, figures, tables, spectroscopic charts, and other formats.	**b3**	Translate queries between relational algebra and SQL
3.5	Use appropriate statistical and computational tools to analyze, model, and interpret experimental data in microbiology and chemistry	**c1**	Use a DBMS to define, create, and manipulate databases.
		c2	Construct SQL statements for data retrieval, insertion, update, and deletion.
		c3	Design and implement small-scale database applications.
4.1	Use information and communication technology effectively for data handling, scientific writing, and digital communication.	**d1**	Communicate technical ideas effectively in written and oral form.
		d2	Work collaboratively on database design projects.
		d3	Use critical thinking to solve data-related problems.

5.Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	**Training** (Practical/Clinical/ .....)	**Self-learning** (Tasks/ Assignments / Projects/ ...)	**Other** (to be determined)
1	Introduction to computers	4	2	2	0	0
2	Internet and Web	4	2	2	0	0
3	Information Technology and Network Types	4	2	2	0	0
4	Database Fundamentals	4	2	2	0	0
5	Characteristics and benefits of databases	4	2	2	0	0
6	Types of Data Models	4	**2**	**2**	0	0
7	Architectural databases	4	2	2	0	0
8	Database Manager	4	2	2	0	0
9	Mid-term					
10	Types of Relationships	4	2	2	0	0
11	Database Management Systems	4	2	2	0	0
12	Relational Database Model	4	2	2	0	0
13	Relational Database Model	4	2	2	0	0
14	Fundamental Concepts	4	2	2	0	0
15	Characteristic entities	4	2	2	0	0

4.Teaching and Learning Methods

1. Lectures
2. E-learning platform

6.Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1written (Semester work) Mid-term	9th week	5	5%
2	Exam 2 ..... (Semester work)	-	-	-
3	Final Written Exam	Sixteenth week	50	50%
4	Final Practical/Clinical/… Exam	Fourteenth week	25	25%
5	Final Oral Exam	Fifteenth week	5	5%
6	Assignments / Project /Portfolio/ Logbook	Fourteenth week	15	15%
7	Field training	-	0	0%
8	Other (Mention)	-	0	0%

* The methods mentioned are examples, the organization may add and/or delete

7.Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	**Silberschatz, A., Korth, H. F., & Sudarshan, S.** (2024). *Database System Concepts* (8th ed.). McGraw-Hill Education. **Elmasri, R., & Navathe, S. B.** (2015). *Fundamentals of Database Systems* (7th ed.). Pearson.
	Other References	E. Petroutsos, Mastering Database Programming with Visual Basic 6: SYBEX Inc., 1999. W. Kim and F. H. Lochovsky, Object-oriented concepts, databases, and applications: ACM Press/Addison-Wesley Publishing Co., 1989. **Garcia-Molina, H., Ullman, J. D., & Widom, J.** (2008). *Database Systems: The Complete Book* (2nd ed.). Prentice Hall.
	Electronic Sources (Links must be added)	**edX – Databases Courses:** https://www.edx.org/learn/databases

	Learning Platforms (Links must be added)	**Coursera – Introduction to Databases:** https://www.coursera.org/learn/introduction-to-databases
	Other (to be mentioned)	Course notes (The Department Notes)
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	Data show
	Supplies	Laptop, board, and markers. Computer lab.
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	
	Other (to be mentioned)	

* The list mentioned is an example, the institution may add and/or delete depending on the nature of the course

Name and Signature **Course Coordinator** **Dr. Eman Ibrahim & Dr. Ahmed Mohamed**	**Name and Signature** **Program Coordinator** **Dr. Mohamed atef**

CHM 105: General chemistry (2)

1.Basic Information

Course Title (according to the bylaw)	**General Chemistry (2)**			
Course Code (according to the bylaw)	**CHM 105**			
Department/s participating in delivery of the course	**Department of chemistry**			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2	**2**	**-**	**3**
Course Type	اجباري			
Academic level at which the course is taught	**First level** الفرقة/المستوي الاول			
Academic Program	**Microbiology and chemistry BSc Program**			
Faculty/Institute	**Faculty of Science**			
University/Academy	**Benha University**			
Name of Course Coordinator	**Prof. Dr. Wagdy I. El-Dougdoug**			
Course Specification Approval Date	**6/18/2025**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	**Approved 18/6/2025 (Department council; meeting number, 37), and 09/7/2025 until 30/7/2025, (faculty council; meeting number, 515)**			

2.Course Overview:

This course provides a comprehensive introduction to general chemistry, with an integrated focus on both physical and organic chemistry. The physical chemistry section study solutions, chemical and ionic equilibrium, including buffers, pH, common ion effect, and solubility product. Emphasis on basic concepts and calculations related to concentration units, vapor pressure, osmotic pressure, and equilibrium. The organic chemistry section introduces structure and chemical bonding in organic molecules, functional groups, isomerism, nomenclature of organic compounds, reactions and physical properties of alkanes, alkenes and alkynes. Emphasis is placed on developing problem-solving skills, understanding chemical reactivity, and applying theoretical concepts to real-world chemical systems.

3.Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
1.1	Demonstrate comprehensive understanding of theories, concepts, principles, facts, and essential techniques related to microbiology and chemistry	A1	Identify the name of different organic compounds.
		A2	Describe chemical concepts of organic compounds.
		A3	describe theories of chemical bonding and hybridization in carbon atom
1.2	Acquire essential knowledge in mathematics, physics, biology, and other supporting sciences necessary for understanding the latest advances in microbiology and chemistry.	A4	Identify physical and chemical properties of alkanes, alkenes and alkynes.
		A5	Describe the basic concept of solubility, chemical equilibrium and ionic equilibrium.
		A6	Identify and explain the classification of solutions and its colligative properties as lowering vapor pressure, osmotic pressure.
1.10	Identify the constitution, properties, and synthetic pathways of chemical compounds and predict their behavior based on structural characteristics..	A7	Define solutions, concentration units as molarity, normality, buffer solution, chemical equilibrium
		A8	memorize the laws and principles of chemical equilibrium, including Le Chatelier's principle.
		A9	explain the solubility product constant and its applications in predicting precipitation and dissolution.
2.7	Postulate and deduce mechanisms, models, and procedures to solve scientific problems in modern microbiology and Analyze chemical data to identify and confirm chemical structures as well as chemical composition	B1	Differentiate between different types of hybridization in carbon atom
		B2	Predict the names of different function groups such as alkanes, alkenes and alkynes
		B3	Outline the structure and chemical bonding in organic molecules.
		B4	Apply appropriate methods to solve quantitative problems involving concentration units and colligative properties.
		B5	Apply mathematical relationships to solve problems involving equilibrium constants and solubility products.
		B6	Formulate and construct equilibrium models to predict solubility and precipitation.
		B7	**Interpret** and **confirm** the behavior of buffer systems under different conditions, and **compare** the effects of adding acids, bases, or salts.
3.2	Use modern laboratory instruments, equipment, and technologies safely and efficiently in chemical and microbiological investigations	C1	Exame the names of different function groups such as alkanes, alkenes and alkynes
		C2	Investigate the chemical and physical properties of simple organic liquid.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	Text	Code	Text
3.4	Handle chemical materials and biological samples safely, considering their physical, chemical, and biological hazards	C3	Analyte different types of organic compounds.
		C4	Identify the different liquid organic compounds
4.8	Demonstrate neatness, accuracy, organization, and aesthetic sense in scientific and professional tasks.	D1	Work cooperatively in teams; manage time; collaborate effectively; and communicate with clarity and professionalism.
		D2	Acquire self-learning and life-long learning skills to remain updated with scientific and technological advancements

