

## 1. DATOS BÁSICOS

<b>Asignatura</b>	Módulo 5: Nutrición Deportiva II. Planificación y control de dietas y nutrición en deportes de equipo e individuales.
<b>Titulación</b>	Máster Universitario en Entrenamiento y Nutrición Deportiva
<b>Escuela/ Facultad</b>	Facultad de Medicina, Salud y Deportes / Escuela Universitaria Real Madrid – Universidad Europea
<b>Curso</b>	Primero
<b>ECTS</b>	6
<b>Carácter</b>	Obligatoria
<b>Idioma/s</b>	Castellano e inglés
<b>Modalidad</b>	Presencial
<b>Semestre</b>	Anual
<b>Curso académico</b>	2025 / 2026
<b>Docente coordinador</b>	D. Guillermo Muñoz Andradas /Dª. Krizia Radesca Fabiano / D. Martín Alejandro Festino / Dª. Rebeca Benítez Valero

## 2. PRESENTACIÓN

El módulo " Nutrición deportiva II. Planificación y control de dietas y nutrición en deportes de equipo e individuales" tiene como objetivo capacitar al alumno para diseñar, fundamentar, analizar y prescribir consejos dietéticos en sujetos activos o deportistas de diferentes edades, niveles de rendimiento o especialidades deportivas.

La calificación de este módulo está compuesta por prácticas en el laboratorio, trabajo en grupo exposiciones orales y examen tipo test.

## 3. COMPETENCIAS Y RESULTADOS DE APRENDIZAJE

### Competencias básicas:

- CB2. Que los estudiantes sepan aplicar los conocimientos adquiridos y su capacidad de resolución en entornos nuevos o poco conocidos dentro de contextos más amplios (o multidisciplinares) relacionados con su área de estudio.
- CB4. Que los estudiantes sepan comunicar sus conclusiones → los conocimientos y razones últimas que las sustentan- a públicos especializados y no especializados de un modo claro y sin ambigüedades.

### Competencias transversales:

- CT2. Comunicación estratégica. Transmitir mensajes (ideas, conceptos, sentimientos, argumentos), tanto de forma oral como escrita, alineando de manera estratégica los intereses de los distintos agentes implicados en la comunicación.
- CT5. Trabajo en equipo. Cooperar con otros en la consecución de un objetivo compartido, participando de manera activa, empática y ejerciendo la escucha activa y el respeto a todos los integrantes.

- CT7. Resiliencia. Adaptarse a situaciones adversas, inesperadas, que causen estrés, ya sean personales o profesionales, superándolas e incluso convirtiéndolas en oportunidades de cambio positivo.

**Competencias específicas:**

- CE4. Interpretar investigaciones y aplicar las nuevas tecnologías en el ámbito del entrenamiento y la nutrición deportiva.
- CE5. Manejar y discriminar la metodología y los procedimientos propios de la investigación científica en el ámbito del entrenamiento y la nutrición deportiva aplicados a todas las edades y niveles de rendimiento.
- CE7. Liderar proyectos de investigación y desarrollo con el resto de la comunidad científica de forma cooperativa y multidisciplinar.

**Resultados de aprendizaje:**

- RA1: Realizar una planificación y organización de la dieta del deportista en función de sus necesidades específicas de mantenimiento, pérdida, ganancia de peso o como coadyuvante en la mejora de un proceso de enfermedad de origen cardio-metabólico.

En la tabla inferior se muestra la relación entre las competencias que se desarrollan en la asignatura y los resultados de aprendizaje que se persiguen:

Competencias	Resultados de aprendizaje
CB1, CB3, CT4, CT6, CT8, CE3, CE4, CE5, CE9	RA1

## 4. CONTENIDOS

- Entrevista nutricional y gasto calórico
- Análisis de la composición corporal
- Planificación teórica y práctica de la ingesta de carbohidratos, proteínas y grasas en deportistas

## 5. METODOLOGÍAS DE ENSEÑANZA-APRENDIZAJE

A continuación, se indican los tipos de metodologías de enseñanza-aprendizaje que se aplicarán:

- Clase magistral.
- Método del caso.
- Aprendizaje basado en proyectos.
- Aprendizaje basado en enseñanzas de taller.
- Aprendizaje inverso.
- Entornos de simulación.

## 6. ACTIVIDADES FORMATIVAS

A continuación, se identifican los tipos de actividades formativas que se realizarán y la dedicación en horas del estudiante a cada una de ellas:

**Modalidad presencial:**

Actividad formativa	Número de horas
Clases Magistrales (modalidad presencial)	30

<b>Análisis de casos (modalidad presencial)</b>	10
<b>Exposiciones orales de trabajos (modalidad presencial)</b>	2
<b>Elaboración de informes y escritos (modalidad presencial)</b>	16
<b>Diseño de estrategias y planes de intervención (modalidad presencial)</b>	14
<b>Trabajo autónomo (modalidad presencial)</b>	50
<b>Debates y coloquios (modalidad presencial)</b>	8
<b>Tutoría (modalidad presencial)</b>	18
<b>Pruebas de conocimiento (modalidad presencial)</b>	2
<b>TOTAL</b>	<b>150</b>

## 7. EVALUACIÓN

A continuación, se relacionan los sistemas de evaluación, así como su peso sobre la calificación total de la asignatura:

**Modalidad presencial:**

Sistema de evaluación	Peso
<b>Pruebas presenciales de conocimiento (modalidad presencial)</b>	60-60%
<b>Exposiciones orales (modalidad presencial)</b>	5-10%
<b>Informes y escritos (modalidad presencial)</b>	5-20%
<b>Caso/problema (modalidad presencial)</b>	5-15%
<b>Trabajo de diseño de estrategias y planes de intervención (modalidad presencial)</b>	5-15%

En el Campus Virtual, cuando accedas a la asignatura, podrás consultar en detalle las actividades de evaluación que debes realizar, así como las fechas de entrega y los procedimientos de evaluación de cada una de ellas.

