Course Title	**Advanced Sports Performance Enhancement**				
Course Code	**DLSEH502**				
Course type	Elective				
Level	Master				
Year / Semester of study	1st or 2nd / 2nd or 3rd				
Teacher's Name	Click or tap here to enter text.				
ECTS	10	Lectures / week		Laboratories/week	
Course Purpose	This course aims to provide students with a comprehensive understanding and practical skills in sports performance and nutrition science, emphasizing the practical application of biomechanics and exercise physiology. Students will explore and apply fundamental principles and techniques for designing and implementing training programs for high-level athletes across various age categories. Additionally, the course will cover nutritional needs and strategies tailored to different types of sports.				
Learning Outcomes	Upon successful completion of the course, students will be able to: ● Analyze factors that contribute to age differences in athletic performance and evaluate their implications on training methodologies. ● Evaluate the effects of the "Female Triad" on health and athletic performance, and formulate strategies to mitigate these effects. ● Apply principles of long-term planning and periodicity in the training of high-level athletes, integrating concepts from exercise physiology to optimize performance. ● Design and implement advanced training techniques based on speed of execution and neuromuscular adaptations, utilizing biomechanical principles to enhance athletic development. ● Develop and execute comprehensive nutritional strategies to improve physical performance and overall health, incorporating the latest research in sports nutrition and exercise physiology. ● Critically assess the effectiveness of training programs and methodologies in accounting for age-related performance differences.				
Prerequisites		Corequisites			
Course Content	This course offers a comprehensive exploration of athletic performance, emphasizing the practical applications of biomechanics and exercise physiology. Students will gain insight into the factors influencing age-related differences in athletic performance and learn to adapt these insights to training methods tailored for athletes at various developmental stages. The course also examines the implications of the "Female Triad" on health and				

	athletic performance, as well as the specific considerations for training older athletes. A significant portion of the course is dedicated to nutrition science, where students will master the principles of a balanced diet that enhances athletic performance. This includes an in-depth study of food nutrients, their biological functions, sources, and potential health issues arising from deficiencies. Students will use tools and databases to analyze food nutrients and recommended daily intakes, thereby deepening their understanding of sports nutrition. Training program design is a central theme, focusing on the analysis of periodicity models and long-term planning principles. Students will learn how to structure training plans that optimize the benefits of high-level athletic training. Additionally, specialized training methods based on execution speed and neuromuscular adaptations will be covered, equipping students with cutting-edge techniques in sports training and applying biomechanics and exercise physiology principles in practice. This application will help explain and refine training design models. Finally, the course delves into the role of nutrition in sports metabolism and introduces dietary strategies to enhance physical performance. Students will evaluate and select appropriate ergogenic supplements, learning to distinguish effective supplements from those less effective, tailored specifically to various types of exercise.
Teaching Methodology	The course is structured and developed based on the principles of distance learning, good practices as well as the guidelines of the Evaluation Body and finally the Pedagogical Framework developed and implemented by our University. Also, through the design and development of distance learning courses, synchronous and asynchronous interaction, communication and collaboration are taken into account at 3 levels: 1) between instructor and student, 2) between students, and 3) between students and content. The course is taught entirely online through the electronic platform Moodle LMS. Mandatory, optional and additional bibliography (e.g. books, articles, links, open educational resources, case studies) in combination with notes, course presentations and suggestions for reading study (bibliography) are available to students through an electronic platform. Also, a variety of appropriate educational material is given through the online platform in the form of presentations with notes, presentations with narration, interactive presentations and videos, interactive learning scenarios, gamification activities, avatars, digital twins, audio files, online quizzes). Various online tools, new and emerging technologies are being exploited: communication tools (e.g. video conferencing, chat rooms), collaboration tools (e.g. discussion forums, blogs, wikis), as well as content development tools. Students are encouraged through the platform and various technological tools to interact with their fellow students and the instructor, in order to become active members of the online learning community created within the framework of the course. Finally, with the use of various technological tools, each student is expected to create his own online learning community. More information about distance learning at Frederick University, the Pedagogical Background developed and implemented, as well as the toolkit used, can be found at the following link. About Distance Learning - Frederick University