4.Teaching and Learning Methods

1. **Lecture and presentations**
2. **Practical section**
3. **Open discussions & Seminars**
4. **Self-learning Tasks**

5.Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups)	**Training (Practical)**	**Self-learning (Tasks/ Assignments)**	**Other (to be determined**
1	Introduction to solutions and concentration units	**4**	**2**	**-**	**-**	**-**
	Lab Safety, Equipment Orientation & Preliminary Organic Tests		**-**	**2**		
2	Colligative properties of solution	**4**	**2**	**-**	**-**	**-**
	Physical Properties and Solubility Tests of Organic Compounds		**-**	**2**		
3	Introduction to chemical equilibrium, equilibrium constants and Le Cahtelier's principle.	**4**	**2**	**-**	**-**	**-**
	Detection of Unsaturation in Hydrocarbons		**-**	**2**		
4	Introduction to Ionic equilibrium and pH calculations.	**4**	**2**	**-**	**-**	**-**
	Identification for Alcohols		**-**	**2**		
5	Buffers, common ion effect and acid base titration	**4**	**2**	**-**	**-**	**-**
	Classification and Identification of Aliphatic and Aromatic Hydrocarbons		**-**	**2**		
6	Solubility product and its applications	**4**	**2**	**-**	**-**	**-**
	Identification for amines		**-**	**2**		
7	Hybridization in carbon atom (sp3, sp2, sp)	**4**	**2**	**-**	**-**	**-**
	Identification for Aldehydes		**-**	**2**		
8	Nomenclature of organic compounds	**4**	**2**	**-**	**-**	**-**
	Identification for Ketones		**-**	**2**		
9	**Mid-Term Exam**					
10	Physical and chemical properties of alkanes	**4**	**2**	**-**	**-**	**-**
	Identification for Carboxylic acids		**-**	**2**		
11	Physical and chemical properties of cycloalkanes	**4**	**2**	**-**	**-**	**-**
	Differentiation Between Aldehydes and Ketones		**-**	**2**		

12	Physical and chemical properties of alkenes	4	2	-	-	-
	Comparative Analysis Between Organic Functional Groups		-	2		
13	Physical and chemical properties of alkynes	4	2	-	-	-
	Comparative Analysis Between Organic Functional Groups		-	2		
14	Isomerism and Structure–Property Relationship	4	2	-	-	-
	Unknown Sample Identification		-	2		
15	Fundamentals of Organic Reaction Types and Mechanisms	4	2	-	-	-
	Unknown Sample Identification		-	2		

6.Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Semester work	Fifth week	15	15%
2	Mid-Term Exam	9th week	5	5%
3	Final Written Exam	seventeenth week	50	50%
4	Final Practical Exam	Sixteenth week	25	25%
5	Final Oral Exam	Sixteenth week	5	5%
Total			100	100%

7.Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course**	1. Brown, T. L., LeMay, H. E., Bursten, B. E., Murphy, C. J., & Woodward, P. M. (2018). *Chemistry: The Central Science* (14th ed.). Boston: Pearson. pp. 1–1200. 2. McMurry, J. (2015). *Organic Chemistry* (9th ed.). Boston: Cengage Learning. pp. 1–1300. 3. Housecroft, C. E., & Sharpe, A. G. (2012). *Inorganic Chemistry* (4th ed.). Harlow: Pearson Education. pp. 1–1100. 4. Zumdahl, S. S., & Zumdahl, S. A. (2020). *Chemistry: An Atoms First Approach* (3rd ed.). Boston: Cengage Learning. pp. 1–1200.

		5. Petrucci, R. H., Herring, F. G., Madura, J. D., & Bissonnette, C. (2017). *General Chemistry: Principles and Modern Applications* (11th ed.). Boston: Pearson. pp. 1–1150. 6- Butler, James N. *Ionic equilibrium: solubility and pH calculations*. John Wiley & Sons, 1998. 7- Scholz, Fritz, and Heike Kahlert. *Chemical equilibria in analytical chemistry*. Cham: Springer International Publishing, 2019.
	Other References	https://en.wikipedia.org/wiki/Acid–base_reaction https://en.wikipedia.org/wiki/Nucleophile https://en.wikipedia.org/wiki/Coordination_complex https://en.wikipedia.org/wiki/Organic_reaction https://en.wikipedia.org/wiki/Redox
	Electronic Sources	The Egyptian Knowledge Bank https://www.ekb.eg/web/gu https://en.wikipedia.org/wiki/Lubricant
	Learning Platforms	https://benhasci.ekb.eg/ https://ebook1.bu.edu.eg/
	Other	
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	Microphone in lectures and Data show
	Supplies	White board
	Electronic Programs	Microsoft office
	Skill Labs/ Simulators	Laboratories with enough chemicals and equipment's
	Virtual Labs	Praxilabs
	Other (to be mentioned)	Internet Searching

Course Coordinator
Prof. Dr. Wagdy El-Dougdoug

Program Coordinator
Dr. Mohamed atef

Zoo101: General Zoology (1)
Course Specification
(2025)

1. Basic Information

Course Title (according to the bylaw)	General Zoology (1)			
Course Code (according to the bylaw)	Zoo101			
Department/s participating in delivery of the course	Zoology Department			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2	2		3h
Course Type	اجبارى			
Academic level at which the course is taught	First level /second semesterl			
Academic Program	Microbiology and chemistry BSc Program			
Faculty/Institute	Science			
University/Academy	Benha University			
Name of Course Coordinator	Prof. Dr. Omar Elghoniemy			
Course Specification Approval Date	**1/7/2025**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department Council Date: 21/7/2025 Facility Council meeting number (515): 9/7/2025 And Emergency session (516) 28/7/2025			

2. Course Overview (Brief summary of scientific content)

The objective of this course is to enable the students to know:

- The different types of tissues which form the body of a living organism.
- The fine structure of the cell and how cell organelles perform their functions.
- Early development stages of Amphioxus, Bufo and chick (spermatogenesis, oogenesis, fertilization, cleavage, organogenesis)

3. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
1.2	Acquire essential knowledge in mathematics, physics, biology, and other supporting sciences necessary for understanding the latest advances in microbiology and chemistry	**a1**	Know different types of tissues which form the body of a living organism.
1.4	Show familiarity with biological and microbiological terminology, nomenclature, and contemporary classification systems based on modern trends and molecular approaches	**a2**	Define the spermatogenesis and oogenesis..
1.8	Recognize the diversity of different plants, animals and microorganisms and understand the principles of bio-diversity and conservation of natural resources	**a3**	Identify fine structure of the cell and how cell organelles perform their functions.
2.9	Evaluate the interrelationships between microorganisms, plants, Insects, animals and their ecosystems and predict their responses to environmental changes	**b1**	Compare different types of tissues.
		b2	Interpret early development stages of Amphioxus, Bufo and chick.
		b3	Combine spermatogenesis, oogenesis and fertilization.
3.9	Prepare, stain, and examine slides for microscopic identification of various microbial types.	**c1**	Draw spermatogenesis and oogenesis stages.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
4.3	Think independently, critically, and creatively to solve scientific and practical problems	**d1**	Effectively manages tasks, time, and resources.
4.8	Demonstrate neatness, accuracy, organization, and aesthetic sense in scientific and professional tasks	**d2**	Search for information and engage in life-long self learning discipline.

4. Teaching and Learning Methods

2. Lectures
3. Presentations
4. E learning
5. Practical work.

5.Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	**Training** (Practical/Clinical/ .....)	**Self-learning** (Tasks/ Assignments / Projects/ ...)	**Other** (to be determined)
1	Epithelial tissues.	**4**	**2**	**2**		
2	Connective tissues. a) Connective tissues proper.	**4**	**2**	**2**		
3	b) Skeletal tissues.	**4**	**2**	**2**		
4	c) Vascular tissues.	**4**	**2**	**2**		
5	Muscular tissues.	**4**	**2**	**2**		
6	Nervous tissues.	**4**	**2**	**2**		
7	Ultra structure and function of cell membrane and cytoplasm.	**4**	**2**	**2**		
8	Mid Term	**0**	**0**	**0**		
9	Ultra structure and function of mitochondria and golgi apparatus.	**4**	**2**	**2**		
10	Ultra structure and function of lysosome and endoplasmic reticulum.	**4**	**2**	**2**		
11	Ultra structure of nucleus, DNA and meiosis division.	**4**	**2**	**2**		
12	Gametogenesis and fertilization.	**4**	**2**	**2**		
13	Early development of Amphioxus.	**4**	**2**	**2**		
14	Early development of Bufo.	**4**	**2**	**2**		
15	Early development of chick.	**4**	**2**	**2**		

6.Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1written (Semester work)	**8**	**5**	**5%**
2	Exam 2 ..... (Semester work)	**-**	**-**	**-**

3	Final Written Exam	**16**	**50**	**50%**
	Final Practical/Clinical/… Exam	**15**	**25**	**25%**
	Final Oral Exam	**15**	**5**	**5%**
	Assignments / Project /Portfolio/ Logbook	**From First Week to 15**	**15**	**15%**
	Field training	**-**	**-**	**-**
	Other (Mention)	**-**	**-**	**-**

*** The methods mentioned are examples, the organization may add and/or delete**

7.Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	Lecture and practical notes approved by Zoology Department. Cell Biology, Genetics, Molecular Biology, Evolution *and* Ecology by Verma *P.S. and* Agarwal V.K., 2005 **-** Cell Biology and Histology: Board Review Series - 3rd edition by Leslie P. Gartner, James L. Hiatt and Judy M. Strum
	Other References	Text-book of embryology: Heape, Walter, 1855-1929 BRS Cell Biology and Histology, 6th Edition Leslie P. Gartner, James L. Hiatt, Judy M. Strum - Morales V, et al. (2001) Chromatin structure and dynamics: Functional implications. Biochimie 83:1029−1039 - Daban J. (2011) Electron microscopy and atomic force microscopy studies of chromatin and metaphase chromosome structure. Micron 42: 733–750 - Verma, P.S; and Agarwal, V.K. (2005) Cell biology, genetics, molecular biology, evolution and ecology. s. chand & company ltd. ram nagar, new delhi-110 055
	Electronic Sources (Links must be added)	www.zoologydeptbenhauniv.blogspot.com/ www.histology.osumc.edu/histology/HumanHisto/index.htm Color atlas of histology - free eBooks download - GoBookee.org www.indiana.edu/~anat550/embryo_main www.visembryo.co www.bu.edu/histology/m/index.htm www.deltagen.com/target/histologyatlas/HistologyAtlas.html
	Learning Platforms (Links must be added)	**Thinqi + E book platformof benha University**
	Other (to be mentioned)	

	Devices/Instruments	Date show
Supportive facilities & equipment for teaching and learning *	**Supplies**	Slides and microscope. **Marks- Board- Labtop**
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	• Student Lab A&B.
	Other (to be mentioned)	

*** The list mentioned is an example, the institution may add and/or delete depending on the nature of the course**

Name and Signature
Course Coordinator
Prof. Dr. Omar Elghoniemy

Name and Signature
Program Coordinator

Dr Mohamed atef

Zoo102: General Zoology (2)Course Specification (2025)

1.Basic Information

Course Title (according to the bylaw)	**General Zoology (2)**			
Course Code (according to the bylaw)	**Zoo102**			
Department/s participating in delivery of the course	Zoology Department			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2	2		3h
Course Type	Compulsory course.			
Academic level at which the course is taught	First level /second semester			
Academic Program	Microbiology and chemistry BSc Program			
Faculty/Institute	Science			
University/Academy	Benha University			
Name of Course Coordinator	Dr. Marwa Atif			
Course Specification Approval Date	**1/7/2025**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department Council Date: 21/7/2025 Facility Council meeting number (515): 9/7/2025 And Emergency session (516) 28/7/2025			

2.Course Overview (Brief summary of scientific content)

The objective of this course is to enable the students to:

- Know a background on animal taxonomy; general characters of animal Kingdom and phyla (from Protozoa to Nematoda).

Distinguish the structure and function of different human systems.

3.Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
1.2	Acquire essential knowledge in mathematics, physics, biology, and other supporting sciences necessary for understanding the latest advances in microbiology and chemistry	**a1**	Know the animal taxonomy in Protozoa to Nematoda.
		a2	Identify the structure of the animal species in Protozoa to Nematoda.
		a3	Define the life cycle of the parasitic animals in Protozoa to Nematoda.
1.4	Show familiarity with biological and microbiological terminology, nomenclature, and contemporary classification systems based on modern trends and molecular approaches	**a4**	Discover food elements, digestion, absorption and metabolism.
		a5	Identity the function of the liver.
		a6	Know the components and functions of blood, blood vessels and heart.
		a7	State the respiratory system structure, functions, regulation and mechanism of action.
1.8	Recognize the diversity of different plants, animals and microorganisms and understand the principles of bio-diversity and conservation of natural resources	**a8**	Memorise the excretory system structure, function, regulation and mechanism of action.
		a9	Memorise the nervous system structure, neuron and nerve impulse.
		a10	Describe the function of endocrine glands.
2.3	Construct integrated lines of reasoning to support hypotheses, confirm evidence, and interpret recent research advancements (e.g., microbial biotechnology, nanotechnology applications, environmental microbiology)	**b1**	link between animals in each class, order and family.
		b2	Compare general characters of Protozoa to Nematoda.
		b3	Interpret life cycle of the parasitic animals.

