Course Syllabus

1	**Course title**	Metabolism
2	**Course number**	0304421
3	**Credit hours**	3
	Contact hours (theory, practical)	3
4	**Prerequisites/corequisites**	Biochemistry 0334321
5	**Program title**	B.Sc. in Biological Sciences
6	**Program code**	4
7	**Awarding institution**	University of Jordan
8	**School**	Faculty of Sciences
9	**Department**	Biological Sciences
10	**Course level**	Senior (4th year)
11	**Year of study and semester (s)**	Second semesters 2023-2024
12	**Other department (s) involved in teaching the course**	None
13	**Main teaching language**	English / Arabic
14	**Delivery method**	☐Face to face learning ☐Blended ☑Fully online
15	**Online platforms(s)**	☑Moodle ☑Microsoft Teams ☐Skype ☐Zoom ☐Others……
16	**Issuing/Revision Date**	Feb 2024

17 Course Coordinator:

Name: Dr. Tareq Alhindi	Contact hours: TBA
Office number: 305	Phone number: 22236
Email: t.alhindi@ju.edu.jo	

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18 Other instructors:

Name: Office number: Phone number: Email: Contact hours: Name: Office number: Phone number: Email: Contact hours:

19 Course Description:

As stated in the approved study plan. Metabolism (anabolism and catabolism) of the main organic molecules in the living cell which includes: carbohydrates, lipids proteins and nucleic acids. With the emphasis on energy metabolism and the role of vitamins as cofactors for enzymes' action.

20 Course aims and outcomes:

A- Aims:

This course concentrates on the metabolism (anabolism and catabolism) of the major organic molecules in the cell which includes carbohydrates, lipids, proteins, nucleic acids, heme group and special molecules with emphasis on energy metabolism (bioenergetics) , the role of vitamins as cofactors for enzymes actions and disorders in metabolism and inherited molecular diseases.

B- Students Learning Outcomes (SLOs):

Upon successful completion of this course, students will be able to understand the following:

1. Energy transformation and conservation (transduction) and utilization (coupling)
2. Principles of bioenergetics and Oxidation reduction reaction
3. Carbohydrate metabolism (glycolysis and gluconeogenesis)
4. Organization and regulation of metabolic pathways
5. Lipids metabolism (types, beta-oxidation, synthesis)
6. Nitrogen metabolism (amnio acid biosynthesis and catabolism)
7. Knowing the role of vitamins and good nutrition in good health
8. Photosynthesis (light reaction and Calvin cycle)

SLOs / SLOs of the course	SLO (1)	SLO (2)	SLO (3)	SLO (4)
1	x			
2	x			
3	x			
4	x			
5	x			
6	x			

21. Topic Outline and Schedule:

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Week	Lecture	Topic	Student Learning Outcome	Learning Methods (Face to Face/Blended/ Fully Online)	Platform	Synchronous / Asynchronous Lecturing	Evaluation Methods	Resources
1	1.1	Introduction	1	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
	1.2	Metabolism :anabolism and catabolism	1,2	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
	1.3	Standard States for Free-Energy Changes	1,2	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
2	2.1	Coupling of Production and Use of Energy	1,2	**Fully Online**	MS Teams	**Asynchronou**	Homework	Book + Slides
	2.2	Coenzyme A in Activation of Metabolic Pathways	1,2	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
	2.3	Carbohydrates	3	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
3	3.1	Glycolysis	3	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
	3.2	The Ten Reactions of Glycolysis (investment phase)	3	**Fully Online**	MS Teams	**Asynchronou**	Reports	Book + Slides
	3.3	The Ten Reactions of Glycolysis (harvest phase)	3	**Fully Online**	MS Teams	**Asynchronou**	Reports	Book + Slides
4	4.1	Anaerobic Metabolism of Pyruvate	3	**Fully Online**	MS Teams	**Asynchronou**	Assignment	Book + Slides
	4.2	Fermentation	3	**Fully Online**	MS Teams	**Asynchronou**	Homework	Book + Slides
	4.3	Control of Glycolysis	4	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides

	5.1	Glycogenesis and Glycogenolysis.	3	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
5	5.2	Gluconeogenesis Produces Glucose From Pyruvate	3	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
	5.3	Control of Carbohydrate Metabolism	4	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
	6.1	Pentose Phosphate Pathway	3	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
6	6.2	Citric Acid Cycle	3	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
	6.3	Energetics and Control of the Citric Acid Cycle	4	**Fully Online**	MS Teams	**Asynchronou**	Quiz	Book + Slides
	7.1	Electron Transport and Oxidative Phosphorylation &ATP- Synthase	3	**Fully Online**	MS Teams	**Asynchronou**	Quiz	Book + Slides
7	7.2	Uncouplers , Inhibitors , carriers and Shuttles	3,4	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
	7.3	Chemiososmosis , ATP yield and Balance Equation	3,4	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
		Mid. Term Exam			Moodle	**Asynchronou**	Exam	Book + Slides
	8.1	Phospholipids	5	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
8	8.2	Lipoproteins (VLDL, LDL, HDL)	5	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
	8.3	Glycolipids and Cholesterol.	5	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides

9	9.1	Catabolism of Lipids	5	**Fully Online**	MS Teams	**Asynchronou**	Report	Book + Slides
	9.2	Ketone Bodies	5	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
	9.3	Synthesis of Acylglycerols and Compound Lipids	5	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
10	10.1	Cholesterol Biosynthesis	5	**Fully Online**	MS Teams	**Asynchronou**	Reports	Book + Slides
	10.2	Regulation of lipid metabolism	5	**Fully Online**	MS Teams	**Asynchronou**	Homework	Book + Slides
	10.3	ATP yield and Balance Eauation	5	**Fully Online**	MS Teams	**Asynchronou**	Homework	Book + Slides
11	11.1	Nitrogen Metabolism	6	**Fully Online**	MS Teams	**Asynchronou**	Homework	Book + Slides
	11.2	Amino Acid Biosynthesis	6	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
	11.3	Amino Acid Catabolism	6	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
12	12.1	Purine Biosynthesis and Catabolism	6	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
	12.2	Pyrimidine Biosynthesis and Catabolism	6	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
	12.3	Connections between Metabolic Pathways	3,5,6	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
13	13.1	Biochemistry and Nutrition	7	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
	13.2	Hormones and Second Messengers	7	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
	13.3	Hormones and the Control of Metabolism	7	**Fully Online**	MS Teams	**Asynchronou**	Homework	Book + Slides

14	14.1	Chloroplasts Are the Site of Photosynthesis	8	**Fully Online**	MS Teams	**Asynchronou**	Homework	Book + Slides
	14.2	Photosystems I and II	8	**Fully Online**	MS Teams	**Asynchronou**	Q & A	Book + Slides
	14.3	the Light Reactions of Photosynthesis	8	**Fully Online**	MS Teams	**Asynchronou**	Reports	Book + Slides
15	15.1	Photosynthesis and ATP Production	8	**Fully Online**	MS Teams	**Asynchronou**	Reports	Book + Slides
	15.2	The Calvin Cycle	8	**Fully Online**	MS Teams	**Asynchronou**	Reports	Book + Slides
	15.3	Healthy diets	7	**Fully Online**	MS Teams	**Asynchronou**	Reports	Book + Slides

22 Evaluation Methods:

Opportunities to demonstrate achievement of the SLOs are provided through the following assessment methods and requirements:

Evaluation Activity	Mark	Topic(s)	SLOs	Period (Week)	Platform
Assignments, and Quizzes	20	TPA	1	4,6,8,10,12,14	written
Midterm Exam	30		1	7	written
Final Exam	50		1	16	written

23 Course Requirements

(e.g: students should have a computer, internet connection, webcam, account on a specific software/platform…etc):

A PC or new smartphone with MS Teams installed and an adequate internet connection; a suitable internet browser to open the Moodle webpage E-learning and JU Exams, and to access Facebook to follow course group

24 Course Policies:

A- Attendance policies:

Enrolled students are expected to attend the lectures in line with the university of Jordan policy as outlined in the JU student handbook. Failure to do so will make the student subject to the penalties outlined in the said document. Furthermore, missing classes will have negative repercussions on the student's participation grade.

B- Absences from exams and submitting assignments on time:

You should talk to your instructor as soon as possible if you miss an exam. All such cases will be dealt with according to the UJ student handbook rules.

C- Health and safety procedures: NA

D- Honesty policy regarding cheating, plagiarism, misbehavior:

All violations pertaining to cheating, plagiarism and misbehaviour will be dealt with in accordance to the rules outlined in the UJ student handbook. In order to avoid plagiarism, the sources for the information contained in your homework must be properly cited and verbatim quotations must be limited and explicitly presented as such. To learn more about the procedures for ethical referencing of information and how to assess the credibility of information critically you can consult with the relevant documents in the course UJ e-learning page (see below).

E- Grading policy: As in Evaluation methods.

F- Available university services that support achievement in the course:

Moodle course page at University of Jordan e-learning portal: https://elearning.ju.edu.jo/

25 References:

A- Required book(s), assigned reading and audio-visuals:

“Biochemistry, 9th Edition” by Mary K. Campbell, et al.© 2017. ISBN-13: 978-1305961135.Tobias, Edward. et.al. (2011). Essential Medical Genetics (6th ed). ISBN: 9781405169745.

B- Recommended books, materials, and media:

Articles, Videos and other material will be provided to students through the online portal (E-Learning) and the course group on Facebook.

26 Additional information:

Name of Course Coordinator: -Dr. Tareq Alhindi ------Signature: ---------- Date: ----------
Head of Curriculum Committee/Department: ---------- Signature: ----------
Head of Department: ---------- Signature: ----------
Head of Curriculum Committee/Faculty: ---------- Signature: ----------
Dean: ---------- Signature: ----------