

NUTR 301E The Mediterranean Diet: From Fiction to Facts

Professor: Carlos Santos Ocaña

Office: Office: CABD Building 20, Room 133, First Floor

Email: csanoca@upo.es

Office Hours: Monday 11:00-12:00 / Wednesday 17:30-18:30

Course information:

Fall 2023

Tuesday and Thursday

9:00-10:20

Course Description

The course is intended to teach students about the critical role of nutrition in longevity and diseases related to aging. The Mediterranean Diet is a type of diet located geographically in countries bordering the Mediterranean Sea. This diet has unique characteristics since it combines excellent gastronomic properties with a high and highly healthy nutritional value. However, false myths or fiction about the Mediterranean diet devalue its favorable properties. That situation does not help increase the MD's adherence, which is crucial to improving health in general and promoting longevity. This course aims to show the composition of the authentic Mediterranean Diet and study from **a biological point of view** the components responsible for the positive effects on health.

A critical point: An introductory knowledge of biology, biochemistry, or organic chemistry is required to follow this course adequately. A placement test will be given on the first day of class for students to know their level.

Course Goals and Methodology

The course aims to introduce students to the Mediterranean Diet from a double point of view: a) the biological reasons for its positive effects on health and longevity and b) the nature and properties of specific nutrients in this diet. This study will be complemented by elaborating dishes containing foods of the MD.

Goals:

- Know what the Mediterranean Diet (MD) is
- Analyze the components of the Mediterranean Diet
- Identify the biological effects of nutrients included in the MD
- Determine how MD nutrients can promote good health
- Evaluate how MD nutrients can retard aging.
- Analyze some Spanish dishes containing components of the MD.

Students will have the syllabus as a starting material at the beginning of the course. No reference textbook is available since topics included in the course are not included in only one book. Students can access materials to follow the course at the e-learning platform Virtual Classroom or Aula Virtual (<https://campusvirtual.upo.es/>) using the login/password provided during the course enrollment.

This course uses an inverted class or flipped class methodology. Students should analyze the class material before the beginning of each lecture. These materials can be

videos, papers, and web pages. Students must answer one exam at the end of every lecture.

The evaluation in this course is continuous. In each lecture, we will include evaluation activities accumulated throughout the course. The following list contains **mandatory** course activities:

- Video class: Watch a video about the lecture.
- Online exams: One after each lecture, in Blackboard
- Class activities: Individual or group activities performed in the classroom.
- Lab work: Laboratory activities
- Basilippo visit: Group visit to an almazara, a traditional olive oil factory. It is free for NUTR301E students and is **mandatory**
- Classbook: To monitor attendance and participation in class
- Kitchen class: To learn how to prepare MD dishes

Learning Objectives

Through this course, students will:

- Describe the origins of the Mediterranean Diet (MD).
- List the essential components of the MD
- Analyze if a diet fits the criteria of MD using MD scores
- Transfer the MD to a different geographical location
- Design dishes adjusted to the MD
- Analyze epidemiological studies about the effects of MD
- Describe the impact of MD on the health
- Describe the diseases on which MD acts positively
- Explain how MD prevents or mitigates the effects of human diseases
- Describe the active ingredients found in MD foods to fight against disease or aging
- Analyze the molecular function target of the active ingredients of MD foods

Required Texts

Books of General Biochemistry:

- Principles of biochemistry. Lehninger, Albert L. ; Nelson, David L. (David Lee), 1942- ; Cox, Michael M. ; New York : Freeman; 2013
- Biochemistry. Berg, Jeremy M. ; Tymoczko, John L. ; Stryer, Lubert ; New York : W. H. Freeman and Company; cop. 2002

Books of Nutrition:

- Clinical nutrition Nutrition Society (Great Britain) ; Elia, Marinos ; Chichester, West Sussex : Wiley-Blackwell; c2013