Bibliography	**Week**	**Online bibliographic references and suggestions for further study**
	Module 1 (Week 1 - 6)	**Mandatory Bibliography** Books/ Linage ● Kleisoyra, v. (2016). ergophysiology (11 edition). broken hill publishers ltd. ● Bompa TO, Buzzichelli C. Periodization: theory and methodology of training. 6. Champaign: Human Kinetics, Inc.; 2018. ● https://www.afoikyriakidi.gr/el/paidi-proponhsh-ygeia (free download): Ch. strength development, strength training Articles ● Dotan R, Mitchell C, Cohen R, Klentrou P, Gabriel D, Falk B. Child-adult differences in muscle activation--a review. Pediatr Exerc Sci. 2012 Feb; 24(1):2-21. doi: 10.1123/pes.24.1.2. PMID: 22433260; PMCID: PMC3804466. ● Radnor JM, Oliver JL, Waugh CM, Myer GD, Moore IS, Lloyd RS. The Influence of Growth and Maturation on Stretch-Shortening Cycle Function in Youth. Sports Med. 2018 Jan; 48(1):57-71. doi: 10.1007/s40279-017-0785-0. PMID: 28900862; PMCID: PMC5752749. ● McKay D, Broderick C, Steinbeck K. The Adolescent Athlete: A Developmental Approach to Injury Risk. Pediatr Exerc Sci. 2016 Nov; 28(4):488-500. doi: 10.1123/pes.2016-0021. Epub 2016 Oct 5. PMID: 27705538. ● Nattiv A, Loucks AB, Manore MM, Sanborn CF, Sundgot-Borgen J, Warren MP; American College of Sports Medicine. American College of Sports Medicine position stand. The female athlete triad. Med Sci Sports Exerc. 2007 Oct; 39(10):1867-82. doi: 10.1249/mss.0b013e318149f111. PMID: 17909417. ● Thein-Nissenbaum J, Hammer E. Treatment strategies for the female athlete triad in the adolescent athlete: current perspectives. Open Access J Sports Med. 2017 Apr 4;8:85-95. doi: 10.2147/OAJSM. S100026. PMID: 28435337; PMCID: PMC5388220. ● Cannataro R, Cione E, Bonilla DA, Cerullo G, Angelini F, D'Antona G. Strength training in elderly: A useful tool against sarcopenia. Front Sports Act Living. 2022 Jul 18;4:950949. doi: 10.3389/fspor.2022.950949. PMID: 35924210; PMCID: PMC9339797. ● Dorrell, H. F., Smith, M. F., & Gee, T. I. (2020). Comparison of Velocity-Based and Traditional Percentage-Based Loading Methods on Maximal Strength and Power Adaptations. Journal of Strength and Conditioning Research, 34(1), 46–53. https://doi.org/10.1519/JSC.0000000000003089

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- Lim JJ and Kong PW. Effects of isometric and dynamic postactivation potentiation protocols on maximal sprint performance. J Strength Cond Res 27: 2730–2736, 2013
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- Gołaś A, Maszczyk A, Zajac A, Mikołajec K, Stastny P.. Optimizing Post Activation Potentiation for Explosive Activities in Competitive Sports. J Hum Kinet. 2016; 42:95–106
- Blazevich AJ, Babault N. Post-activation potentiation (PAP) versus post-activation performance enhancement (PAPE) in humans: historical perspective, underlying mechanisms, and current issues. Front Physiol. 2019; 10:1359
- Bartolomei S, Zaniboni F, Verzieri N, Hoffman JR. New Perspectives in Resistance Training Periodization: Mixed Session vs. Block Periodized Programs in Trained Men. J Strength Cond Res. 2023 Mar 1; 37(3):537-545. doi: 10.1519/JSC.0000000000004465. Epub 2023 Jan 18. PMID: 36727999 Clinical Trial.
- Hartmann H, Wirth K, Keiner M, Mickel C, Sander A, Szilvas E. Short-term Periodization Models: Effects on Strength and Speed-strength Performance. Sports Med. 2015 Oct; 45(10):1373-86. doi: 10.1007/s40279-015-0355-2. PMID: 26133514 Review.