3.9	Prepare, stain, and examine slides for microscopic identification of various microbial types	**c1**	Draw *Ascaris and Bufo regularis* body systems.
4.3	Think independently, critically, and creatively to solve scientific and practical problems	**d1**	Effectively manages tasks, time, and resources.
4.8	Demonstrate neatness, accuracy, organization, and aesthetic sense in scientific and professional tasks.	**d2**	Search for information and engage in life-long self learning discipline.
		d3	Exhibit the sense of beauty and neatness

4.Teaching and Learning Methods

1- **Lectures**
2- **Team work**
3- **Practical work**

5.Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	**Training (Practical/ Clinical/ ... ...)**	**Self-learning (Tasks/ Assignments/ Projects/ ...)**	**Other (to be determined)**
1	Systematic Zoology Phylum Protozoa. Phylum Sarcomastigophora	**5**	**2**	**3**		
2	Phyla Ciliophora & Sporozoa	**5**	**2**	**3**		
3	Phylum Porifera.	**5**	**2**	**3**		
4	Phylum Coelenterata.	**5**	**2**	**3**		
5	Phylum Platyhelminthes. Class Trematoda.	**5**	**2**	**3**		
6	Class Cestoda.	**5**	**2**	**3**		
7	Phylum Nematoda.	**5**	**2**	**3**		
8	Food and nutrition Digestion	**5**	**2**	**3**		
9	Mid Term	**0**	**0**	**0**		
10	Absorption, metabolism and liver.	**5**	**2**	**3**		
11	Blood and circulation.	**5**	**2**	**3**		
12	Respiration.	**5**	**2**	**3**		
13	Excretion.	**5**	**2**	**3**		
14	Nervous system and muscle action.	**5**	**2**	**3**		
15	Endocrine glands.	**5**	**2**	**3**		

6.Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1written (Semester work)	**9**	**5**	**5%**
2	Exam 2 ..... (Semester work)	**-**	**-**	**-**
3	Final Written Exam	**16**	**50**	**50%**
4	Final Practical/Clinical/… Exam	**15**	**25**	**25%**
5	Final Oral Exam	**15**	**5**	**5%**
6	Assignments / Project /Portfolio/ Logbook	**From First Week to 15**	**15**	**15%**

	Field training	-	-	-
	Other (Mention)	-	-	-

* The methods mentioned are examples, the organization may add and/or delete

7.Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	Notes approved by Department of Zoology. Principles of Systematic Zoology, Ernst Mayr and Peter D Ashlock, 1997. -A manual of the Sub-kingdom Coelenterata Joseph Reay Greene, 1861. -Biology of Protozoa, D.R. Khanna, 2004 -A text book of invertebrate zoology: Protozoa, Porifera, Coelenterata, Platyhelminthes & Nemathelminthes, for B.-S students of Indian universities, Volume 1, 1962. -Freeliving Freshwater Protozoa, D. J. Patterson, 1996. تأليف : د.أحمد الحسيني و د.أميل دميان- القاهرة . -1962 - بيولوجية الحيوان العملية (الجزء الثاني)
	Other References	-Principles of systematic zoology, Ernst Mayr 1969 -Biological Systematics: Principles and Applications, 2nd Edition Andrew V. Brower, 2009. -The biology of protozoa, Michael A. Sleigh, 1973 -A manual of the sub-Kingdom Coelenterata By Joseph Reay Greene, 1861 -Platyhelminthes, Mario Benazzi, Giuseppina Benazzi Lentati, 1976.
	Electronic Sources (Links must be added)	http://books.google.com.eg/books?id=_XbrBcFGv1EC&source=gbs_similarboo http://en.wikipedia.org/wiki/Systematic_Biology
	Learning Platforms (Links must be added)	**Thinqi + E book platformof benha University**
	Other (to be mentioned)	
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	**Date show**
	Supplies	Slides and microscope. Animals' samples **Marks- Board- Labtop**
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	• Student Lab A&B.

	Other (to be mentioned)	

*** The list mentioned is an example, the institution may add and/or delete depending on the nature of the course**

Name and Signature **Course Coordinator** Dr. Marwa Atif	**Name and Signature** **Program Coordinator** Dr Mohamed atef

Bot 105: General botany (2) Course Specification (2025)

1.Basic Information

Course Title (according to the bylaw)	**General botany (2)**			
Course Code (according to the bylaw)	**Bot 105**			
Department/s participating in delivery of the course	**Botany and microbiology department**			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2	**2**	**-**	**3**
Course Type	اجباري			
Academic level at which the course is taught	الفرقة/المستوي الاول			
Academic Program	**microbiology and chemistry B.SC.**			
Faculty/Institute	**faculty of science**			
University/Academy	**Benha university**			
Name of Course Coordinator	**Dr\ aziza nagah**			
Course Specification Approval Date	**1/7/2025**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department Council Date: 21/7/2025 Facility Council meeting number (515): 9/7/2025 And Emergency session (516) 28/7/2025			

2.Course Overview (Brief summary of scientific content)

By Finishing of this course the graduate will able understanding the physical properties of colloids, definition and structure of plant cell. The diffusion, osmosis to permeability in the plant cell and recognize the difference between the different tissues. The enzymatic actions in plant, photosynthesis respiration &growth in the plant and knowing the internal structure of the different plant organs (leaf-stem-root).