- Molecular basis of nutrition and aging Malavolta, Marco.; Mocchegiani, Eugenio; London : Academic Press; 2016

Other sources:

- Olive : a global history. Lanza, Fabrizia. London : Reaktion Books; 2011
- Olive oil and health Quiles, José L.; Ramírez-Tortosa, M. Carmen.; Yaqoob, Parveen.; Wallingford, UK ; Cambridge, MA : CABI Pub.; c2006
- Cereals and pulses nutraceutical properties and health benefits Yu, Liangli.; Cao, Rong.; Shahidi, Fereidoon, 1951-; Ames, Iowa : Wiley-Blackwell; 2012
- Phytochemicals of Nutraceutical Importance Prakash, D. ;Sharma, G. ;Prakash, Dhan ; Sharma, Girish Wallingford: CABI; 2014
- Olives. Ioannis Therios, CABI, 2008. ProQuest Ebook Central
- The Mediterranean diet: culture, health and science. Lorenzo M. Donini, Lluís Serra-Majem, Monica Bullo, Angel Gil, Jordi Salas-Salvado, British Journal of Nutrition, <https://doi.org/10.1017/S0007114515001087>
- The Mediterranean diet: health, science and society. Mariette Gerber and Richard Hoffman. British Journal of Nutrition (2015), 113, S4–S10 doi:10.1017/S0007114514003912.

The origin of the graphic materials is indicated in the corresponding documents or slides.

Course Requirements and Grading

Final exam: At the end of the course. It is an online exam performed in a computer room. It comprises 30 multiple-choice questions with only one option and **six** short-answer questions.

Midterm exam: In the middle of the course. It is an online exam performed in a computer room. It comprises 30 multiple-choice questions with only one option and **four** short-answer questions.

Class activities and lab reports: Each lecture ends with a group or individual activity that the professor will evaluate. Class and lab activity reports will be hand-delivered during class on the date indicated in the rules for each activity. **Late submission will be penalized with 10%** on the grade obtained for each day late.

Participation: Students must prepare each class in advance with material provided by the professor. This material has a class video that the students should view.

At the end of the class, students should complete a questionnaire with multiple-choice questions with a single correct answer and two essay questions. It is recommended that students check the due dates of the questionnaires as they cannot be completed after this date.

Classbook: The classbook is a notebook that will be used to control class attendance and as a tool for student participation. In the notebook, students should respond to questions the teacher raises during class, surveys, or other activities.

The final grade will be calculated as follows:

- Participation (20%): Online exams 15% and video watching 5%
- Classbook (10%)
- Midterm exam (20%)
- Class activities and lab reports: Regular classes and lab activities (20%)
- Final exam (30%)

General Course Policies

Leaving the classroom: Leaving the classroom repeatedly is disturbing to both professors and classmates and may adversely affect the participation grade. Please make use of the 10-minute breaks in between classes to fill up the water bottle, use the restroom, and do other activities.

Punctuality and tardiness: Arriving late is disruptive to the professor and classmates. Please be punctual, as the professor may count late arrival as half of an absence or close the door, not let any late students in, and consider it one complete lack.

Communicating with instructor: Please allow at least 48 hours for your instructor to respond to emails. The weekend is not included in this timeframe. If you have an urgent request or question for your professor, send it during the week.

Attendance and Absentee Policy

Attendance is mandatory at all classes. As we understand that you might fall ill or be unable to come to class (e.g. due to a religious holiday, a flight delay, a family wedding/reunion, graduation, a job interview, etc.) at some point during the semester, you are allowed up to 4 absences. You will be responsible for the material covered and any work missed. You will not need to justify your absences (up to 4) in any way unless you miss an exam, a presentation, a quiz, etc. In this case, you must present a doctor's note (signed, stamped, and dated) to be able to reschedule the exam, etc. It will still count as an absence, but you will be allowed to retake the exam, etc. We don't encourage you to use all 4 days unless you really need them, as your participation grade may suffer if you are not in class. If used unwisely and you get sick late in the semester, the following penalties will apply:

- On your 5th absence, 1 point will be taken off of your final Spanish grade
- On your 6th absence, 3 points will be taken off of your final Spanish grade
- On your 7th absence, you will automatically fail the course

For classes that meet once a week, each absence counts as two. The penalties outlined above apply for classes that meet daily if you go over 6 absences (7th absence=5th

absence above). Exams missed due to an excused absence must be made up within a week of returning to classes. Talk to your professor immediately after your return.

