

1. BASIC INFORMATION

Course	Module 6: Sports Injuries	
Degree program	Master's Degree in Sports Training and Nutrition	
School	Real Madrid Graduate School/School of Sports Sciences	
Year	First	
ECTS	2 ECTS	
Credit type	Mandatory	
Language(s)	English	
Delivery Mode	Campus-Based	
Semester	Annual	
Academic Year	2020/2021	
Coordinating professor	Dr. HELIOS PAREJA/GERMAN DÍAZ UREÑA	

2. PRESENTATION

"Sports Injuries" is a complementary module closely related to one of the main master's degree modules, namely Module 3: Sports Training, and at the same time fundamentally linked to the biomechanics of movement in sports. This module covers fundamental aspects such as epidemiology of sports injuries, their treatment, rehabilitation and retraining in elite sportspeople in their respective sports.

3. COMPETENCIES AND LEARNING OUTCOMES

Core competencies:

- CB1. Students should possess and understand knowledge that provides a basis or opportunity to be innovative in the development and/or application of ideas, often in a research context.
- CB2. Students should be able to apply their acquired knowledge and problem-solving ability in new or little-known environments within broader (or multidisciplinary) contexts related to their area of study.

Universidad Europea

- CB3. Students should be able to integrate knowledge and tackle the complexity of formulating judgements based on information that, being incomplete or limited, includes reflections on social and ethical responsibilities related to the application of their knowledge and judgements.
- CB4. Students should be able to communicate their conclusions —and the ultimate reasons that support them— to specialized and non-specialized audiences in a clear and unambiguous way.
- *CB5. Students should possess learning skills that allow them to continue studying in a largely self-directed or autonomous way.*

Cross-curricular competencies:

- *CT1. Self-learning skills:* being able to choose the most effective strategies and tools at the most appropriate time to learn and autonomously put our learning into practice.
- CT7. Responsibility: being able to fulfill the commitments a person makes to themselves and to others when performing a task and trying to achieve a set of goals as part of the learning process. The ability of any individual to acknowledge and accept the consequences of their own actions.
- *CT9: Teamwork: being able* to participate and cooperate actively with other people, areas and/or organizations in order to achieve common goals.

Specific competencies:

- CE1. Having in-depth knowledge of how the human organism adapts to different physical loads in individuals of different ages and performance levels, or that belong to special population groups.
- CE11. Acquiring knowledge independently (self-learning).

Learning outcomes:

- RA1. Understanding of fundamental concepts related to prevention, treatment and rehabilitation of sports injuries.
- RA2. Determining, based on case studies, practical sessions, reading and information searches, the available evidence on the prevention, treatment and rehabilitation of sports injuries.
- RA3. In-depth analysis and synthesis based on searching fundamental bibliographic sources related to the prevention and treatment of sports injuries.
- RA4. Developing and implementing rehabilitation programs to help sportspeople recover from the different injuries that can occur during sporting activity.



The table below shows the relationship between the competencies developed in the course and the learning outcomes pursued:

Competencies	Learning outcomes
CB1, CB2, CB3, CB4, CB5 CT1, CT7, CT9 CE1, CE11	RA1
CB1, CB2, CB3, CB4, CB5 CT1, CT7, CT9 CE1, CE11	RA2
CB1, CB2, CB3, CB4, CB5 CT1, CT7, CT9 CE1, CE11	RA3
CB1, CB2, CB3, CB4, CB5 CT1, CT7, CT9 CE1, CE11	RA4

4. COURSE CONTENT

- 1. Fundamentals of preventive and therapeutic interventions in the field of sports.
- 2. General concepts in attending to the injured sportsperson.
- 3. Short and long-term goals in the functional recovery of the injured sportsperson.
- 4. Biological fundamentals of tissue healing.
- 5. Main foot, ankle and leg injuries. Classification. Prevention and rehabilitation strategies.
- 6. Main knee, thigh and pelvis injuries. Classification. Prevention and rehabilitation strategies.
- 7. Chronic lower back pain and physical exercise. Therapeutic interventions based on exercise.
- 8. Main shoulder injuries. Prevention and rehabilitation strategies. Neuromuscular reeducation.