3.Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**code**	**Text**
1.2	Acquire essential knowledge in mathematics, physics, biology, and other supporting sciences necessary for understanding the latest advances in microbiology and chemistry	**a1**	identify physical properties of colloidal solution and- Structure of the plant cell.
1.4	Show familiarity with biological and microbiological terminology, nomenclature, and contemporary classification systems based on modern trends and molecular approaches	**a2**	know diffusion, osmosis, permeability in the plant cell - Types of tissues
		a3	determine the components and function of different permanent tissue systems.
1.8	Recognize the diversity of different plants, animals and microorganisms and understand the principles of bio-diversity and conservation of natural resources	**a4**	determine the components and function of different permanent tissue systems.
		a5	identify respiration and photosynthesis processes.
		a6	describe the internal structure of the different plant organs (leaf-stem-root).
2.9	Evaluate the interrelationships between microorganisms, plants and their ecosystems and predict their responses to environmental changes	**b1**	Compare between colloids and crystalloids, Investigate the RQ value in different respiratory substrates.
		b2	Compare between the internal structure of root -stem-leaf of dicot and monocot plant.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**code**	**Text**
		b3	Apply techniques to understand main differences between crystalloids and colloids.
		b4	Recognize the components and functions of essential plant tissue systems.
		b6	Compare between the internal structure of root -stem-leaf of dicot and monocot plant.
3.9	Prepare, stain, and examine slides for microscopic identification of various microbial types.	**c1**	Investigate action of enzyme, differentiate the sugary leaves from starchy leaves.
		c2	preparation of slides for plant cell- different types of plastids and starch grains.
		c3	Differentiate colloids from crystalloids, Investigate the RQ value in different respiratory substrates.
		c4	differentiate between different types of tissues and superficial structures such as parenchyma, root hairs, trichomes, collenchyma and stomata under microscope
		c5	Investigate action of enzymes, differentiate the sugary leaves from starchy leaves.
		c6	draw diagram and sector sections for internal structures of root- stem-leaf of monocot and dicot plant
4.3	Think independently, critically, and creatively to solve scientific and practical problems	**d1**	Think independently, set tasks and explain physiological processes on scientific basis.
		d2	Management, working in group & life-long learning
4.8	Demonstrate neatness, accuracy, organization, and aesthetic sense in scientific and professional tasks.	**d3**	Ethical behavior, community linked thinking.
		d4	Use computer, internet & communications

4.Teaching and Learning Methods

1. lectures

2. practical work

3. E-learning

4. Canadian Journal of botany & Egyptian Journal of Botany& www.google.com & www.scincedirect.com

5.Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	**Training** (Practical/ Clinical/ .....)	**Self-learning** (Tasks/ Assignments/ Projects/)	**Other** (to be determined)
1	Introduction for plant anatomy and Definition of plant cell	**4**	**2**	**2**	**-**	**-**
2	study the protoplasmic components of plant cell	**4**	**2**	**2**	**-**	**-**
3	study the non- protoplasmic components of plant cell	**4**	**2**	**2**	**-**	**-**
4	Study the principles used in the classification of plant tissues and its type	**4**	**2**	**2**	**-**	**-**
5	determine the components and function of different permanent tissue systems	**4**	**2**	**2**	**-**	**-**
6	determine the components and function of different permanent tissue systems	**4**	**2**	**2**	**-**	**-**
7	Study internal structure of root, stem and leaves for monocots and dicot plants	**4**	**2**	**2**	**-**	**-**
8	**Protoplasm and colloidal state**	**4**	**2**	**2**	**-**	**-**
9	**Midterm and revision**	**-**	**-**	**-**	**-**	**-**
10	**Properties of colloids**	**4**	**2**	**2**	**-**	**-**
11	**Diffusion, Imbibition, and factors affecting the rate of diffusion**	**4**	**2**	**2**	**-**	**-**
12	**Osmosis, Plasmolysis and Factors affecting the osmotic pressure**	**4**	**2**	**2**	**-**	**-**
13	**Permeability**	**4**	**2**	**2**	**-**	**-**
14	**Respiration and Photosynthesis**	**4**	**2**	**2**	**-**	**-**
15	**Respiration and Photosynthesis**	**4**	**2**	**2**	**-**	**-**

6.Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Midterm exam	**9**	**5**	**5%**
2	Assignment 1	**13**	**15**	**15%**

3	Final Practical/Clinical/… Exam	**16**	**25**	**25%**
4	Final Oral Exam	**16**	**5**	**5%**
5	Final Written Exam	**From week 17**	**50**	**50%**

*** The methods mentioned are examples, the organization may add and/or delete**

7.Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	**Course notes**
	Other References	Text book: Introduction to Plant Physiology Author: William G. Hopkins, Norman P. A. Hüner Publisher: Wiley; 4 edition (December 10, 2008), 528 pages Lack, A., & Evans, D. (2021). *BIOS Instant Notes in Plant Biology*. Taylor & Francis.
	Electronic Sources (Links must be added)	Canadian Journal of botany & Egyptiain Journal of Botany& www.google.com & www.scincedirect.com Gibson, L. J. (2012). The hierarchical structure and mechanics of plant materials. *Journal of the royal society interface*, *9*(76), 2749-2766. Muwaffaqoh, D., Kirana, T., & Rachmadiarti, F. (2021). The development of e-book based on project based learning on the plant anatomy structure material. *IJORER: International Journal of Recent Educational Research*, *2*(4), 416-431. Aloni, R. (2021). *Vascular differentiation and plant hormones*. Springer Nature.
	Learning Platforms (Links must be added)	**Thinqi+E book platform of benha university**
	Other (to be mentioned)	Text book: An Introduction to Plant Structure and Development: Plant Anatomy for the Twenty-First Century Author: Charles B. Beck Publisher: Cambridge University Press; 2 editions (2009), 464 pages Calixto, E. S., Lange, D., Bronstein, J., Torezan-Silingardi, H. M., & Del-Claro, K. (2021). Optimal

		defense theory in an ant–plant mutualism: extrafloral nectar as an induced defence is maximized in the most valuable plant structures. *Journal of Ecology*, *109*(1), 167-178. Damayanti, N. P. S., & Yudiana, K. (2021). Pop-Up Book Media on the Topic of Plants' Anatomy and Physiology. *Jurnal Ilmiah Sekolah Dasar*, *5*(3), 505-514.
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	**Data show**
	Supplies	**Laptop- markers- microphone- board**
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	**Visual lab**
	Other (to be mentioned)	

*** The list mentioned is an example, the institution may add and/or delete depending on the nature of the course**

Name and Signature
Course Coordinator

Dr\ aziza nagah

Name and Signature
Program Coordinator

Dr\ Mohamed atef

103 Phy : General Physics (1) Course Specification (2025)

1.Basic Information

Course Title (according to the bylaw)	**General Physics (1)**			
Course Code (according to the bylaw)	**103 Phy**			
Department/s participating in delivery of the course	Department of Physics			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2	0	1	2
Course Type	اجباري			
Academic level at which the course is taught	الفرقة/المستوي الاول			
Academic Program	**Microbiology and chemistry BSc Program**			
Faculty/Institute	**Faculty of science**			
University/Academy	**Benha university**			
Name of Course Coordinator	Dr. Mahmoud H. Makled			
Course Specification Approval Date	**7/9/2025**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department Council Date: 21/7/2025 Facility Council meeting number (515): 9/7/2025 And Emergency session (516) 28/7/2025			

2.Course Overview (Brief summary of scientific content)

The objective of this course enables the student to:

Collect and recognize a lot of knowledge about the main topics of the Properties of Matter and Heat, such as the elasticity and plasticity of material, the different types of stresses and strains, moment of inertia, simple harmonic motion in addition to the different types of wave equation and interference of waves and some basics of fluid dynamics. Study Unary phase diagram of matter, types of thermometers and temperature scales, heat at conduction and radiation, methods of specific heat measurements and Gas laws and thermodynamics. This will be supported by some applications in each field.