### 7.1. Convocatoria ordinaria

Para superar la asignatura en convocatoria ordinaria deberás obtener una calificación mayor o igual que 5,0 sobre 10,0 en la calificación final.

### 7.2. Convocatoria extraordinaria

Para superar la asignatura en convocatoria extraordinaria deberás obtener una calificación mayor o igual que 5,0 sobre 10,0 en la calificación final de la asignatura.

Se deben entregar las actividades no superadas en convocatoria ordinaria, tras haber recibido las correcciones correspondientes a las mismas por parte del docente, o bien aquellas que no fueron entregadas.

## 8. CRONOGRAMA

En este apartado se indica el cronograma con fechas de entrega de actividades evaluables de la asignatura:

Actividades evaluables	Fecha
Pruebas presenciales de conocimiento	Febrero-Julio
Exposiciones orales	Marzo-Mayo
Informes y escritos	Marzo-Mayo
Caso/problemática	Marzo-Mayo

Este cronograma podrá sufrir modificaciones por razones logísticas de las actividades. Cualquier modificación será notificada al estudiante en tiempo y forma.

## 9. BIBLIOGRAFÍA

La búsqueda bibliográfica es parte del trabajo autónomo del alumno sobre la temática del seminario. El profesor podrá orientar al alumno en esta búsqueda.

1. Alvares TS, Conte-Junior CA, Silva JT, Paschoalin VM. Acute L-Arginine supplementation does not increase nitric oxide production in healthy subjects. *Nutr Metab (Lond)*. 2012;9(1):54.
2. Álvares TS, Meirelles CM, Bhambhani YN, Paschoalin VM, Gomes PS. L-Arginine as a potential ergogenic aid in healthy subjects. *Sports Med*. 2011;41(3):233-48.
3. Alway SE, Bennett BT, Wilson JC, Edens NK, Pereira SL. Epigallocatechin-3-gallate improves plantaris muscle recovery after disuse in aged rats. *Exp Gerontol*. 2014;50:82-94.
4. Alway SE, Bennett BT, Wilson JC, Sperringer J, Mohamed JS, Edens NK, et al. Green tea extract attenuates muscle loss and improves muscle function during disuse, but fails to improve muscle recovery following unloading in aged rats. *J Appl Physiol (1985)*. 2015;118(3):319-30.
5. Alway SE, McCrory JL, Kearcher K, Vickers A, Frear B, Gilleland DL, et al. Resveratrol enhances exercise-induced cellular and functional adaptations of skeletal muscle in older men and women. *J Gerontol A Biol Sci Med Sci*. 2017.
6. Andre TL, Gann JJ, McKinley-Barnard SK, Song JJ, Willoughby DS. Eight Weeks of Phosphatidic Acid Supplementation in Conjunction with Resistance Training Does Not Differentially Affect Body Composition and Muscle Strength in Resistance-Trained Men. *J Sports Sci Med*. 2016;15(3):532-9.

