

**8th ESIS International Summer School on Energy Methods
in Fracture and Fatigue
Messina, Italy, July 10-12 2023**

The aim of the Summer School is to expand the knowledge of young researchers providing an insight on the development and application of experimental energy methods for stress-deformation analysis on:

- Mechanical materials and components;
- Fatigue characterization of mechanical systems;
- Fracture mechanics and damage control in both static and dynamic fields.

The Summer School will focus on general topics associated with energy approaches to describe the fracture behavior of structural materials with emphasis on the development and application of fatigue assessment for structural integrity.

Lectures:

The proposed topic for the summer school on Energy Methods in Fracture and Fatigue are the following:

1. Thermodynamics of Mechanical Fatigue (**Prof. Michael Khonsari**, Louisiana State University, USA)
2. Thermoelastic Stress Analysis in Fracture Mechanics (**Prof. Liviu Marsavina**, Politechnica University of Timisoara, Romania)
3. Energetic local approaches for fatigue design (**Prof. Filippo Berto**, La Sapienza University, Italy, and **Dr. Pietro Foti**, NTNU)
4. Charpy instrumented pendulum and J integral as energy methods in dynamic and static fracture mechanics (**Prof. Aleksandar Sedmak**, University of Belgrade, Serbia)
5. Thermographic Methods for fatigue and fracture assessment (**Prof. Giacomo Risitano**, **Dr. Danilo D'Andrea**, **Dr. Dario Santonocito**, University of Messina, Italy)

<https://www.semfract23.net/programme>

Time	Course	Lecturer
Day 1 - Monday 10th July, 2023		
19:00-21:00	Welcome Party	
Day 2 - Tuesday 11th July, 2023		
9:00-10:45	Thermodynamics of Mechanical Fatigue - Part 1	Prof. Michael M. Khonsari
10:45-11:00	Coffee-break	
11:00-12:45	Thermodynamics of Mechanical Fatigue - Part 2	Prof. Michael M. Khonsari
12:45-14:00	Lunch	

14:00-16:00	Thermoelastic Stress Analysis in Fracture Mechanics	Prof. Liviu Marsavina
20:00	Summer School dinner	
Day 3 - Wednesday 12th July, 2023		
9:00-10:45	Energetic local approaches for fatigue design	Dr. Pietro Foti
10:45-11:00	Coffee-break	
11:00-12:45	Charpy instrumented pendulum and J integral as energy methods in dynamic and static fracture mechanics	Prof. Aleksandar Sedmak
12:45-14:00	Lunch	
14:00-15:00	Thermographic Methods for fatigue and fracture assessment	Dr. Danilo D'Andrea - Dr. Dario Santonocito
15:00-16:00	Final Exam	

<https://www.semfract23.net/lecturers>

Example of questions (AS):

1 - Impact toughness is:

1. Ability of a material to resist impact load by plastic deformation
2. Energy for crack initiation as obtained using instrumented Charpy pendulum and standard notched specimens
3. Energy for crack propagation as obtained using instrumented Charpy pendulum and standard notched specimens
4. Total energy as obtained using instrumented Charpy pendulum and pre-cracked specimens

2 - J integral is:

1. Conservation law for a cracked 3D body under dynamic load
2. Path independent line integral, defining stress-strain nonlinear HRR fields around crack tip, representing Energy release rate.
3. Useless fracture mechanics parameter since it can't be measured or calculated
4. Applicable to welded joints, thermal, volume and inertial problems without any modifications.