3.Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
1.2	Acquire essential knowledge in mathematics, physics, biology, and other supporting sciences necessary for understanding the latest advances in microbiology and chemistry	a1	Define the concept of matter, Heate , Simple harmonic motion , fluid dynamics , types of heat counductions and thermodynamics
		a2	Describe the moment of inertia of rigid body and phase digram
1.4	Show familiarity with biological and microbiological terminology, nomenclature, and contemporary classification systems based on modern trends and molecular approaches.	a3	Determine the different types of wave motion such as simple pindulumn,oscillating spring and ,wave equation and interference of waves
		a4	Memorize between the different types of stresses – strains of matter, thermometers and temperature scales.
3.2	Use modern laboratory instruments, equipment, and technologies safely and efficiently in chemical and microbiological investigations	b1	Interpret the dimension theory ,waves nature , heat transform and thermodynamics
		b2	Apply some models to exam the validity of physical low
3.5	Use appropriate statistical and computational tools to analyze,	b3	confirm a lot of information about physical meaning of course topics.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	model, and interpret experimental data in microbiology and chemistry		
4.8	**Demonstrate neatness, accuracy, organization, and aesthetic sense in scientific and professional tasks**	**d1**	**Work in team to synthesis and studying some physical properties of some materials .**

4.Teaching and Learning Methods

1-Guided Self-Learning.

2-E- learning.

3-Visual Presentations.

4-Interactive Lectures.

5-Interactive Workshops.

5.Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	Training (Practical/Clinical/ .....)	Self-learning (Tasks/ Assignments/ Projects/ ...)	Other (to be determined)
1	Physical quantity	3	2	0	0	1
2	Dimension theory	3	2	0	0	1
3	Unites	3	2	0	0	1
4	balance equation	3	2	0	0	1
5	Types of motion	3	2	0	0	1
6	Motion in different directions	3	2	0	0	1
7	Second newton low of motion	3	2	0	0	1
8	Mid- Term Exam & review	0	0	0	0	0
9	Work and energy	3	2	0	0	1
10	Introduction in heat	3	2	0	0	1
11	Heat and heat transfer	3	2	0	0	1
12	Kinetic theory of gases	3	2	0	0	1
13	Specific heat of gases	3	2	0	0	1
14	First law of thermodynamics	3	2	0	0	1
15	revision	3	2	0	0	1

6.Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Semester Work	Fifth week	5	5%
2	Mid-Term Exam	eight week	5	5%
3	Oral exam	Fifteenth week	10	10%
4	Written exam	Sixteenth week	80	80%

* The methods mentioned are examples, the organization may add and/or delete

7.Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	Lecture notes approved by Physics department.
	Other References	Fundamentals of Physics Extended, 9th Edition, David Halliday, Robert Resnick, Jearl Walker (2011)
	Electronic Sources (Links must be added)	http://www. Physics2000 http://www. Physics today
	Learning Platforms (Links must be added)	
	Other (to be mentioned)	- **Serway, R. A., & Jewett, J. W. (2018). *Physics for Scientists and Engineers* (10th ed.). Cengage Learning.** • Covers a broad range of physics topics with detailed examples and problem sets. • **Young, H. D., & Freedman, R. A. (2019). *University Physics with Modern Physics* (15th ed.). Pearson** Known for its clarity and accuracy, this book covers both classical and modern physics -
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	Data show
	Supplies	Using a microphone in lectures Using a black board
	Electronic Programs	
	Skill Labs/ Simulators	Group Discussions
	Virtual Labs	
	Other (to be mentioned)	

* The list mentioned is an example, the institution may add and/or delete depending on the nature of the course

Name and Signature **Course Coordinator** **Dr. Mahmoud H. Makled**	**Name and Signature** **Program Coordinator** **Dr. Mohamed atef**

phy 104: Electricity, Magnetism and Modern Physics
Course Specification

1.Basic Information

Course Title (according to the bylaw)	**Electricity, Magnetism and Modern Physics**			
Course Code (according to the bylaw)	**phy 104**			
Department/s participating in delivery of the course	**Department of Physics**			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Tutorial**	**Total**
	1	**2**	**1**	**2**
Course Type	اجباري			
Academic level at which the course is taught	الفرقة/المستوي الاول			
Academic Program	**Microbiology and chemistry B.Sc program**			
Faculty/Institute	**Faculty of Science**			
University/Academy	**Benha University**			
Name of Course Coordinator	**Ass.Prof. Saed Abed Elgany**			
Course Specification Approval Date	1/7/2025			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department Council Date: 21/7/2025 Faculity Council meeting number (515): 9/7/2025 And Emergency session (516) 28/7/2025			

2.Course Overview (Brief summary of scientific content)

This course covers the principles of optics and electromagnetism, focusing on the behaviour of light, image formation, and applications in vision and instrumentation. It introduces electrostatics, electric circuits, magnetic fields, and electromagnetic induction, with emphasis on real-world applications such as cameras, microscopes, and the human eye.

3.Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
1.2	Acquire essential knowledge in mathematics, physics, biology, and other supporting sciences necessary for understanding the latest advances in microbiology and chemistry	**a1**	**list a lot of scientific information about theories of light and electromagnetic field and the applications of each other**
		a2	**describe magnetic and electric field nature in addition to mirror and lenses equations**
		a3	**discuss about the function of eye, electric circuits and capacitors**
1.11	Understand the principles of thermodynamics, kinetics, catalysis, and quantum chemistry, and their applications in chemical and biological systems	**b1**	**apply data from each optical or electromagnetic systems**
		b2	**illustrate according to beam reflection what is nature of surface and wave and according to electromagnetic induction what is the nature of source**
		b3	**modified optical and electromagnetic systems by logic way**
		b4	**demonstrate the use of microscope and telescopes and lenses and mirrors**
3.2	Use modern laboratory instruments, equipment, and technologies safely and efficiently in chemical and microbiological investigations	**c1**	**managed some experiments using lenses in addition to mirrors and electric circuits.**
		c2	**Analyze the output data from optical and electromagnetic techniques.**
3.5	Use appropriate statistical and computational tools to analyze, model, and interpret experimental data in microbiology and chemistry	**c3**	**present the optical and electromagnetic phenomena in modern area applications**
		c4	**Plan and conduct investigations using standard scientific methods**

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
4.8	Demonstrate neatness, accuracy, organization, and aesthetic sense in scientific and professional tasks	**d1**	**express problems concerning to the course topics**
		d2	**Communicate to work efficiently in a team or separately**
		d3	**report data and writing reports in the different model and fields**

4.Teaching and Learning Methods

- Lecture and Practical Work
- E-learning
- Seminars and Discussion
- Presentations