7. Angeli G, Barros TLD, Barros DFLD, Lima M. Investigation of the effects of oral supplementation of arginine in the increase of muscular strength and mass. *Revista Brasileira de Medicina do Esporte*. 2007;13(2):129-32.
8. Antonio J, Uelmen J, Rodriguez R, Earnest C. The effects of Tribulus terrestris on body composition and exercise performance in resistance-trained males. *Int J Sport Nutr Exerc Metab*. 2000;10(2):208-15.
9. Bailey SJ, Blackwell JR, Lord T, Vanhatalo A, Winyard PG, Jones AM. L-Citrulline supplementation improves O<sub>2</sub> uptake kinetics and high-intensity exercise performance in humans. *J Appl Physiol* (1985). 2015;119(4):385-95.
10. Ballak SB, Jaspers RT, Deldicque L, Chalil S, Peters EL, de Haan A, et al. Blunted hypertrophic response in old mouse muscle is associated with a lower satellite cell density and is not alleviated by resveratrol. *Exp Gerontol*. 2015;62:23-31.
11. Bang HS, Seo DY, Chung YM, Oh KM, Park JJ, Arturo F, et al. Ursolic Acid-induced elevation of serum irisin augments muscle strength during resistance training in men. *Korean J Physiol Pharmacol*. 2014;18(5):441-6.
12. Barillaro C, Liperoti R, Martone AM, Onder G, Landi F. The new metabolic treatments for sarcopenia. *Aging Clin Exp Res*. 2013;25(2):119-27.
13. Beis L, Mohammad Y, Easton C, Pitsiladis YP. Failure of glycine-arginine- $\alpha$ -ketoisocaproic acid to improve high-intensity exercise performance in trained cyclists. *Int J Sport Nutr Exerc Metab*. 2011;21(1):33-9.
14. Bennett BT, Mohamed JS, Alway SE. Effects of resveratrol on the recovery of muscle mass following disuse in the plantaris muscle of aged rats. *PLoS One*. 2013;8(12):e83518.
15. Bescós R, Sureda A, Tur JA, Pons A. The effect of nitric-oxide-related supplements on human performance. *Sports Med*. 2012;42(2):99-117.
16. Blancquaert L, Everaert I, Missinne M, Baguet A, Stegen S, Volkaert A, et al. Effects of Histidine and  $\beta$ -alanine Supplementation on Human Muscle Carnosine Storage. *Med Sci Sports Exerc*. 2017;49(3):602-9.
17. Blum A, Cannon RO, Costello R, Schenke WH, Csako G. Endocrine and lipid effects of oral L-arginine treatment in healthy postmenopausal women. *J Lab Clin Med*. 2000;135(3):231-7.
18. Boebel KP, Baker DH. Comparative utilization of the alpha-keto and D- and L-alpha-hydroxy analogs of leucine, isoleucine and valine by chicks and rats. *J Nutr*. 1982;112(10):1929-39.
19. Bond P. Phosphatidic acid: biosynthesis, pharmacokinetics, mechanisms of action and effect on strength and body composition in resistance-trained individuals. *Nutr Metab (Lond)*. 2017;14:12.
20. Brown GA, Vukovich MD, Martini ER, Kohut ML, Franke WD, Jackson DA, et al. Endocrine responses to chronic androstenedione intake in 30- to 56-year-old men. *J Clin Endocrinol Metab*. 2000;85(11):4074-80.
21. Brown GA, Vukovich MD, Sharp RL, Reifenrath TA, Parsons KA, King DS. Effect of oral DHEA on serum testosterone and adaptations to resistance training in young men. *J Appl Physiol* (1985). 1999;87(6):2274-83.
22. Bucci L, Hickson JF, Pivarnik JM, Wolinsky I, McMahon JC, Turner SD. Ornithine ingestion and growth hormone release in bodybuilders. *Nutrition Research*. 1990;10(3):239-45.
23. Buford BN, Koch AJ. Glycine-arginine-alpha-ketoisocaproic acid improves performance of repeated cycling sprints. *Med Sci Sports Exerc*. 2004;36(4):583-7.
24. Caballero B, Gleason RE, Wurtman RJ. Plasma amino acid concentrations in healthy elderly men and women. *Am J Clin Nutr*. 1991;53(5):1249-52.
25. Cai X, Zhu C, Xu Y, Jing Y, Yuan Y, Wang L, et al. Alpha-ketoglutarate promotes skeletal muscle hypertrophy and protein synthesis through Akt/mTOR signaling pathways. *Sci Rep*. 2016;6:26802.
26. Campbell B, Roberts M, Kerksick C, Wilborn C, Marcello B, Taylor L, et al. Pharmacokinetics, safety, and effects on exercise performance of L-arginine alpha-ketoglutarate in trained adult men. *Nutrition*. 2006;22(9):872-81.
27. Campbell BI, La Bounty PM, Roberts M. The ergogenic potential of arginine. *J Int Soc Sports Nutr*. 2004;1(2):35-8.
28. Candow DG, Chilibeck PD, Burke DG, Davison KS, Smith-Palmer T. Effect of glutamine supplementation combined with resistance training in young adults. *Eur J Appl Physiol*. 2001;86(2):142-9.

29. Cardoso GA, Salgado JM, Cesar MeC, Donado-Pestana CM. The effects of green tea consumption and resistance training on body composition and resting metabolic rate in overweight or obese women. *J Med Food.* 2013;16(2):120-7.
30. Castillo L, Ajami A, Branch S, Chapman TE, Yu YM, Burke JF, et al. Plasma arginine kinetics in adult man: response to an arginine-free diet. *Metabolism.* 1994;43(1):114-22.
31. Chilosí A, Casarano M, Comparini A, Battaglia FM, Mancardi MM, Schiaffino C, et al. Neuropsychological profile and clinical effects of arginine treatment in children with creatine transport deficiency. *Orphanet J Rare Dis.* 2012;7:43.
32. Cho YH, Lee SY, Kim CM, Kim ND, Choe S, Lee CH, et al. Effect of Loquat Leaf Extract on Muscle Strength, Muscle Mass, and Muscle Function in Healthy Adults: A Randomized, Double-Blinded, and Placebo-Controlled Trial. *Evid Based Complement Alternat Med.* 2016;2016:4301621.
33. Chromiak JA, Antonio J. Use of amino acids as growth hormone-releasing agents by athletes. *Nutrition.* 2002;18(7-8):657-61.
34. Church DD, Schwarz NA, Spillane MB, McKinley-Barnard SK, Andre TL, Ramirez AJ, et al. L-Leucine Increases Skeletal Muscle IGF-1 but Does Not Differentially Increase Akt/mTORC1 Signaling and Serum IGF-1 Compared to Ursolic Acid in Response to Resistance Exercise in Resistance-Trained Men. *J Am Coll Nutr.* 2016;35(7):627-38.
35. Clarkson PM, Rawson ES. Nutritional supplements to increase muscle mass. *Crit Rev Food Sci Nutr.* 1999;39(4):317-28.
36. Collier SR, Collins E, Kanaley JA. Oral arginine attenuates the growth hormone response to resistance exercise. *J Appl Physiol (1985).* 2006;101(3):848-52.
37. Curi R, Newsholme P, Procopio J, Lagranha C, Gorjão R, Pithon-Curi TC. Glutamine, gene expression, and cell function. *Front Biosci.* 2007;12:344-57.
38. Curis E, Nicolis I, Moinard C, Osowska S, Zerrouk N, Bénazeth S, et al. Almost all about citrulline in mammals. *Amino Acids.* 2005;29(3):177-205.
39. Cusi K, Cukier S, DeFronzo RA, Torres M, Puchulu FM, Redondo JC. Vanadyl sulfate improves hepatic and muscle insulin sensitivity in type 2 diabetes. *J Clin Endocrinol Metab.* 2001;86(3):1410-7.
40. Cutrufello PT, Gadomski SJ, Zavorsky GS. The effect of L-citrulline and watermelon juice supplementation on anaerobic and aerobic exercise performance. *J Sports Sci.* 2015;33(14):1459-66.
41. Cynober L. Ornithine alpha-ketoglutarate as a potent precursor of arginine and nitric oxide: a new job for an old friend. *J Nutr.* 2004;134(10 Suppl):2858S-62S; discussion 95S.
42. Demura S, Yamada T, Yamaji S, Komatsu M, Morishita K. The effect of L-ornithine hydrochloride ingestion on human growth hormone secretion after strength training. *Advances in Bioscience and Biotechnology.* 2010;1:7-11.
43. Dhatariya KK, Greenlund LJ, Bigelow ML, Thapa P, Oberg AL, Ford GC, et al. Dehydroepiandrosterone replacement therapy in hypoadrenal women: protein anabolism and skeletal muscle function. *Mayo Clin Proc.* 2008;83(11):1218-25.
44. Domínguez R, Hernández Louredo J, Maté-Muñoz JL, Garnacho-Castaño MV. [Effects of β-alanine supplementation on athletic performance]. *Nutr Hosp.* 2014;31(1):155-69.
45. Dukes A, Davis C, El Refaey M, Upadhyay S, Mork S, Arounleut P, et al. The aromatic amino acid tryptophan stimulates skeletal muscle IGF1/p70s6k/mTor signaling in vivo and the expression of myogenic genes in vitro. *Nutrition.* 2015;31(7-8):1018-24.
46. Dutt V, Gupta S, Dabur R, Injeti E, Mittal A. Skeletal muscle atrophy: Potential therapeutic agents and their mechanisms of action. *Pharmacol Res.* 2015;99:86-100.
47. Evain-Brion D, Donnadieu M, Roger M, Job JC. Simultaneous study of somatotrophic and corticotrophic pituitary secretions during ornithine infusion test. *Clin Endocrinol (Oxf).* 1982;17(2):119-22.
48. Evans M, Guthrie N, Pezzullo J, Sanli T, Fielding RA, Bellamine A. Efficacy of a novel formulation of L-Carnitine, creatine, and leucine on lean body mass and functional muscle strength in healthy older adults: a randomized, double-blind placebo-controlled study. *Nutr Metab (Lond).* 2017;14:7.
49. Fang Y, Vilella-Bach M, Bachmann R, Flanigan A, Chen J. Phosphatidic acid-mediated mitogenic activation of mTOR signaling. *Science.* 2001;294(5548):1942-5.
50. Fawcett JP, Farquhar SJ, Walker RJ, Thou T, Lowe G, Goulding A. The effect of oral vanadyl sulfate on body composition and performance in weight-training athletes. *Int J Sport Nutr.* 1996;6(4):382-90.