5. LEARNING METHODOLOGIES

The types of teaching methodologies are listed below:

- Master Class
- Case Method
- Cooperative learning
- PBL

6. LEARNING ACTIVITIES

Listed below are the types of learning activities and the number of hours the student will spend on each one:



Learning activity	Number of hours
Epidemiology of sports injuries	10 hours on campus 10 hours of self- directed learning
Treatment and return to play in sports injuries	15 hours on campus 15 hours of self- directed learning
TOTAL	50 h

7. ASSESSMENT

Listed below are the assessment systems used and the weight each one carries towards the final course grade:

Assessment system	Weight
Activity 1. Epidemiology of sports injuries	PASS or FAIL
Activity 2.	100%
Treatment and return to play in sports injuries	10076

When you access the course on the *Campus Virtual*, you'll find a description of the activities you have to complete, as well as the deadlines and assessment procedures for each one. The activities can be changed due to master's needs.

7.1. First exam period

To pass the course in the first exam period, you must obtain a final course grade of at least 5 out of 10.

7.2. Second exam period

To pass the course in the second exam period, you must obtain a final grade of at least 5 out of

10. The student must deliver the activities not successfully completed in the first exam period



after having received the corresponding corrections from the professor, or those that were not delivered in the first place.

8. SCHEDULE

This section indicates the schedule with delivery dates of evaluable activities of the subject:

Assessable activity	Date
Activity 1.	
Epidemiology of sports injuries	JUNE
Activity 2.	
Treatment and return to play in	
sports injuries	JUNE

This schedule may undergo modifications for logistical reasons of the activities. Any modification will be notified to the student in a timely manner.



9. **BIBLIOGRAPHY**

Äärimaa V, Kääriäinen M, Vaittinen S, Tanner J, Järvinen T, Best T, Kalimo H. Restoration of myofiber continuity after transaction injury by surgical suturing. Neuromuscul Disord. 2004;3:421–428.

- 1. Äärimaa V, Rantanen J, Best T, Schultz E, Corr D, Kalimo H. Mild eccentric stretch injury in skeletal muscle causes transient effects on tensile load and cell proliferation. Scand. J Med Sci Sports. 2004;14:367–372.
- 2. Ahmad CS, Redler LH, Ciccotti MG, Maffulli N, Longo UG, Bradley J. Evaluation and management of hamstring injuries. Am J Sports Med. 2013;41:2933–2947.
- Askling C, Malliaropoulos N, Karlsson J. High-speed running type or stretching-type of hamstring injuries makes a difference to treatment and prognosis. Br J Sports Med. 2012;46:86–87.
- Askling C, Tengvar M, Thorstensson A. Acute hamstring injuries in Swedish elite football: a prospective randomized controlled clinical trial comparing two rehabilitation protocols. Br J Sports Med. 2013;47:953–959.
- 5. Beiner JM, Jokl P, Cholewicki J. The effects of anabolic steroids and corticosteroids on healing of muscle contusion injury. Am J Sports Med. 1999;27:2–9. .
- 6. Beiner JM, Jokl P. Muscle contusion injury and myositis ossificans traumatica. Clin Orthop Rel Res. 2002;403S:S110–S119. .
- Bennett M, Best TM, Babul S, Taunton J, Lepawsky M. Hyperbaric oxygen therapy for delayed onset muscle soreness and closed soft tissue injury. Cochrane Database Syst Rev. 2005;19:CD004713.
- Best TM, Loitz-Ramage B, Corr DT, Vanderby R. Hyperbaric oxygen in the treatment of acute muscle stretch injuries. Results in an animal model. Am J Sports Med. 1998;26:367– 372. .
- Bleakley C, McDonough S, MacAuley D. The use of ice in the treatment of acute soft tissue injury: A systematic review of randomized controlled trials. Am J Sports Med. 2004;34:251– 261. .
- 10. Brooks JHM, Fuller CW, Kemp SPT, Reddin DB. Incidence, risk and prevention of hamstring muscle injuries in professional rugby union. Am J Sports Med. 2006;34:1297–1306.
- 11. Buckwalter JA. Should bone, soft tissue, and joint injuries be treated with rest or activity? J Orthop Res. 1995;13:155–156.
- 12. Chan O, Del Buono A, Best TM, Maffulli N. Acute muscle strain injuries: proposed new classification system. Knee Surg Traumatol Arthrosc. 2012;20:2356–2362.
- 13. Deal DN, Tipton J, Rosencrance E, Curl WW, Smith TL. Ice reduces edema. A study of microvascular permeability in rats. J Bone & Joint Surg. 2002;84-A:1573–1578.



