

**National Taiwan University of Sport**  
**International Short-term Summer Program**  
**Course Outline**

Course: Physiological and biomechanical monitoring of a multi-day cycling tour

Instructor: Dr Chen-Kang Chang, PhD (Email: [wspahn@ntupes.edu.tw](mailto:wspahn@ntupes.edu.tw))

Dr Chih-Hui Chiu, PhD (Email: [loveshalom@hotmail.com](mailto:loveshalom@hotmail.com))

Course description

This course will monitor the physiological and biomechanical adaptations to Iron Camel, a 15-day 1100-km cycling tour around Taiwan. The students will spend 2 days each before and after the cycling tour in Sport Science Research Center to measure various physiological and biomechanical parameters in participants of the tour. In addition, the students will record and analyze heart rate data collected during the cycling tour. The students are expected to have basic knowledge in biochemistry, physiology, and biomechanics.

Course objectives

1. Understand how to measure and analyze various physiological and biomechanical parameters.
2. Understand how to analyze heart rate data and exercise intensity.
3. Compare physiological and biomechanical changes after the cycling tour.
4. Summarize the induced adaptations and accumulated exercise intensity of the tour.

Student evaluation

1. Two lab reports (20% each)
2. Heart rate analysis report (20%)
3. Final report (40%)
4. Participation, discussion, and dedication (20%)

Tentative schedule (may be adjusted according to Iron Camel schedule)

Days	Hands-on	Duration
Day 2 (3 days prior to tour)	1. Body composition (BIA and Bod Pod) 2. Incremental cycling (breath-by-breath gas analysis, heart rate response, lactate threshold, heart rate-load relationship, electromyography)	8 hr

	3. Write a report	
Day 3 (2 days prior to tour)	<ol style="list-style-type: none"> <li>1. Explosive power in lower limbs (force platform)</li> <li>2. Isokinetic characteristics of upper and lower limb movements (Biodex)</li> <li>3. Analysis of electromyography data</li> <li>4. Write a report</li> </ol>	8 hr
Day 6 – Day 20 (During the tour)	<ol style="list-style-type: none"> <li>1. Collect heart rate data (Garmin/Polar watch with heart rate monitor)</li> <li>2. Analyze heart rate and exercise intensity</li> </ol>	30 hr
Day 21 (1 day after the tour)	Same as Day 1	8 hr
Day 22 (2 days after the tour)	<ol style="list-style-type: none"> <li>1. Same as Day 2</li> <li>2. Write the final report</li> </ol>	8 hr