51. Forbes SC, Bell GJ. The acute effects of a low and high dose of oral L-arginine supplementation in young active males at rest. *Appl Physiol Nutr Metab.* 2011;36(3):405-11.
52. Fraser WM, Tucker HS, Grubb SR, Wigand JP, Blackard WG. Effect of L-tryptophan on growth hormone and prolactin release in normal volunteers and patients with secretory pituitary tumors. *Horm Metab Res.* 1979;11(2):149-55.
53. Garcia JM, Boccia RV, Graham CD, Yan Y, Duus EM, Allen S, et al. Anamorelin for patients with cancer cachexia: an integrated analysis of two phase 2, randomised, placebo-controlled, double-blind trials. *Lancet Oncol.* 2015;16(1):108-16.
54. Gleeson M. Dosing and efficacy of glutamine supplementation in human exercise and sport training. *J Nutr.* 2008;138(10):2045S-9S.
55. Glenn JM, Gray M, Jensen A, Stone MS, Vincenzo JL. Acute citrulline-malate supplementation improves maximal strength and anaerobic power in female, masters athletes tennis players. *Eur J Sport Sci.* 2016;16(8):1095-103.
56. Glenn JM, Gray M, Stewart RW, Moyen NE, Kavouras SA, DiBrezzo R, et al. Effects of 28-Day Beta-Alanine Supplementation on Isokinetic Exercise Performance and Body Composition in Female Masters Athletes. *J Strength Cond Res.* 2016;30(1):200-7.
57. Glenn JM, Gray M, Wethington LN, Stone MS, Stewart RW, Moyen NE. Acute citrulline malate supplementation improves upper- and lower-body submaximal weightlifting exercise performance in resistance-trained females. *Eur J Nutr.* 2017;56(2):775-84.
58. Goldman A, Basaria S. Adverse health effects of androgen use. *Mol Cell Endocrinol.* 2017.
59. Gonzalez AM, Sell KM, Ghigiarelli JJ, Kelly CF, Shone EW, Accetta MR, et al. Effects of phosphatidic acid supplementation on muscle thickness and strength in resistance-trained men. *Appl Physiol Nutr Metab.* 2017;42(4):443-8.
60. Hammarqvist F, Werner J, Ali R, von der Decken A, Vinnars E. Addition of glutamine to total parenteral nutrition after elective abdominal surgery spares free glutamine in muscle, counteracts the fall in muscle protein synthesis, and improves nitrogen balance. *Ann Surg.* 1989;209(4):455-61.
61. Hays NP, Kim H, Wells AM, Kajkenova O, Evans WJ. Effects of whey and fortified collagen hydrolysate protein supplements on nitrogen balance and body composition in older women. *Journal of the American Dietetic Association.* 2009;109(6):1082-7.
62. Hickner RC, Tanner CJ, Evans CA, Clark PD, Haddock A, Fortune C, et al. L-citrulline reduces time to exhaustion and insulin response to a graded exercise test. *Med Sci Sports Exerc.* 2006;38(4):660-6.
63. Hoffman JR, Ratamess NA, Faigenbaum AD, Ross R, Kang J, Stout JR, et al. Short-duration beta-alanine supplementation increases training volume and reduces subjective feelings of fatigue in college football players. *Nutr Res.* 2008;28(1):31-5.
64. Hoffman JR, Stout JR, Williams DR, Wells AJ, Fragala MS, Mangine GT, et al. Efficacy of phosphatidic acid ingestion on lean body mass, muscle thickness and strength gains in resistance-trained men. *J Int Soc Sports Nutr.* 2012;9(1):47.
65. Isidori A, Lo Monaco A, Cappa M. A study of growth hormone release in man after oral administration of amino acids. *Curr Med Res Opin.* 1981;7(7):475-81.
66. Jackson JR, Ryan MJ, Alway SE. Long-term supplementation with resveratrol alleviates oxidative stress but does not attenuate sarcopenia in aged mice. *J Gerontol A Biol Sci Med Sci.* 2011;66(7):751-64.
67. Jacobs PL, Goldstein ER, Blackburn W, Orem I, Hughes JJ. Glycine propionyl-L-carnitine produces enhanced anaerobic work capacity with reduced lactate accumulation in resistance trained males. *J Int Soc Sports Nutr.* 2009;6:9.
68. Joy JM, Gundersmann DM, Lowery RP, Jäger R, McCleary SA, Purpura M, et al. Phosphatidic acid enhances mTOR signaling and resistance exercise induced hypertrophy. *Nutr Metab (Lond).* 2014;11:29.
69. Katashima CK, Silva VR, Gomes TL, Pichard C, Pimentel GD. Ursolic acid and mechanisms of actions on adipose and muscle tissue: a systematic review. *Obes Rev.* 2017;18(6):700-11.
70. Keller J, Couturier A, Haferkamp M, Most E, Eder K. Supplementation of carnitine leads to an activation of the IGF-1/PI3K/Akt signalling pathway and down regulates the E3 ligase MuRF1 in skeletal muscle of rats. *Nutr Metab (Lond).* 2013;10(1):28.
71. Keller J, Ringseis R, Koc A, Lukas I, Kluge H, Eder K. Supplementation with L-carnitine downregulates genes of the ubiquitin proteasome system in the skeletal muscle and liver of piglets. *Animal.* 2012;6(1):70-8.