- 14. Ekstrand J, Askling C, Magnusson H, Mithoefer K. Return to play after thigh muscle injury in elite football players: implementation and validation of the Munich muscle injury classification. Br J Sports Med. 2013;47:769–774. [PMC free article].
- 15. Ekstrand J, Hägglund M, Waldén M. Epidemiology of muscle injuries in professional football (soccer) Am J Sports Med. 2011;39:1226–1232. .
- 16. Guillodo Y, Bouttier R, Saraux A. Value of sonograpphy combined with clinical assessment to evaluate muscle injury severity in athletes. J Athlet Train. 2011;46:500–504. [PMC free article].
- 17. Huard J, Li Y, Fu FH. Muscle injuries and repair: current trends in research. Journal of Bone & Joint Surgery. 2002;84-A:822–832. .
- 18. Hurme T, Kalimo H, Lehto M, Järvinen M. Healing of skeletal muscle injury. An ultrastructural and immunohistochemical study. Med Sci Sports Exerc. 1991;23:801–810. .
- 19. Hurme T, Rantanen J, Kalimo H. Effects of early cryotherapy in experimental skeletal muscle injury. Scand J Med & Sci Sports. 1993;3:46–51.
- 20. Jackson DW, Feagin JA. Quadriceps contusions in young athletes: relation of severity of injury to treatment and prognosis. J Bone & Joint Surg. 1973;55-A:95–105. .
- 21. Järvinen M, Lehto M, Sorvari T. Effect of some anti-inflammatory agents on the healing of ruptured muscle. An experimental study in rats. J Sports Traumatol. 1992;14:19–28.
- 22. Järvinen M. Healing of a crush injury in rat striated muscle. 2. A histological study of the effect of early mobilization and immobilization on the repair processes. Acta Pathol Microbiol Scand. 1975;83A:269–282.
- 23. Järvinen M. Healing of a crush injury in rat striated muscle. 3. A microangiographical study of the effect of early mobilization and immobilization on capillary ingrowth. Acta Pathol Microbiol Scand. 1976;84A:85–94.
- 24. Järvinen M. Healing of a crush injury in rat striated muscle. 4. Effect of early mobilization and immobilization on the tensile properties of gastrocnemius muscle. Acta Chir Scand. 1976;142:47–56.
- 25. Järvinen TAH, Järvinen TLN, Kääriäinen M, Kalimo H, Järvinen M. Biology of muscle trauma. Am J Sports Med. 2005;33:745–766. .
- 26. Kalimo H, Rantanen J, Järvinen M. Muscle injuries in sports. Baillière's Clinical Orthop. 1997;2:1–24.
- Kannus P, Parkkari J, Järvinen TLN, Järvinen TAH, Järvinen M. Basic science and clinical studies coincide: active approach is needed in the treatment of sports injuries. Scand J Med Sci Sports. 2003;13:150–154.
- 28. Kuang S, Kuroda K, Le Grand F, Rudnicki MA. Asymmetric self-renewal and commitment of satellite stem cells in muscle. Cell. 2007;129:999–1010. [PMC free article] .



