

Module Overview

of the Master's Program in
Exercise Science & Sports Nutrition

Mandatory Modules of the Master's Program in Exercise Science & Sports Nutrition

Applied Sports Anatomy (10 Credit Points)

- Molecular foundations of physiological adaptation processes
- Fundamentals of cellular mechanotransduction
- Anatomy, structure, and mechanical properties of skeletal muscle
- Structural characteristics and composition of connective tissues
- Muscle adaptation processes induced by physical activity and training stimuli
- Effects of physical activity on bone, cartilage, tendons, ligaments, and fascia
- Interactions and potential interference between endurance and strength training adaptations

Test Performance: Exam (90 Minutes)

Sport and Exercise Psychology for Coaches (5 Credit Points)

- Fundamentals of sports psychology
- Relaxation and arousal regulation techniques
- Goal-setting methods for performance enhancement
- Visualization and mental imagery techniques
- Attention control and focus strategies
- Communication and counseling techniques
- Application of heart rate variability in mental training

Test Performance: Term Paper

Organ Systems (10 Credit Points)

- Structural organization of the human organism
- Fundamentals of digestion and nutrient processing
- Structure and function of the human gastrointestinal system
- Structure and function of the liver, kidneys, gallbladder, thyroid, and pancreas
- Structure and function of the urinary system and the immune system

Test Performance: Exam (120 Minutes)

Testing and Training Strength, Speed, Agility, and Quickness (5 Credit Points)

- Performance diagnostics and sport-specific testing procedures
- Fundamentals of sports biology and physiological determinants of performance
- Core principles of biomechanics relevant to performance assessment
- Training methods and evidence-based exercise prescription
- Practical training examples and program development

Test Performance: Exam (90 Minutes), Practical Examination (20 Minutes)

Applied Physiology of Sport and Exercise (10 Credit Points)

- The importance of the endocrine system during physical activity
- Influence of genetic and epigenetic factors on adaptation processes
- Adaptive reactions of the nervous system to training
- Acute reactions and adaptations of the cardiovascular system
- Adaptations to strength and endurance training

Test Performance: Exam (90 Minutes)

Testing and Training Flexibility and Endurance (5 Credit Points)

- Performance diagnostics and sport-specific testing procedures
- Fundamentals of sports biology and physiological performance determinants
- Core principles of biomechanics relevant to movement and performance analysis
- Training methods and evidence-based exercise prescription
- Practical training examples and structured program design

Test Performance: Exam (90 Minutes)

Bioenergetics of Training and Exercise (10 Credit Points)

- Fundamentals of biology and biochemistry
- Catalytic and regulatory strategies in biochemical pathways
- Biosynthesis of key biological molecules
- Metabolism: overarching concepts and basic pathway patterns
- Carbohydrate, fat, and protein metabolism and their adaptations to training
- Influence of physical activity and nutrition on metabolic coordination

Test Performance: Exam (120 Minutes)

Designing Training Programs (5 Credit Points)

- Principles of periodization in sport training
- Temporal and content-related levels of a comprehensive training plan
- Development of training plans: long-term/multiannual plans, annual plans, macro- and mesocycles, weekly plans, and individual session planning
- Recognition, prevention, and management of overtraining
- Strategies for peaking, tapering, and detraining
- Concurrent training: managing multiple training modalities
- Applied training planning using practical examples

Test Performance: Oral Examination (30 Minutes)

Nutrition Strategies and Plans (5 Credit Points)

- Planning and development of nutrition strategies in competitive sports
- Influence of nutrition on physiological adaptation processes
- Nutritional anamnesis and analysis techniques
- Nutrition counseling for elite athletes
- Interdisciplinary mentoring and development of individualized nutrition strategies

Test Performance: Oral Examination (30 Minutes)

Applied Biomechanics and Technology (10 Credit Points)

- Analysis of human movement using biomechanical principles and quantitative methods
- Application of motion-capture technologies, force measurement systems, and wearable sensors in performance assessment
- Evaluation of kinetic and kinematic data to identify performance limitations and injury risk factors
- Integration of biomechanical insights into evidence-based training, rehabilitation, and nutrition strategies
- Critical examination of emerging technologies and their validity, reliability, and practical utility in sport settings
- Development of technical and analytical competencies for implementing technology-driven solutions in applied performance environments

Test Performance: Exam (120 Minutes)

Management of Recovery in Sport (5 Credit Points)

- The importance of recovery management in sports performance
- Sports-biological principles of fatigue and recovery
- Assessment and monitoring of fatigue in athletes
- Training and performance monitoring techniques
- Recovery strategies and evaluation of their effectiveness
- Integration of recovery and nutrition
- Individualized recovery management using practical case examples

Test Performance: Exam (90 Minutes)

Research Project (5 Credit Points)

- Scientific training and research methodologies
- Data collection, management, and analysis techniques
- Preparation, writing, and presentation of a scientific paper

Test Performance: Project Report, Presentation (30 Minutes)

Practical Sports Nutrition (5 Credit Points)

- Body composition assessment and diagnostic methods
- Calculation and interpretation of basal metabolic rate
- Measurement and evaluation of individual and sport-specific energy requirements
- Nutritional diagnostics and assessment techniques
- Principles of food science relevant to sports and health
- Special dietary needs across populations and performance contexts
- Applied nutrition management using practical case examples

Test Performance: Oral Examination (20 Minutes)

Colloquium on the Master's Thesis (5 Credit Points)

- Consultation on foundational issues in developing a Master's thesis
- Literature research and critical review
- Presentation and discussion of the thesis at various stages of development
- Preparation of a research exposé
- Discussion and interpretation of research results, including application to other fields
- Scientific research methods and training in research design
- Formulation of research hypotheses
- Preparation, writing, and presentation of a scientific paper

Test Performance: Presentation of the Topic and the Progress of the Master Thesis

Master Thesis (10 Credit Points)

- Independent investigation of a research question using scientific research methods within a defined timeframe

Test Performance: Master Thesis

Optional Compulsory Modules of the Master's Program in Exercise Science & Sports Nutrition

Youth Fitness Development (5 Credit Points)

- Importance and practical applications of youth sports science
- Fundamentals of sports biology relevant to children and adolescents
- Personal development in young athletes
- Evidence-based training recommendations for childhood and adolescence
- Talent identification and promotion in youth competitive sports

Test Performance: Exam (90 Minutes)

Sports Injuries and Rehabilitation (5 Credit Points)

- Risk assessment and management in sports injuries
- Legal and ethical considerations in injury prevention and management
- Pain assessment, healing processes, and tissue recovery
- Therapeutic interventions and rehabilitation strategies
- Safe return to sport, activity, or competition

Test Performance: Term Paper

Nutrition Supplements (5 Credit Points)

- Distinctions between dietary supplements, novel foods, and pharmaceuticals
- Doping regulations and the role of supplements in sports
- Classes of substances, their mechanisms, and physiological effects
- Systematic literature review and evidence-based evaluation of supplements
- Consultation and practical application across different target groups

Test Performance: Oral Examination (30 Minutes)

Modern Diets (5 Credit Points)

- Overview and examples of contemporary diets
- Resource-efficient and sustainable dietary approaches
- Superfoods and their nutritional relevance
- Organic and bio-food initiatives
- Individualized nutrition based on genetic analysis
- Innovative meat substitutes and alternative protein sources
- Influence of media, marketing, and social media influencers on dietary trends
- Nutrition 4.0: diets in the context of globalization and digitalization

Test Performance: Exam (90 Minutes)