72. King DS, Sharp RL, Vukovich MD, Brown GA, Reifenrath TA, Uhl NL, et al. Effect of oral androstenedione on serum testosterone and adaptations to resistance training in young men: a randomized controlled trial. *JAMA*. 1999;281(21):2020-8.
73. Kokubo T, Maeda S, Tazumi K, Nozawa H, Miura Y, Kirisako T. The Effect of L-Ornithine on the Phosphorylation of mTORC1 Downstream Targets in Rat Liver. *Prev Nutr Food Sci*. 2015;20(4):238-45.
74. Koulu M. Re-evaluation of L-tryptophan-stimulated human growth hormone secretion: A dose-related study with a comparison with L-dopa and apomorphine tests. *Journal of Neural Transmission*. 1982;55(4):269-75.
75. Kraemer WJ, Spiering BA, Volek JS, Ratamess NA, Sharman MJ, Rubin MR, et al. Androgenic responses to resistance exercise: effects of feeding and L-carnitine. *Med Sci Sports Exerc*. 2006;38(7):1288-96.
76. Kraemer WJ, Volek JS, French DN, Rubin MR, Sharman MJ, Gómez AL, et al. The effects of L-carnitine L-tartrate supplementation on hormonal responses to resistance exercise and recovery. *J Strength Cond Res*. 2003;17(3):455-62.
77. Kreider RB, Ferreira MP, Greenwood M, Wilson M, Almada AL. Effects of conjugated linoleic acid supplementation during resistance training on body composition, bone density, strength, and selected hematological markers. *J Strength Cond Res*. 2002;16(3):325-34.
78. Kunkel SD, Elmore CJ, Bongers KS, Ebert SM, Fox DK, Dyle MC, et al. Ursolic acid increases skeletal muscle and brown fat and decreases diet-induced obesity, glucose intolerance and fatty liver disease. *PLoS One*. 2012;7(6):e39332.
79. Kunkel SD, Suneja M, Ebert SM, Bongers KS, Fox DK, Malmberg SE, et al. mRNA expression signatures of human skeletal muscle atrophy identify a natural compound that increases muscle mass. *Cell Metab*. 2011;13(6):627-38.
80. Lang CH, Pruznak A, Navaratnarajah M, Rankine KA, Deiter G, Magne H, et al. Chronic α-hydroxyisocaproic acid treatment improves muscle recovery after immobilization-induced atrophy. *Am J Physiol Endocrinol Metab*. 2013;305(3):E416-28.
81. Le Bricon T, Coudray-Lucas C, Lioret N, Lim SK, Plassart F, Schlegel L, et al. Ornithine alpha-ketoglutarate metabolism after enteral administration in burn patients: bolus compared with continuous infusion. *Am J Clin Nutr*. 1997;65(2):512-8.
82. Lin Y, Chen F, Zhang J, Wang T, Wei X, Wu J, et al. Neuroprotective effect of resveratrol on ischemia/reperfusion injury in rats through TRPC6/CREB pathways. *J Mol Neurosci*. 2013;50(3):504-13.
83. Ma Y, Guo Z, Wang X. Tribulus terrestris extracts alleviate muscle damage and promote anaerobic performance of trained male boxers and its mechanisms: Roles of androgen, IGF-1, and IGF binding protein-3. *Journal of Sport and Health Science* 2015;12:1-8.
84. Mattison JA, Wang M, Bernier M, Zhang J, Park SS, Maudsley S, et al. Resveratrol prevents high fat/sucrose diet-induced central arterial wall inflammation and stiffening in nonhuman primates. *Cell Metab*. 2014;20(1):183-90.
85. Meador BM, Mirza KA, Tian M, Skelding MB, Reaves LA, Edens NK, et al. The Green Tea Polyphenol Epigallocatechin-3-Gallate (EGCg) Attenuates Skeletal Muscle Atrophy in a Rat Model of Sarcopenia. *J Frailty Aging*. 2015;4(4):209-15.
86. Mero AA, Ojala T, Hulmi JJ, Puurtinen R, Karila TA, Seppälä T. Effects of alfa-hydroxy-isocaproic acid on body composition, DOMS and performance in athletes. *J Int Soc Sports Nutr*. 2010;7:1.
87. Mobley CB, Hornberger TA, Fox CD, Healy JC, Ferguson BS, Lowery RP, et al. Effects of oral phosphatidic acid feeding with or without whey protein on muscle protein synthesis and anabolic signaling in rodent skeletal muscle. *J Int Soc Sports Nutr*. 2015;12:32.
88. Moinard C, Nicolis I, Neveux N, Darquy S, Bénazeth S, Cynober L. Dose-ranging effects of citrulline administration on plasma amino acids and hormonal patterns in healthy subjects: the Citrudoze pharmacokinetic study. *Br J Nutr*. 2008;99(4):855-62.
89. Mok E, Eléouet-Da Violante C, Daubresse C, Gottrand F, Rigal O, Fontan JE, et al. Oral glutamine and amino acid supplementation inhibit whole-body protein degradation in children with Duchenne muscular dystrophy. *Am J Clin Nutr*. 2006;83(4):823-8.
90. Molfin A, Amabile MI, Rossi Fanelli F, Muscaritoli M. Novel therapeutic options for cachexia and sarcopenia. *Expert Opin Biol Ther*. 2016;16(10):1239-44.
91. Morales AJ, Nolan JJ, Nelson JC, Yen SS. Effects of replacement dose of dehydroepiandrosterone in men and women of advancing age. *J Clin Endocrinol Metab*. 1994;78(6):1360-7.

