1	**Course title**	Lipids in Nutrition
2	**Course number**	0603952
3	**Credit hours (theory, practical)**	3 theory
	Contact hours (theory, practical)	0 practical
4	**Prerequisites/co requisites**	Master level
5	**Program title**	Human Nutrition and Dietetics
6	**Program code**	031
7	**Awarding institution**	The University of Jordan
8	**School**	School f Agriculture
9	**Department**	Department of Nutrition and Food Technology
10	**Level of course**	Doctoral level
11	**Year of study and semester (s)**	Second semester 2019/2020
12	**Final Qualification**	PhD in Human Nutrition and Dietetics
13	**Other department(s) involved in teaching the course**	None
14	**Language of Instruction**	English
15	**Date of production/revision**	January 2020

16. Course Coordinator:

Office numbers, office hours, phone numbers, and email addresses should be listed.

Prof. Mousa Numan Ahmad
mosnuman@ju.edu.jo
Office No. 036
962-6-3550000-22412

Office hours					
Day/Time	**Sunday**	**Monday**	**Tuesday**	**Wednesday**	**Thursday**
Day	*	*	*	*	
Time	**9-10**	**9-10**	**9-10**	**9-10**	

17. Other instructors:

Office numbers, office hours, phone numbers, and email addresses should be listed.

18. Course Description:

An advanced level study of the physiological molecular and biochemical aspects of lipids including digestion, absorption and metabolism and their regulatory aspects. It also involves the study of the regulatory and metabolic aspects of the cell membrane on both structural and functional levels as well as the study of certain lipid-related physiological, genetic and biochemical problems.
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19. Course aims and outcomes:

A- Aims:

1. Acquire an advanced knowledge of the physiological, molecular and biochemical transformation of the individual lipid molecules in man.
2. Develop a distinctive understanding of the metabolic interrelations/integration of lipids and their related compounds at the cellular level, and of the uniqueness of individual tissues and organs in metabolism.
3. Develop an advanced understanding of the homeostatic regulation of the lipid materials.
4. Be able to relate the biochemical events of lipids at the cellular level to the physiological processes occurring in the whole body.
5. Be able to relate the nutritional and biochemical concepts of lipids to clinical situations.
6. Be able to identify, define and describe the tools that are available for studying and investigating the various topics of nutritional-lipid biochemistry in health and disease.
7. Be able to describe and design experiments that show the relation between lipids and related substances and biochemical processes in the body, and how these processes can be disturbed by defective nutritional utilization.
8. Be able to locate research literature related to normal and clinical lipid nutrition, biochemistry and physiology, and how to interpret them with the advancement of knowledge in these fields.
9. Be able to critically evaluate information both of lipid nutrition and biochemistry and disease, such as evaluating sources of facts, claims, doubts, bias, conflicts and assumption, and how to utilize them to open new avenues of research- develop a research problem or hypothesis for investigating a specific topic in nutritional biochemistry of lipids and related materials.

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to:

A. Knowledge and Understanding: Student is expected to

A1- Appreciate the basics of lipid nutrition and biochemistry, emphasizing nutrition of fatty acid, cholesterol and major bioactive lipid compounds and their reactions and interactions and explanations of related physiological and clinical phenomena.

A2- Realize the concepts on which all metabolism is based including methods and approaches in metabolism, kinetics and thermodynamics.

A3- Describe the oxidative and degradative pathways of fatty acid, cholesterol and major bioactive lipid compounds, their control and integration in health and how failures of this integration explain a number of diseases and, hence how they can be treated.

A4- Know the metabolism of major bioactive lipid compounds and how can be introduced into the metabolic scheme and examined from the standpoint of control and integration in health and disease.

A5- Understand the synthetic pathways of major bioactive lipid compounds together with a range of clinical topics such as obesity, diabetes mellitus cardiovascular diseases and selected inborn errors of metabolism.

A6- Be familiar with unique metabolic profile of major body organ systems, mainly brain, muscle, liver and adipose tissue in relation to major bioactive lipid compounds.

A7- Understand the integration of substrate/ fatty acid/ ketone body metabolism in different body organs under normal and disease conditions, and how it is controlled by hormones and neurotransmitters.

B. Intellectual Analytical and Cognitive Skills: Student is expected to

B1- Realize the essentials of structure, nomenclature and shorthand conventions for major bioactive lipid compounds.
B2- Gain knowledge about thermodynamic relations of the reactions in various metabolic pathways.
B3- Gain advanced knowledge of the various aspects in lipid metabolic regulation, including allosteric interaction, enzyme sensitivity, hormones and compartmentation, as well as the general metabolic integration of the catabolic and anabolic pathways and their clinical correlations.
B4- Appreciate the uniqueness of individual body tissues and organ systems in lipid metabolism.

