



Politecnico
di Torino

THEXOR



Winter school 2025!

Organizing committee:

Raffaella Sesana, Francesca Curà and Luca Corsaro
DIMEAS Politecnico di Torino



“Thermal phenomena related to stress in materials”

Details:

Who: PhD students, Researchers, etc.

When: 19-20-21/02/2025 (16 hours).

Where: Torino (Italy) – Politecnico di Torino.

Costs: free event!

Registration: via email (luca.corsaro@polito.it) until 10/02/2025.

The course is recognized for the Ph.D. accreditation credits according to PhD schools.

Stay tuned on www.thexorpolito.com (news section) for any updates!

Main Topics:

- Analysis of deformation mechanisms and thermodynamic phenomena in case of metallic materials.
- Notions of electromagnetic radiation and thermal transport phenomena.
- Surface temperature measurements: from local to global instruments.
- Thermography: thermal cameras, typologies, techniques, applications, etc.
- The emissivity problem.
- Recent applications of Thermography in the mechanical field: research activities, case studies and practical applications.

Labs:

- Thermography setup.
- Laboratory applications.

Invited lectures

- *“IR cameras technology”* – Nicola Genna (Advanced/Integrated Systems Business Unit - Teledyne FLIR Solutions).
- *“Estimating the intrinsic dissipation using the second harmonic of the temperature signal”* – Prof. Mauro Ricotta (Department of Industrial Engineering - University of Padova).
- *“Infrared thermography-based evaluation of the elastic-plastic J-integral to correlate fatigue crack growth data of a stainless steel”* – Prof. Giovanni Meneghetti (Department of Industrial Engineering - University of Padova).
- *“Alternative methods for estimation of fatigue life via IR thermography”* – Martin Matušů (Faculty of Mechanical Engineering, Division of Strength and Elasticity, Czech Technical University).
- *“Energy and related temperature variation assessment for quantitative damage analysis of various materials: application for fatigue and fracture mechanics”* – Prof. Umberto Galietti (Department of Mechanics Mathematic Management, Bari Politechnic University).
- *“Design and Monitoring of Cycloidal Gearboxes: Architecture, Power Losses, Thermal Modeling, and Infrared Thermography Analysis”* – Lorenzo Maccioni (Faculty of Engineering, NOI Techpark, Free University of Bozen-Bolzano).

Program

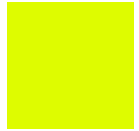
Wednesday February 19th 2025 – Room 17

	Lecture	Speaker
13.30-14.00	Registration	
14.00-14.30	Introduction	Raffaella Sesana
	AIPnD Welcome	Monica Volinia
14.30-15.00	Strain mechanism in metals	
	Thermodynamic phenomena related to strain in metals: microplastic strain, internal energy, dissipation, internal damping.	Raffaella Sesana
15.00-16.00	Basics of electromagnetic radiation	Raffaella Sesana
	Thermal energy transport phenomena	
16.00-17.00	Overview on surface temperature measurements: destructive and non-destructive techniques, local and full field measuring devices and techniques	Raffaella Sesana
17.00-18.00	Measuring IR radiation: from emissivity estimation to the impact of ambient on infrared thermographic measurement.	Raffaella Sesana

Lecture		Speaker
8.30-9.30	Thermographic techniques: from preliminary Passive thermography approach to recent applications of Active (stimulated) thermography.	Francesca Curà
9.30-10.30	IR cameras technology	Nicola Genna
10.30-11.00	BREAK	
11.00-12.00	Energy and related temperature variation assessment for quantitative damage analysis of various materials: application for fatigue and fracture mechanics	Umberto Galietti
12.00-13.00	Estimating the intrinsic dissipation using the second harmonic of the temperature signal	Mauro Ricotta
13.00-14.00	LUNCH	
14.00-15.00	Infrared thermography-based evaluation of the elastic-plastic J-integral to correlate fatigue crack growth data of a stainless steel	Giovanni Meneghetti
15.00-16.00	Case studies: ▪ Active Thermography for welded joints ▪ Active Thermography for weld microstructure characterization	Luca Santoro
16.00-17.00	Alternative methods for estimation of fatigue life via IR thermography	Martin Matušů
17.00-18.00	Design and Monitoring of Cycloidal Gearboxes: Architecture, Power Losses, Thermal Modeling, and Infrared Thermography Analysis	Lorenzo Maccioni

Friday February 21st 2025 – Room 17b

Lecture		Speaker
8.30-9.30	Case studies:	Luca Corsaro
	■ Characterization of mechanical fatigue damage by means of Passive and Active Thermographic techniques.	
	■ Fatigue limit estimation on mechanical components by means of Passive Thermography.	
	■ Characterization of effects of surface treatments on mechanical materials and components by means of Active Thermography.	
	■ Diffusivity and conductivity measurements by means of Active Thermography.	
9.30-10.30	Laboratory activity	
10.30-11.00	BREAK	
11.00-13.00	Laboratory activity	
13.00-13.30	BREAK	
13.30-14.30	Final test	



Speakers contact

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