RECOMMENDED FOR FURTHER STUDY

- Nyland J. Overuse Noncontact ACL Injury in Young Athletes: Since We Can't Completely Fix It, Why Not Prevent It? Sports Health. 2023 Mar-Apr; 15(2):162-164. doi: 10.1177/19417381231152865. PMID: 36811881; PMCID: PMC9950994.
- Kraemer W, Denegar C, Flanagan S. Recovery from injury in sport: considerations in the transition from medical care to performance care. Sports Health. 2009 Sep; 1(5):392-5. doi: 10.1177/1941738109343156. PMID: 23015898; PMCID: PMC3445177.
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- Xenofondos, A., Patikas, D., Koceja, D. M., Behdad, T., Bassa, E., Kellis, E., et al. (2015). Post-activation potentiation: the neural effects of post-activation depression. Muscle Nerve 52, 252–259. doi: 10.1002/mus.24533

Digital Material

- Presentation with notes on training plan design and explanation of periodization models and slide summary.
- Presentation with notes about training based on the speed of execution of exercises with presentation of examples from individual sports and summary presentation of slides.
- Presentation with notes on the phenomenon of metastimulatory facilitation in competitive sports, with detailed presentation of examples from individual surveys and from athletes of various high-level sports after the implementation of this type of training.

	Module 2 (Week 7-12)	**Mandatory Bibliography** Linage • Maughan RJ (2018). IOC Medical and Scientific Commission reviews its position on the use of dietary supplements by elite athletes. *British Journal of Sports Medicine* 52: 418-419. • Thomas DT, Erdman KA, Burke LM (2016). American College of Sports Medicine. Joint Position Statement. Nutrition and Athletic Performance. Med Sci Sports Exerc. 48(3): 543-68. Book • W. McArdle (2017). Nutrition in Exercise and Physical Activity (Broken Hill) - Chapters 7,8 & 12. **Digital Material** • Presentation with notes on nutrition and its role in exercise and corresponding summary presentation of a few slides with narration. • Presentation with notes on healthy eating and corresponding summary presentation of a few slides with narration. • Presentation with notes on nutritional ergogenic aids and corresponding summary presentation of a few slides with narration. • 4th online meeting link • Websites**:** European Food Safety Authority https://multimedia.efsa.europa.eu/drvs/index.htm?lang=el Institute of Medicine of the National Academies of the USA https://ods.od.nih.gov/HealthInformation/nutrientrecommendations.aspx https://ods.od.nih.gov/factsheets/list-VitaminsMinerals Department of Agriculture of the United States of America https://fdc.nal.usda.gov/ https://www.myplate.gov/eat-healthy/what-is-myplate **Bibliography for Additional Study** Linage • West S, Monteyne AJ, van der Heijden I, Stephens FB, Wall BT (2023). Nutritional Considerations for the Vegan Athlete. *Adv Nutr.* 14(4):774-795. • Kerksick CM, Wilborn CD, Roberts MD, Smith-Ryan A, Kleiner SM, Jäger R, Collins R, Cooke M, Davis JN, Galvan E,

		Greenwood M, Lowery LM, Wildman R, Antonio J, Kreider RB (2018). ISSN exercise & sports nutrition review update: research & recommendations. J Int Soc Sports Nutr. 1; 15(1):38.

Assessment	**General Description of Evaluation** The evaluation of the course includes activities of continuous/formative, self-evaluation and summative. Specifically, the evaluation of this course includes the following: final written exam, 2 evaluation assignments, 2 evaluative online interactive discussions, various weekly educational activities such as interactive activities, interactive presentations/videos and self-assessment activities. From the above, the following are scored: • Final exam (**50%**) • 2 evaluation papers (20% + 15% = 35%) • 2 online interactive activities (7.5% + 7.5% = **15%**) All assignments (except the final exam) are assigned and delivered to the online platform, as well as a plagiarism check through the turnitin tool. The final exam is developed by the instructor and completed by the students on a special platform used exclusively for the exams.
Language	English / Greek