C. Subject- Specific Skills: Students is expected to

C1- Describe the integrated metabolic pathways of lipids and fatty acids, and how to pinpoint the metabolic defect(s) that occur(s) in major bioactive lipid compounds related diseases and, hence how they can be treated or managed.
C2- Identify, define and describe the tools that are available for studying and investigating the various topics of lipid nutrition, and biochemistry in health and disease.
C3- Describe and design experiments that show the relation between dietary lipids and biochemical processes in the body, and how these processes can be disturbed by defective lipid utilization.

D. Transferable Key Skills: Students is expected to

D1- Locate research literature related to normal and clinical lipid nutrition, biochemistry and physiology, and how to interpret them with the advancement of knowledge in these fields.
D2- Critically evaluate information both of lipid nutrition, biochemistry and disease, such as evaluating sources of facts, claims, doubts, bias, conflicts and assumption, and how to utilize them to open new avenues of research- develop a research problem or hypothesis for investigating a specific topic in lipid nutrition and biochemistry.
D3- Gain essential skills to relate the body metabolic status with major bioactive lipid compounds nutritional status.

20. Topic Outline and Schedule:

[Note: Topics usually vary depending on instructors, scientific perspectives, and student needs]

Topic	Reference	Week	Achieved ILO/s	Instructor
• Introduction and General Review - Lipid nutrition and metabolism. - Lipids in nutrition and Health.	1-6	1st - 2nd	A1, A2, B1, B2, D1,	Prof. Mousa Ahmad
• Nutrition and Metabolism of Lipids - Chemistry, physiology and nutrition of lipids. - Fatty acid oxidation spiral. - Ketone body formation and utilization - Biosynthesis of fatty acids, triglycerides and phospholipids. - Blood lipids and lipoproteins. - Biosynthesis and metabolism of cholesterol. - Metabolism of other steroids. - Essential fatty acids-metabolism. - Uniqueness of individual organs and tissues. - Control of lipid metabolism. - Lipids in membrane structure and function. - Selected nutritional and clinical correlations.	1- 6	2nd – 6th	A3-A5, B2- B5, C1- C3, D1- D3,	Prof. Mousa Ahmad
• Regulation of Lipid Metabolism - Metabolic control-Basic concepts. - Control mechanisms-Key enzymes and regulators. - Metabolism of individual tissues and/ organs. - Lipolysis-ketogenesis interrelationships. - Energy metabolism-regulation of fatty acid oxidation. - Selected nutritional and clinical correlations.	1- 6	6th – 8th	A1-A7, B4, B5, C3, D2, D3,	Prof. Mousa Ahmad
• Lipid in Nutrition and Health - Dietary lipids, blood lipids and lipoproteins. - Dietary lipids and cardiovascular disease. - Dietary lipids and metabolic syndrome. - Nutritional significance of lipid peroxidation. - The nutritional and biological properties of the polyunsaturated fatty acids. - dietary lipids in relation to weight control	1- 6	9th – 15th	A6, A7, B5, C3, D3,	Prof. Mousa Ahmad
• Introduction and General Review - Lipid nutrition and metabolism. - Lipids in nutrition and Health.	1-6	15th - 16th	A1-A7, B1-B5, C1-C3, D1-D3	Prof. Mousa Ahmad
• Overall Review	1-6	1st - 2nd	A1, A2, B1, B2, D1,	Prof. Mousa Ahmad

21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:

a) Assignments: Each student is given several homework exercises in which he/she explores the literature through use of the library or the internet, and then writes a short report.

b) Learning Resources: Related published literature, articles, reports of related organizations and institutes and use of documentation systems (e.g. use of journal systems of writing and publishing, and instructions to write course report and prepare oral presentation).

c) Learning/ Teaching Methods: Lectures, group discussions and presentations for previously assigned topics, seminars and term papers of assigned topics by individual students (individual skills and self expression development).Teaching tools include: Slides, transparencies, power point, handouts, demonstrations and case study analysis.

22. Evaluation Methods and Course Requirements:

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

ILO/s	Learning Methods	Evaluation Methods
A. Knowledge and Understanding (**A1-A7**)	Lectures, discussions	Exams, assignments, home works, quizzes,
B. Intellectual Analytical and Cognitive Skills (**B1-B4**)	Lectures, discussions	Exams, assignments, home works, quizzes
C. Subject Specific Skills (**C1-C3**)	Lectures, discussions	Exams, assignments, home works, quizzes
D. Transferable Key Skills (**D1-D3**)	Project, Presentations	Project and presentation evaluation .