5.Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	**Training** (Practical)	**Self-learning** (Tasks/ Assignments / Projects/ ...)	**Tutorial**
1	**The nature and propagation of light**	**4**	**1**	**2**	**-**	**1**
2	**Reflection and refraction of spherical wave at plane and spherical surfaces**	**4**	**1**	**2**	**-**	**1**
3	**Mirrors and Lenses**	**4**	**1**	**2**	**-**	**1**
4	**the structure of the eye**	**4**	**1**	**2**	**-**	**1**
5	**Cameras, microscopes and Telescopes**	**5**	**2**	**2**	**-**	**1**
6	**Colom's Low**	**5**	**2**	**2**	**-**	**1**
7	**continuity of Colom's low**	**5**	**2**	**2**	**-**	**1**
8	**Electrostatic field and potential**	**5**	**2**	**2**	**-**	**1**
9	**Med-Term Exam**		**-**	**-**	**-**	**-**
10	**Capacitors**	**5**	**2**	**2**	**-**	**1**
11	**Dielectric materials**	**5**	**2**	**2**	**-**	**1**
12	**Electric Current and DC Circuits**	**5**	**2**	**2**	**-**	**1**
13	**Kirchhoff Low and electric circuit analysis**	**5**	**2**	**2**	**-**	**1**
14	**Magnetic field and forces**	**5**	**2**	**2**	**-**	**1**
15	**Electromagnetic induction**	**5**	**2**	**2**	**-**	**1**

6.Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Mid-Term Exam	**9th week**	**5**	**5%**
2	Continuous evaluation and assignment	**1st:14th week**	**15**	**15%**
3	Final Practical Exam	**14th week**	**25**	**25%**
4	Final Oral Exam	**15th week**	**5**	**5%**
5	Final Written Exam	**16th week**	**50**	**50%**

7.Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	**Lecture notes approved by Physics department.**
	Other References	**Halliday, D., Resnick, R., Walker, J., Edwards, F., & Merrill, J. J. (2021). *Fundamentals of Physics, Extended* (12th ed.). Wiley.** •
	Electronic Sources (Links must be added)	**http://www. Physics2000** **http://www. Physics today**
	Learning Platforms (Links must be added)	**https://www.ekb.eg/ar/home** **https://benhasci.ekb.eg/** **https://ebook.bu.edu.eg**
	Other (to be mentioned)	
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	**Using a microphone in lectures** **Using a blackboard, Group Discussions, and Data show**
	Supplies	
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	
	Other (to be mentioned)	

Name and Signature
Course Coordinator
Asst.Prof.Saed Abed Elgany

Name and Signature
Program Coordinator

Asst. Prof.Mohamed Atef

Mat 111: calculus Course Specification

(2025)

1.Basic Information

Course Title (according to the bylaw)	**calculus**			
Course Code (according to the bylaw)	**Mat 111**			
Department/s participating in delivery of the course	**Mathematics and Computer Science**			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	2	0	2	3
Course Type	اجباري			
Academic level at which the course is taught	الفرقة/المستوي الاول			
Academic Program	Microbiology and chemistry B.Sc. Program			
Faculty/Institute	**Faculty of science**			
University/Academy	**Benha university**			
Name of Course Coordinator	**Dr. Ahmed Moustafa**			
Course Specification Approval Date	1/7/2025			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Department Council Date: 21/7/2025 Faculity Council meeting number (515): 9/7/2025 And Emergency session (516) 28/7/2025			

2.Course Overview (Brief summary of scientific content)

At the end of this course, the students must be able to

Postulate concepts and choose appropriate solutions to solve problems on scientific basis, apply mathematical knowledge and skills to the solution of real life problems.

3.Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		**Course Learning Outcomes** Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
1.2	Acquire essential knowledge in mathematics, physics, biology, and other supporting sciences necessary for understanding the latest advances in microbiology and chemistry.	**a 1**	**To know Mathematical knowledge in solving different problems.**
		a 2	**Determine knowledge of the principles of mathematical modeling and applications.**
		a3	**Explain the meaning of complicated statements using mathematical notations and language.**
2.2	Analyse, assess, and interpret quantitative and qualitative scientific data from various sources.	**b1**	**Apply the knowledge of the mathematical processes for modeling of real-world problems.**
		b 2	**Develop appropriate knowledge and awareness of the importance and applications of mathematical assumption.**
		b 3	**Confirm wide background knowledge related to the different branches of Mathematics.**
4.3	Think independently, critically, and creatively to solve scientific and practical problems.	**d 4**	Use computer, internet & communications

4.Course Schedule

Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	**Training** (Practical/Clinical/ .....)	**Self-learning** (Tasks/ Assignments / Projects/ ...)	**Other** (to be determined)
1	**Functions**	**4**	**2**	**0**	**0**	**2**
2	**Classifying Functions**	**4**	**2**	**0**	**0**	**2**
3	**limits of Function values**	**4**	**2**	**0**	**0**	**2**
4	**Continuity**	**4**	**2**	**0**	**0**	**2**
5	**Limits involving infinity; Asymptotes of graphs**	**4**	**2**	**0**	**0**	**2**
6	**Differentiation**	**4**	**2**	**0**	**0**	**2**
7	**Applications of Derivatives**	**4**	**2**	**0**	**0**	**2**
8	**Mid Term Exam and The Chain Rule**	**0**	**0**	**0**	**0**	**0**
9	**Maclaurin and Taylor series**	**4**	**2**	**0**	**0**	**2**
10	**INTEGRATION**	**4**	**2**	**0**	**0**	**2**
11	**TECHNIQUES OF INTEGRATION**	**4**	**2**	**0**	**0**	**2**
12	**Integration by PARTIAL FRACTIONS**	**4**	**2**	**0**	**0**	**2**
13	**Definite Integrals**	**4**	**2**	**0**	**0**	**2**
14	**Applications on Integration**	**4**	**2**	**0**	**0**	**2**
15	**revision**	**4**	**2**	**0**	**0**	**2**

5.Teaching and Learning Methods

1-Interactive Lectures.

2-Guided Self-Learning.

3-Interactive Workshops.

4-Visual Presentations.

5-Discussion Sessions & Seminars

6.Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Midterm exam	**Week 8**	**10**	**10%**
2	Final Written Exam	**Start of 16th week**	**60**	**60%**
3	Final Oral Exam	**Week 15**	**10**	**10%**
4	Exercise/ evaluation	**During all weeks**	**20**	**20%**
	Other (Mention)			

*** The methods mentioned are examples, the organization may add and/or delete**

7.Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	**-Notes approved by Math. Department.**
	Other References	**Virgil Snyder, Elementary textbook on the calculus. New York, (2020).** **-H. Jerome Keisler -Elementary Calculus: An Infinitesimal Approach(2016)**
	Electronic Sources (Links must be added)	**https://cims.nyu.edu/~kiryl/Calculus/Section_5.3--Evaluating_Definite_Integrals/RSimpson-_Lecture24.pdf** **http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.368.2271&rep=rep1&type=pdf** **http://www.maths.manchester.ac.uk/~bespalov/teaching/2E1_LA_notes_1.pdf** **https://people.richland.edu/james/lecture/m116/matrices/**
	Learning Platforms (Links must be added)	
	Other (to be mentioned)	**- WWL Chen, Notes on first-year calculus, (web edition, 2019).**
Supportive facilities &	**Devices/Instruments**	**Data show**
	Supplies	**Black board and white board**

equipment for teaching and learning *		**marker**
	Electronic Programs	
	Skill Labs/ Simulators	
	Virtual Labs	
	Other (to be mentioned)	