Academic Honesty

Academic integrity is a guiding principle for all academic activity at Pablo de Olavide University. Cheating on exams and plagiarism (including copying from the Internet) are clear violations of academic honesty. A student is guilty of plagiarism when he or she presents another person's intellectual property as his or her own. The penalty for plagiarism and cheating is a failing grade for the assignment/exam and a failing grade for the course. Avoid plagiarism by citing sources properly, using footnotes and a bibliography, and not cutting and pasting information from various websites when writing assignments.

Learning accommodations

If you require special accommodations or have any other medical condition you deem may affect your class performance, you must stop by the International Center to speak to Marta Carrillo (mcaroro@acu.upo.es) either turn in your documentation or to confirm that our office has received it. The deadline is September 29th. Marta will explain the options available to you.

Behavior Policy

Students are expected to always show integrity and act professionally and respectfully. A student's attitude in class may influence his/her participation grade. The professor has a right to ask a student to leave the classroom if the student is unruly or appears intoxicated. If a student is asked to leave the classroom, that day will count as an absence regardless of how long the student has been in class. Cell phone use is not allowed, and animals (except seeing-eye dogs) are not permitted in the classrooms.

Time distribution table corresponding to face-to-face classes

Classroom	33 h
Laboratory and fieldwork activities	9 h
Exams	3 h
Total	45 h

Course contents

Lecture 1: What is the Mediterranean diet?

1. The historical origin of the Mediterranean diet (MD)
2. The traditional Mediterranean diet
3. The seven countries study and MD pattern
4. The pyramid of the Mediterranean diet
5. The food composition of the Mediterranean diet
6. Benefits of MD
7. MD versus Standard Western diet
8. The Mediterranean diet score (MDS)
9. Transferring MD to other countries
10. Ultra-processed foods in MD

Lecture 2: How to analyze MD effects

1. Epidemiological studies classification
 - a. Case-control
 - b. Cohort studies
 - c. Random Controlled Trials (RCT)
2. Cohort studies in MD
3. RCT in MD
4. Survival studies versus epidemiologic studies
5. Components of epidemiological studies
6. Proven effects of MD foods

Lecture 3: Biological mechanisms of MD effects

1. A general view of metabolism
 - a. Main features of metabolism
 - b. Functions of metabolism
 - c. Nutrient's digestion
 - d. Fuel for organs
2. Nutrient's assimilation
 - a. Carbohydrates
 - b. Proteins
 - c. Fats
3. Effects of MD foods on metabolism
4. Definition of aging
5. Metabolic pathways modified by MD
6. Mitochondrial improvement generated by MD
7. Epigenetics changes of MD
8. Caloric restriction in MD

Lecture 4: Aging-related diseases: targets of MD

- a. Metabolic syndrome, diabetes, and obesity
- b. Vascular inflammation, dyslipidemia, and CVD
- c. Cancer
- d. Degenerative diseases

Lecture 5: Olive oil as the best source of MUFA

1. The olive and olive tree
 - a. Olive tree culture
 - b. Structure and fruit development
2. Methods to produce olive oil
 - a. Procedure
 - b. Types of olive oil
 - c. The composition of the olive oil
 - i. Fatty acids
 - ii. Triacylglycerols (TAGs)
 - iii. Polyphenols
 - iv. Sterols
 - v. Odorant molecules
 - d. Quality parameters in olive oil
 - i. Acidity
 - ii. Peroxidation
3. Epidemiological studies of EVOO effects
4. Biological effects of EVOO