92. Müller EE, Brambilla F, Cavagnini F, Peracchi M, Panerai A. Slight effect of L-tryptophan on growth hormone release in normal human subjects. *J Clin Endocrinol Metab.* 1974;39(1):1-5.
93. Nagaya N, Itoh T, Murakami S, Oya H, Uematsu M, Miyatake K, et al. Treatment of cachexia with ghrelin in patients with COPD. *Chest.* 2005;128(3):1187-93.
94. Nagaya N, Moriya J, Yasumura Y, Uematsu M, Ono F, Shimizu W, et al. Effects of ghrelin administration on left ventricular function, exercise capacity, and muscle wasting in patients with chronic heart failure. *Circulation.* 2004;110(24):3674-9.
95. Neychev VK, Mitev VI. The aphrodisiac herb *Tribulus terrestris* does not influence the androgen production in young men. *J Ethnopharmacol.* 2005;101(1-3):319-23.
96. Novak F, Heyland DK, Avenell A, Drover JW, Su X. Glutamine supplementation in serious illness: a systematic review of the evidence. *Crit Care Med.* 2002;30(9):2022-9.
97. Pérez-Guisado J, Jakeman PM. Citrulline malate enhances athletic anaerobic performance and relieves muscle soreness. *J Strength Cond Res.* 2010;24(5):1215-22.
98. Pinkoski C, Chilibeck PD, Candow DG, Esliger D, Ewaschuk JB, Facci M, et al. The effects of conjugated linoleic acid supplementation during resistance training. *Med Sci Sports Exerc.* 2006;38(2):339-48.
99. Prosser JM, Majlesi N, Chan GM, Olsen D, Hoffman RS, Nelson LS. Adverse effects associated with arginine alpha-ketoglutarate containing supplements. *Hum Exp Toxicol.* 2009;28(5):259-62.
100. Quesnele JJ, Laframboise MA, Wong JJ, Kim P, Wells GD. The effects of beta-alanine supplementation on performance: a systematic review of the literature. *Int J Sport Nutr Exerc Metab.* 2014;24(1):14-27.
101. Qureshi A, Naughton DP, Petroczi A. A systematic review on the herbal extract *Tribulus terrestris* and the roots of its putative aphrodisiac and performance enhancing effect. *J Diet Suppl.* 2014;11(1):64-79.
102. Rathbone CR, Booth FW, Lees SJ. Sirt1 increases skeletal muscle precursor cell proliferation. *Eur J Cell Biol.* 2009;88(1):35-44.
103. Riedel E, Nündel M, Hampl H. alpha-Ketoglutarate application in hemodialysis patients improves amino acid metabolism. *Nephron.* 1996;74(2):261-5.
104. Roaiah MF, El Khayat YI, GamalEl Din SF, Abd El Salam MA. Pilot Study on the Effect of Botanical Medicine (*Tribulus terrestris*) on Serum Testosterone Level and Erectile Function in Aging Males With Partial Androgen Deficiency (PADAM). *J Sex Marital Ther.* 2016;42(4):297-301.
105. Rogerson S, Riches CJ, Jennings C, Weatherby RP, Meir RA, Marshall-Gradisnik SM. The effect of five weeks of *Tribulus terrestris* supplementation on muscle strength and body composition during preseason training in elite rugby league players. *J Strength Cond Res.* 2007;21(2):348-53.
106. Saunders B, Elliott-Sale K, Artioli GG, Swinton PA, Dolan E, Roschel H, et al. β-alanine supplementation to improve exercise capacity and performance: a systematic review and meta-analysis. *Br J Sports Med.* 2017;51(8):658-69.
107. Segura R, Ventura JL. Effect of L-tryptophan supplementation on exercise performance. *Int J Sports Med.* 1988;9(5):301-5.
108. Shad BJ, Smeuninx B, Atherton PJ, Breen L. The mechanistic and ergogenic effects of phosphatidic acid in skeletal muscle. *Appl Physiol Nutr Metab.* 2015;40(12):1233-41.
109. Shen CL, Chyu MC, Yeh JK, Zhang Y, Pence BC, Felton CK, et al. Effect of green tea and Tai Chi on bone health in postmenopausal osteopenic women: a 6-month randomized placebo-controlled trial. *Osteoporos Int.* 2012;23(5):1541-52.
110. Song HJ, Grant I, Rotondo D, Mohede I, Sattar N, Heys SD, et al. Effect of CLA supplementation on immune function in young healthy volunteers. *Eur J Clin Nutr.* 2005;59(4):508-17.
111. Stehle P, Zander J, Mertes N, Albers S, Puchstein C, Lawin P, et al. Effect of parenteral glutamine peptide supplements on muscle glutamine loss and nitrogen balance after major surgery. *Lancet.* 1989;1(8632):231-3.
112. Stensrud T, Ingjer F, Holm H, Strømme SB. L-tryptophan supplementation does not improve running performance. *Int J Sports Med.* 1992;13(6):481-5.
113. Stevens BR, Godfrey MD, Kaminski TW, Braith RW. High-intensity dynamic human muscle performance enhanced by a metabolic intervention. *Med Sci Sports Exerc.* 2000;32(12):2102-8.
114. Strüder HK, Weicker H. Physiology and pathophysiology of the serotonergic system and its implications on mental and physical performance. Part I. *Int J Sports Med.* 2001;22(7):467-81.