*** The list mentioned is an example, the institution may add and/or delete depending on the nature of the course**

Name and Signature **Course Coordinator** **Dr. Ahmed Moustafa**	**Name and Signature** **Program Coordinator** **Dr. Mohamed Atef**

100Ent: General Entomology Course Specification

(2025)

5. Basic Information

Course Title (according to the bylaw)	**General Entomology**			
Course Code (according to the bylaw)	**100Ent**			
Department/s participating in delivery of the course	Entomology Department			
Number of credit hours/points of the course (according to the bylaw)	**Theoretical**	**Practical**	**Other (specify)**	**Total**
	1	**2**	**-**	**2**
Course Type	اجباري			
Academic level at which the course is taught	الفرقة/المستوي الاول			
Academic Program	**Microbiology and chemistry program**			
Faculty/Institute	**Faculty of science**			
University/Academy	**Benha university**			
Name of Course Coordinator	Prof. Abdelwahab A. Ibrahim			
Course Specification Approval Date	**7/1/2025**			
Course Specification Approval (Attach the decision/minutes of the department /committee/council ....)	Faculty council, 9/7/2025 until 30/7/2025 Meeting number 515			

6. Course Overview (Brief summary of scientific content)

The objective of this course is to aqurire the students with the prelimenary and necessary knowledge and different skills about insects and its importance to the environment.

7. Course Learning Outcomes CLOs

Matrix of course learning outcomes CLOs with program outcomes POs (NARS/ARS)

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
1.4	Show familiarity with biological and microbiological terminology, nomenclature, and contemporary classification systems based on modern trends and molecular approaches.	A1	Define the term "Entomology" and the job of an entomologist.
		A2	Outline different types of insect habitats.
1.5	Describe the morphology, physiology, genetics, and evolution of diverse microorganisms including bacteria, viruses, fungi, parasites, and algae.	A3	Mention the general characters of insects and its external morholpgy.
		A4	Describe how insects see, walk, fly, hear,feed and protect itself.
1.8	Recognize the diversity of different plants, animals and microorganisms and understand the principles of bio-diversity and conservation of natural resources.	A5	Enumerate examples of beneficial and harmful insects.
3.8	Utilize modern information retrieval systems, taxonomic keys, bioassays, molecular biology techniques, and microbial identification tools.	C1	Differentiate between different types of insect legs, wings, antennae, and mouth parts.
		C2	determine the damage caused by insect pests and their benifits.
3.9	Prepare, stain, and examine slides for microscopic identification of various microbial types.	C3	Illustrate the external morphology of insects.
		C4	Differentiate between the types of insect metamorphosis.
4.8	Demonstrate neatness, accuracy, organization, and	D1	Think independently, and solve problems on scientific basis.

Program Outcomes (NARS/ARS) (according to the matrix in the program specs)		Course Learning Outcomes Upon completion of the course, the student will be able to:	
Code	**Text**	**Code**	**Text**
	aesthetic sense in scientific and professional tasks.	**D2**	**Acquire self- and life-long learning.**
		D3	**Exhibit the sense of beauty and neatness.**

8. Teaching and Learning Methods

21- Lectures.

5. Presentations & Movies.
6. Discussions & Seminars.
7. Practical work.

Course Schedule						
Number of the Week	Scientific content of the course (Course Topics)	Total Weekly Hours	Expected number of the Learning Hours			
			Theoretical teaching (lectures/discussion groups/ .....)	**Training** (Practical/Clinical/ .....)	**Self-learning** (Tasks/ Assignments / Projects/ ...)	**Other** (to be determined)
1	Course objectives, why do we need to study insects?	**3**	**1**	**2**	**-**	**-**
2	insects and their relatives	**3**	**1**	**2**	**-**	**-**
3	diversity and dominance of insects	**3**	**1**	**2**	**-**	**-**
4	insect size, habitats and life span	**3**	**1**	**2**	**-**	**-**
5	insect skeleton, vision and hearing	**3**	**1**	**2**	**-**	**-**
6	insect metamorphosis and reproduction	**3**	**1**	**2**	**-**	**-**
7	insect antennae, wings and legs	**3**	**1**	**2**	**-**	**-**
8	**Midterm exam**	**0**	**0**	**0**	**0**	**0**
9	insect mouthparts	**3**	**1**	**2**	**-**	**-**
10	insect breathing	**3**	**1**	**2**	**-**	**-**
11	means of protection in insects	**3**	**1**	**2**	**-**	**-**
12	benefits and products of insects	**3**	**1**	**2**	**-**	**-**
13	harmful insects	**3**	**1**	**2**	**-**	**-**
14	insects and war	**3**	**1**	**2**	**-**	**-**
15	interesting facts about insects	**3**	**1**	**2**	**-**	**-**

9. Methods of students' assessment

No.	Assessment Methods *	Assessment Timing (Week Number)	Marks/ Scores	Percentage of total course Marks
1	Exam 1written (midterm exam)	**8th week**	**5**	**5%**
2	Final Practical/Clinical/… Exam	**16th week**	**25**	**25%**
3	Final Oral Exam	**16th week**	**5**	**5%**
4	Final Written Exam	**From week 17th**	**50**	**50%**
5	Assignments / Project /Portfolio/ Logbook	**12th week**	**15**	**15%**

	Field training	-	-	-
	Other (Mention)	-	-	-

* The methods mentioned are examples, the organization may add and/or delete

10. Learning Resources and Supportive Facilities *

Learning resources (books, scientific references, etc.) *	**The main (essential) reference for the course** (must be written in full according to the scientific documentation method)	**Course notes: Introduction to entomology (100Ent) ***
	Other References	*** Sing R.P. (1997). Introduction to entomology**
	Electronic Sources (Links must be added)	-
	Learning Platforms (Links must be added)	-
	Other (to be mentioned)	***John Henry (2012). An introduction to entomology * Naumann I.D. (1994). Systematic and applied entomology: an introduction**
Supportive facilities & equipment for teaching and learning *	**Devices/Instruments**	**PowerPoint presentation- Scientific films**
	Supplies	**White board- microphone-data show- marker**
	Electronic Programs	-
	Skill Labs/ Simulators	-
	Virtual Labs	-
	Other (to be mentioned)	-

* The list mentioned is an example, the institution may add and/or delete depending on the nature of the course

Name and Signature
Course Coordinator
Prof. Abdelwahab A. Ibrahim

Name and Signature
Program Coordinator
Asst. prof. dr\ Mohamed atef