Evaluation	Point %	Date
Midterm Exam	30	
1 Assigned Quiz	10	
Course Project/ Presentation	20	
Final Exam	40	

23. Course Policies:

A- Attendance policies:

Students are expected to attend punctually all lectures and to participate in course assignments and activities as described in the course syllabus. A student's participation in the work of the course is a precondition for receiving credit for the course. However, in the case of absences, the university instructions and regulations will be applied. For only emergency absences accompanied by a written explanation of sickness from a physician (or other pertinent documentation related to the particular situation), a notice should be given to the instructor no later than 48 hours from the absence in order to make reasonable arrangements. A student missing 15% or more of the class meetings will be dropped from the class and will be given a grade of "failure for absences".

B- Absences from exams and handing in assignments on time:

Generally, in the case of absences, the university instructions and regulations will be applied. For only medically explained absences, a notice should be given to the instructor no later than the last class before the anticipated absence in order to make reasonable arrangements. In this case, a make-up assignments or presentation or exam will be arranged according to the university regulations.

C- Health and safety procedures:

The University of Jordan is committed to providing safe, healthy and supportive learning environments for all students which address their educational needs.

D- Honesty policy regarding cheating, plagiarism, misbehaviour:

Students are expected to be honest and forthright in their academic endeavours. To falsify the results of one's work, to steal the words or ideas of another, to cheat on an examination, to allow another person to commit, or assist another in committing an act of academic dishonesty, corrupts the essential process by which knowledge is advanced. In the case of dishonesty, cheating, plagiarism, and misbehaviour, the university of Jordan′s instructions and regulations will be strictly applied.

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

The University of Jordan Library and Computer and Information Technology Centre.

24. Required equipment: (Facilities, Tools, Labs, Training….)

Lecture room, electronic facilities, audiovisual aids, smart boards, and library facilities.

25. References:

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

1. Devlin T.M. Textbook of Biochemistry with Clinical Correlations. New York: John Wiley, 2016-2018/ Latest edition.
2. Brody T. Nutritional Biochemistry. New York: Academic Press, Latest edition.
3. Toth P. and Sica D. Clinical Challenges in Lipid Disorders. Oxford: Clinical Publishing & Oxford Latest edition.
4. Gurr M.I. Lipid Biochemistry: An Introduction. London: Harwood and Frayn Blackwell Science, Latest edition.
5. Martin O.W. *et. al.* Harper's Review of Biochemistry. California: Lange Medical Publications, Latest edition.
6. Akoh C. C. and Min D.B. Food Lipids, Chemistry, Nutrition, and Biotechnology. New York, Basel: Marcel Dekker, Inc., 2002.

Recommended books, materials, and media:

7. Gropper SS, Smith JL & Groff JL. Advanced Nutrition and Human Metabolism. Wadsworth, Cengage Learning. Belmont, CA, USA, Latest edition..
8. Shils M.C., Olson T.A. & Shike M. Modern Nutrition in Health and Disease. Philadelphia: Lea and Febiger, Latest edition.
9. Stryer L. Biochemistry. New York: W.H. Freeman, Latest edition.
10. Martin O.W. *et. al.*, Harper's Review of Biochemistry. California: Lange Medical Publications, Latest edition.
11. Rolfes S.R, Pinna K. and Whitney E. Understanding Normal and Clinical Nutrition. U.S.A: Thomson-Wadsworth, Latest edition..
12. Mahan LK, Escott-stump S & Raymond JL. Food and the Nutrition Care Process. Philadelphia: W.B. Saunders, 2018.
13. Bender DA. Introduction to Nutrition and Metabolism. London: Taylor and Francis, Latest edition.
14. Most Recent Nutritional Biochemistry Textbooks and Articles.
15. Selected Internet Sites :
    1. www.nutrition.org 2. www.faseb.org/ascn 3. www.webmed.com 4. www.fda.gov
    5. www.asns.org 6. www.ilsi.org 7. www.usda.gov 8. www.diabetes.org
    9. www.dietitians.ca 10. www.nas.edu 11. www.dietetics.com 12. www.apha.org
    13. www.bda.uk.com 14. www.nse.org 15. www.fao.org/food 16. www.who.int

26. Additional information:

Name of Course Coordinator: Prof. Mousa Numan Ahmad Signature: Date: 2/2/2020

Head of curriculum committee/Department: ---------- Signature: ----------

Head of Department: ---------- Signature: ----------

Head of curriculum committee/Faculty: ---------- Signature: ----------

Dean: ---------- -Signature: ----------