Lecture 6: The role of PUFA in the MD action

1. Nutritional value of fish
 - a. Sources of PUFA
 - i. Oily fish and nuts
 - b. Omega-3 and omega-6 PUFA
 - c. Effects of PUFA on the health
 - d. The negative effect of fish consumption
 - i. Toxic compound accumulation
 - ii. Peroxidation
 - e. The ratio $\omega 3/\omega 6$
 - i. Meaning of the ratio
 - ii. The anti-inflammatory action of $\omega 3$

Lecture 7: How to avoid meat in MD as a source of proteins

1. Protein function and structure
 - a. Amino acid's structure
 - b. Type of amino acids
 - c. Proteogenic and essential amino acids

2. Amino acid requirements in the diet
 - a. Animal sources in MD
 - b. Plant sources in MD
3. Legumes in MD as a protein source
 - a. Nutritional
 - b. Cost
 - c. Environmental
4. The savvy combination of legumes and cereals in MD

Lecture 8: The hidden role of fiber in MD goodness

- a. Sources of edible fiber in MD
- b. Fiber classification
- c. Fiber properties
- d. Physiological effects of fiber

Lecture 9: MD is an antioxidant diet

1. Antioxidants in fruits, vegetables, and spices
 - a. Redox reactions and redox stress
 - b. Free radicals
 - i. Definition
 - ii. Formation
 - c. Effects of oxidative stress
 - d. Antioxidant's classification
 - e. The action of antioxidants to block oxidative stress
2. Epidemiologic studies about fruits
3. Examples of antioxidants
 - a. Carotenoids
 - b. Vitamin C
 - c. Resveratrol

Class Schedule

#	Date	Location	
1	9/12/2023	Building 25 S	Course Presentation
2	9/14/2023	Building 25 S	Lecture 1A: What is the Mediterranean diet?
3	9/19/2023	Building 25 S	Lecture 1B
4	9/21/2023	Building 25 S	Lecture 2A: How to analyze MD effects
5	9/26/2023	Building 25 S	Lecture 2B
6	9/28/2023	Building 25 S	Lecture 3A: Biological mechanisms of MD effects
7	10/03/2023	Building 25 S	Lecture 3B
8	10/05/2023	Building 25 S	Lecture 4A: Aging-related diseases: targets of MD
9	10/10/2023	Building 25 S	Lecture 4B
10	10/17/2023	Building 25 S	Lecture 4C
11	10/19/2023	Building 25 S	Lecture 5A: Olive oil is the best source of MUFA
12	10/20/2023	Building 23 Lab 4	Lab 1: Making EVOO
13	10/24/2023	Computer Room	Midterm Exam
14	10/26/2023	Building 25 S	Lecture 5B
15	10/27/2023	Almazara	Basilippo visit
16	10/31/2023	Building 23 Lab 4	Lab 2: Analyzing EVOO
17	11/02/2023	Building 25 S	Lecture 6A: The role of PUFA in the MD action
18	11/14/2023	Building 25 S	Lecture 6B
19	11/16/2023	Building 25 S	Lecture 6C
20	11/21/2023	Building 25 S	Lecture 7A: How to avoid meat in MD as a source of proteins
21	11/23/2023	Building 25 S	Lecture 7B
22	11/24/2023	Building 23 Lab 10	Kitchen Class (A)
23	11/28/2023	Building 25 S	Lecture 8A: The hidden role of fiber in MD goodness
24	11/30/2023	Building 25 S	Lecture 8B
22	12/01/2023	Building 23 Lab 10	Kitchen Class (B)
25	12/05/2023	Building 25 S	Lecture 9A: MD is an antioxidant diet
26	12/12/2023	Building 25 S	Lecture 9B
27		Computer Room	Final Exam