115. Sun K, Wu Z, Ji Y, Wu G. Glycine Regulates Protein Turnover by Activating Protein Kinase B/Mammalian Target of Rapamycin and by Inhibiting MuRF1 and Atrogin-1 Gene Expression in C2C12 Myoblasts. *J Nutr.* 2016;146(12):2461-7.
116. Tarnopolsky M, Zimmer A, Paikin J, Safdar A, Aboud A, Pearce E, et al. Creatine monohydrate and conjugated linoleic acid improve strength and body composition following resistance exercise in older adults. *PLoS One.* 2007;2(10):e991.
117. Temel JS, Abernethy AP, Currow DC, Friend J, Duus EM, Yan Y, et al. Anamorelin in patients with non-small-cell lung cancer and cachexia (ROMANA 1 and ROMANA 2): results from two randomised, double-blind, phase 3 trials. *Lancet Oncol.* 2016;17(4):519-31.
118. Thibault R, Flet L, Vavasseur F, Lemerle M, Ferchaud-Roucher V, Picot D, et al. Oral citrulline does not affect whole body protein metabolism in healthy human volunteers: results of a prospective, randomized, double-blind, cross-over study. *Clin Nutr.* 2011;30(6):807-11.
119. Tischler ME, Desautels M, Goldberg AL. Does leucine, leucyl-tRNA, or some metabolite of leucine regulate protein synthesis and degradation in skeletal and cardiac muscle? *J Biol Chem.* 1982;257(4):1613-21.
120. Trexler ET, Smith-Ryan AE, Stout JR, Hoffman JR, Wilborn CD, Sale C, et al. International society of sports nutrition position stand: Beta-Alanine. *J Int Soc Sports Nutr.* 2015;12:30.
121. Tujioka K, Yamada T, Aoki M, Morishita K, Hayase K, Yokogoshi H. Dietary ornithine affects the tissue protein synthesis rate in young rats. *J Nutr Sci Vitaminol (Tokyo).* 2012;58(4):297-302.
122. Valayannopoulos V, Boddaert N, Chabli A, Barbier V, Desguerre I, Philippe A, et al. Treatment by oral creatine, L-arginine and L-glycine in six severely affected patients with creatine transporter defect. *J Inherit Metab Dis.* 2012;35(1):151-7.
123. van Someren KA, Edwards AJ, Howatson G. Supplementation with beta-hydroxy-beta-methylbutyrate (HMB) and alpha-ketoisocaproic acid (KIC) reduces signs and symptoms of exercise-induced muscle damage in man. *Int J Sport Nutr Exerc Metab.* 2005;15(4):413-24.
124. van Wijck K, Wijnands KA, Meesters DM, Boonen B, van Loon LJ, Buurman WA, et al. L-citrulline improves splanchnic perfusion and reduces gut injury during exercise. *Med Sci Sports Exerc.* 2014;46(11):2039-46.
125. Veldhuis JD. Aging and hormones of the hypothalamo-pituitary axis: gonadotropic axis in men and somatotrophic axes in men and women. *Ageing Res Rev.* 2008;7(3):189-208.
126. Villareal DT, Holloszy JO. DHEA enhances effects of weight training on muscle mass and strength in elderly women and men. *Am J Physiol Endocrinol Metab.* 2006;291(5):E1003-8.
127. von Haehling S, Ebner N, Dos Santos MR, Springer J, Anker SD. Muscle wasting and cachexia in heart failure: mechanisms and therapies. *Nat Rev Cardiol.* 2017;14(6):323-41.
128. Walberg-Rankin J, Hawkins CE, Fild DS, Sebolt DR. The Effect of Oral Arginine During Energy Restriction in Male Weight Trainers. *The Journal of Strength & Conditioning Research.* 1994;8(3):170-7.
129. Wang W, Dai Z, Wu Z, Lin G, Jia S, Hu S, et al. Glycine is a nutritionally essential amino acid for maximal growth of milk-fed young pigs. *Amino Acids.* 2014;46(8):2037-45.
130. Wang W, Wu Z, Dai Z, Yang Y, Wang J, Wu G. Glycine metabolism in animals and humans: implications for nutrition and health. *Amino Acids.* 2013;45(3):463-77.
131. Wax B, Kavazis AN, Brown SP, Hilton L. Effects of supplemental GAKIC ingestion on resistance training performance in trained men. *Res Q Exerc Sport.* 2013;84(2):245-51.
132. Wax B, Kavazis AN, Webb HE, Brown SP. Acute L-arginine alpha ketoglutarate supplementation fails to improve muscular performance in resistance trained and untrained men. *J Int Soc Sports Nutr.* 2012;9(1):17.
133. Wax B, Kavazis AN, Weldon K, Sperlak J. Effects of supplemental citrulline malate ingestion during repeated bouts of lower-body exercise in advanced weightlifters. *J Strength Cond Res.* 2015;29(3):786-92.
134. Werner J. Clinical use of glutamine supplementation. *The Journal of nutrition.* 2008;138(10):2040S-4S.
135. Wideman L, Weltman JY, Patrie JT, Bowers CY, Shah N, Story S, et al. Synergy of L-arginine and GHRP-2 stimulation of growth hormone in men and women: modulation by exercise. *Am J Physiol Regul Integr Comp Physiol.* 2000;279(4):R1467-77.