- 29. Kujala UM, Orava S, Järvinen M. Hamstring injuries: Current trends in treatment and prevention. Sports Med. 1997;23:397–404.
- Levinen WM, Begfeld JA, Tessendorf W, Moorman CT., 3rd Intramuscular corticosteroid injection for hamstring injuries. A 13-year experience in the National Football League. Am J Sports Med. 2000;28:297–300.
- 31. Malliaropoulos N, Isinkaye T, Tsitas K, Maffulli N. Reinjury after acute thigh muscle injuries in elite track and field athletes. Am J Sports Med. 2011;39:304–310.
- Malliaropoulos N, Papacostas E, Kiritsi O, Papalada A, Gougoulias N, Maffulli N. Posterior thigh muscle injuries in elite track and field athletes. Am J Sports Med. 2010;38:1813– 1819. .
- Malliaropoulos N, Papacostas E, Kiritsi O, Papalada A, Gougoulis N, Maffulli N. Posterior thigh muscle injuries in elite track and field athletes. Am J Sports Med. 2010;38:1813– 1819. .
- 34. Markert CD, Merrick MA, Kirby TE, Devor ST. Non thermal ultrasound and exercise in skeletal muscle regeneration. Arch Phys Med Rehabil. 2005;86:1304–1310. .
- 35. Menetrey J, Kasemkijwattana C, Fu FH, et al. Suturing versus immobilization of a muscle laceration. A morphological and functional study in a mouse model. Am J Sports Med. 1999;27:222–229. .
- Obremsky WT, Seaber AV, Ribbeck BM, Garrett WE., Jr Biomechanical and histological assessment of controlled muscle strain injury treated with piroxicam. Am J Sports Med. 2004;22:558–561.
- 37. O'Grady M, Hackney AC, Schneider K, et al. Diclofenac sodium (Voltaren) reduced exerciseinduced injury in human skeletal muscle. Med Sci Sports & Exerc. 2000;32:1191–1196. .
- Rahusen FT, Weinhold PS, Almekinders LC. Nonsteroidal anti-inflammatory drugs and acetaminophen in the treatment of an acute muscle injury. Am J Sports Med. 2001;32:1856–1859.
- 39. Rantanen J, Hurme T, Lukka R, Heino J, Hurme T, Lukka R, Heino J, Kalimo H. Satellite cell proliferation and expression of myogenin and desmin in regenerating skeletal muscle: evidence for two different populations of satellite cells. Lab Invest. 1995;72:341–347.
- 40. Rantanen J, Thorsson O, Wollmer P, Hurme T, Kalimo H. Effects of therapeutic ultrasound on the regeneration of skeletal muscle myofibers after experimental muscle injury. Am J Sports Med. 1999;27:54–59.
- 41. Sarimo J, Lempainen L, Mattila K, Orava S. Complete proximal hamstring avulsions: a series of 41 patients with operative treatment. Am J Sports Med. 2008;36:1110–1115.
- 42. Schaser K-D, Disch AC, Stover JF, Lauffer A, Bail HJ, Mittlmeier T. Prolonged superficial local cryotherapy attenuates microcirculatory impairment, regional inflammation, and muscle necrosis following closed soft tissue injury in rats. Am J Sports Med. 2007;35:93–102.



- 43. Schneider-Kolsky ME, Hoving JL, Warren P, Connell DA. A comparison between clinical assessment and magnetic resonance imaging of acute hamstring injuries. Am J Sports Med. 2006;34:1008–1015. .
- 44. Sherry MA, Best TM. A comparison of 2 rehabilitation programs in the treatment of acute hamstring strains. J Orthop Sports Phys Ther. 2004;34:116–125.
- 45. Thorsson O, Lilja B, Nilsson P, Westlin N. Immediate external compression in the management of an acute muscle injury. Scand J Med & Sci Sports. 1997;7:182–190. .
- Thorsson O, Rantanen J, Hurme T, Kalimo H. Effects of nonsteroidal anti-inflammatory medication on satellite cell proliferation during muscle contraction. Am J Sports Med. 1998;26:172–176.
- 47. Vaittinen S, Lukka R, Sahlgren C, Rantanen J, Hurme T, Lendahl U, Eriksson JE, Kalimo H. The expression of intermediate filament protein nestin as related to vimentin and desmin in regenerating skeletal muscle. J Neuropathol Exp Neurol. 2001;60:588–659.
- Warren P, Gabbe BJ, Schneider-Kolsky M, Bennell KL. Clinical predictors of time to return to competition and of recurrence following hamstring strain in elite Australian footballers. Br J Sports Med. 2010;44:415–419. .
- 49. Wilkin LD, Merrick MA, Kirby TE, Devor ST. Influence of therapeutic ultrasound on skeletal muscle regeneration following blunt contusion. Int J Sports Med. 2004;25:73–77. .
- 50. Yu JG, Thornell LE. Desmin and actin alterations in human muscles affected by delayed onset muscle soreness: a high resolution immunocytochemical study. Histochem Cell Biol. 2002;118:171–179.

10. DIVERSITY ATTENTION UNIT

Students with specific educational support needs:

Adaptations or curricular adjustments for students with specific educational support needs, in order to guarantee equal opportunities, will be guided by the Diversity Attention Unit (UAD).

The issuance of a report of curricular adaptations / adjustments by said Unit will be essential, so students with specific educational support needs should contact through: unidad.diversidad@universidadeuropea.es at the beginning of each semester.

11. ONLINE SURVEYS

Your opinion matters!

The Universidad Europea encourages you to participate in several surveys which help identify the strengths and areas we need to improve regarding professors, degree programs and the teaching-learning process.

The surveys will be made available in the "surveys" section in virtual campus or via e-mail.



Your assessment is necessary for us to improve.

Thank you very much for your participation.