

MASTER I IDRETTSVITENSKAP 2022/2024  
ORDINARY EXAM  
IN  
EXERCISE BIOLOGY AND SPORT PERFORMANCE ANALYSIS I (MA460)

**Introduction:** There are questions from 7 seminars. All parts count equally. Manage your time. The answer must be written in English, Norwegian, Swedish or Danish.

**Seminar 1: Running economy, a physiological and biomechanical perspective (10 points)**

Question: Identify factors that may improve running economy and explain the mechanisms by which such improvements may occur.

**Seminar 2: Muscle mechanics (10 points)**

Questions

1. During a running test, how can muscle architectural data be used to estimate the instantaneous force being produced? Your answer should include the concept of force-length-velocity potential seen in the lecture.
2. Explain the advantage and the disadvantage of a short Achilles tendon moment arm for a sprint runner.

**Seminar 3: Oxygen transport and utilization during whole body maximal exercise (10 points)**

Questions:

1. Explain how and to what extent the following organs limit maximal oxygen consumption during whole-body maximal exercise a) The lungs. b) The heart c) The blood d) The muscles
2. Oxygen delivery increases with endurance training. What are the mechanisms?

**Seminar 4: Biomechanics of overuse injuries (10 points)**

Question: Discuss the challenges and limitations of research related to identifying biomechanical risk factors for overuse injury. Consider study design and provide examples to support your answers.

**Seminar 5: Strength training for elderly (10 points)**

Question: Discuss the possible effects of physical training on specific strength and the underlying mechanisms in an untrained 80-year-old participant.

**Seminar 6: Integrated performance analysis (10 points)**

Question: Explain differences in pacing pattern and energy system contribution during 30 min running on track versus 30 min cross-country skiing with varying terrain.

**Seminar 7: Performance analysis in Team sport (10 points)**

Questions:

1. How can match analysis contribute to the training planning process?
2. Several contextual factors can influence the outcome of a match analysis. List three (3) possible factors.
3. A sprint in a typical match analysis is defined by a (so called) speed threshold (e.g. 25 km/h). What is the challenge with this definition when it comes analyzing the training load players are subjected to?