136. Wideman L, Weltman JY, Patrie JT, Bowers CY, Shah N, Story S, et al. Synergy of L-arginine and growth hormone (GH)-releasing peptide-2 on GH release: influence of gender. *Am J Physiol Regul Integr Comp Physiol.* 2000;279(4):R1455-66.
137. Wirén M, Permert J, Larsson J. Alpha-ketoglutarate-supplemented enteral nutrition: effects on postoperative nitrogen balance and muscle catabolism. *Nutrition.* 2002;18(9):725-8.
138. Wong RH, Howe PR, Buckley JD, Coates AM, Kunz I, Berry NM. Acute resveratrol supplementation improves flow-mediated dilatation in overweight/obese individuals with mildly elevated blood pressure. *Nutr Metab Cardiovasc Dis.* 2011;21(11):851-6.
139. Wu G, Wu Z, Dai Z, Yang Y, Wang W, Liu C, et al. Dietary requirements of "nutritionally non-essential amino acids" by animals and humans. *Amino Acids.* 2013;44(4):1107-13.
140. Yao K, Yin Y, Li X, Xi P, Wang J, Lei J, et al. Alpha-ketoglutarate inhibits glutamine degradation and enhances protein synthesis in intestinal porcine epithelial cells. *Amino Acids.* 2012;42(6):2491-500.
141. Yen SS, Morales AJ, Khorram O. Replacement of DHEA in aging men and women. Potential remedial effects. *Ann N Y Acad Sci.* 1995;774:128-42.
142. Zdzieblik D, Oesser S, Baumstark MW, Gollhofer A, König D. Collagen peptide supplementation in combination with resistance training improves body composition and increases muscle strength in elderly sarcopenic men: a randomised controlled trial. *Br J Nutr.* 2015;114(8):1237-45.

## 10. UNIDAD DE ORIENTACIÓN EDUCATIVA Y DIVERSIDAD

Desde la Unidad de Orientación Educativa y Diversidad (ODI) ofrecemos acompañamiento a nuestros estudiantes a lo largo de su vida universitaria para ayudarles a alcanzar sus logros académicos. Otros de los pilares de nuestra actuación son la inclusión del estudiante con necesidades específicas de apoyo educativo, la accesibilidad universal en los distintos campus de la universidad y la equiparación de oportunidades.

Desde esta Unidad se ofrece a los estudiantes:

1. Acompañamiento y seguimiento mediante la realización de asesorías y planes personalizados a estudiantes que necesitan mejorar su rendimiento académico.
2. En materia de atención a la diversidad, se realizan ajustes curriculares no significativos, es decir, a nivel de metodología y evaluación, en aquellos alumnos con necesidades específicas de apoyo educativo persiguiendo con ello una equidad de oportunidades para todos los estudiantes.
3. Ofrecemos a los estudiantes diferentes recursos formativos extracurriculares para desarrollar diversas competencias que les enriquecerán en su desarrollo personal y profesional.
4. Orientación vocacional mediante la dotación de herramientas y asesorías a estudiantes con dudas vocacionales o que creen que se han equivocado en la elección de la titulación.

Los estudiantes que necesiten apoyo educativo pueden escribirnos a:

[orientacioneducativa@universidadeuropea.es](mailto:orientacioneducativa@universidadeuropea.es)

## 11. ENCUESTAS DE SATISFACCIÓN

¡Tu opinión importa!

La Universidad Europea te anima a participar en las encuestas de satisfacción para detectar puntos fuertes y áreas de mejora sobre el profesorado, la titulación y el proceso de enseñanza-aprendizaje.

Las encuestas estarán disponibles en el espacio de encuestas de tu campus virtual o a través de tu correo electrónico.

Tu valoración es necesaria para mejorar la calidad de la titulación.

Muchas gracias por tu participación.