

Work Package 6: Evaluation and Tuning

Gerd Bitsch, Fraunhofer ITWM, Kaiserslautern

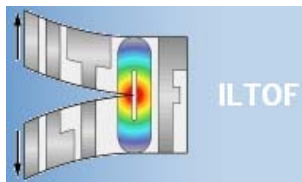
Leonardo ILTOF Project

Fifth Meeting – October 15, 2008

NH Laguna Palace Hotel

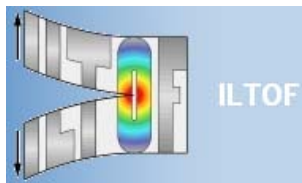
Venice Mestre, Italy

<http://nhlagunapalace.hotelinvenice.com/>



ILTOF e-courses and publishing in 2008

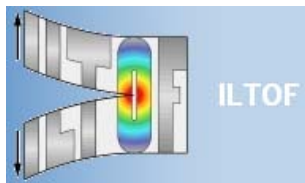
ILTOF01 - Fracture mechanics and complexity sciences	March
ILTOF02 - Fundamentals in linear elastic fracture mechanics	June
ILTOF03 - Advanced applications of nonlinear crack models	June
ILTOF04 - Miscellanea	July
ILTOF05 - Structural damage mechanisms interpreted by acoustic emission	
ILTOF06 - Application of fracture mechanics, fatigue and creep principles to avoid or predict failure in engineering problems	September
ILTOF07 - Applications of the Finite Elements Method to Fracture Mechanics	October
ILTOF08 - Concepts of fracture mechanics	
ILTOF09 - Statistical methods in fatigue testing	September






Number of login accounts created vs. Received questionnaires

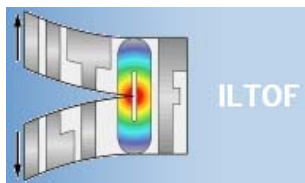
Country	Iltof 01	Iltof 02	Iltof 03	Iltof 04	Iltof 05	Iltof 06	Iltof 07	Iltof 08	Iltof 09
Australia	2	1							
India	5	2	2	2					
Italy	2								
Canada	1								
Germany	2	2							
Poland	7								
USA	1								
Turkey	75								
Portugal	1								
Senegal	1								
Sum login accounts	97	7	2	2					
Received questionnaires	6	6	4	2		2			2

In total 22 fully filled questionnaires (3 uncompleted)







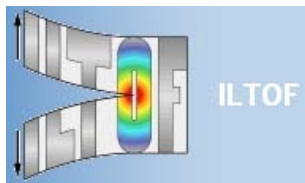
1. Are you new to the fracture mechanics – structural integrity topic or already trained- expert of the matter?

		Response Percent	Response Count
new		60 %	15
trained		36%	9
Expert		4%	1
		Answered questions: 25 Skipped questions: 0	






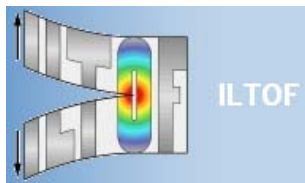
You are...

		Response Percent	Response Count
student		60	15
professor / trainer		4	1
employee / mangager in the industry		32	8
self-employed		0	0
none of the above (PhD student)		4	1
		Answered questions: 25 Skipped questions: 0	



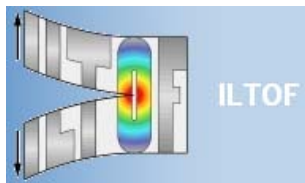
Your level of higher education (education after age 18)

		Response Percent	Response Count
No higher education		0	0
Technical degree		0	0
University degree		24	6
University master degree		44	11
Ph. D. / second level master degree		32	8
		Answered questions: 25 Skipped questions: 0	



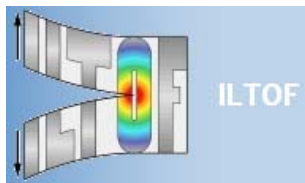
Your proficiency in English

		Response Percent	Response Count
excellent /native language		28	7
very good		60	15
good		12	3
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 25 Skipped questions: 0	





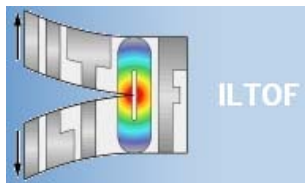
Which course did you attend?

	Response Percent	Response Count
Fracture mechanics and complexity sciences	27,3	6
Fundamentals in linear elastic fracture mechanics	27,3	6
Advanced applications of nonlinear crack models	18,2	4
Miscellanea	9,1	2
Application of fracture mechanics, fatigue and creep principles to avoid or predict failure in engineering problems	9,1	2
Statistical methods in fatigue testing	9,1	2
	Answered questions: 22 Skipped questions: 3	

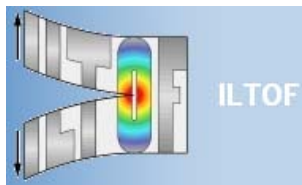


Did you complete the course?

		Response Percent	Response Count
Yes		95,5	21
No	 (Why? → Programm and Plug-In installation took to long / Statistic course)	4,5	1
		Answered questions: 22 Skipped questions: 3	



ILTOF course 1: Fracture mechanics and complexity sciences



Fracture mechanics and complexity sciences

•**Author:**

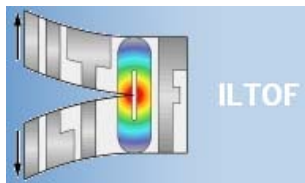
Prof. Dr. Alberto Carpinteri, Chair of Structural Mechanics, Politecnico di Torino

•**Addressee:**

The course is addressed to Master and Ph.D. students, post-doctoral fellows, young researchers, specialists in Fracture Mechanics working in the industry.

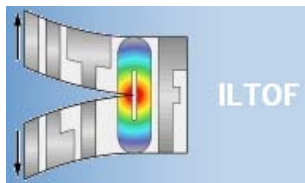
•**Aim:**

The course intends to provide the fundamental concepts of Nonlinear Fracture Mechanics as well as of Fractal Fracture Mechanics.





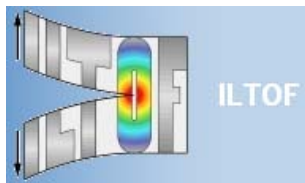
Diposition of the course

1. Crackling, brittle ruptures and Catastrophe Theory
2. Instability phenomena (snap-back and snapthrough) in fibrereinforced materials
3. Period doubling and deterministic chaos in the vibration of cracked elements
4. Multi-scale and fractal character of the internal material structure
5. Renormalisation groups and scaling laws for stress, deformation and strain energy density
6. Multifractal scaling laws for tensile strenght and fracture energy
7. Fractional calculus and static-kinematic duality in the mechanics of fractal media
8. Acoustic emission and critical phenomena in structural and seismic engineering


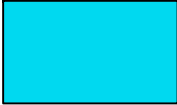


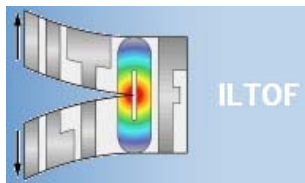
Your overall level of satisfaction: was the course “Fracture mechanics and complexity sciences” useful?

		Response Percent	Response Count
excellent		50	3
very good		17	1
good		0	0
acceptable		33	2
poor		0	0
very poor		0	0
		Answered questions: 6	Skipped questions: 0







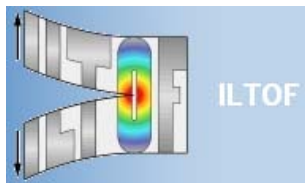
If you are new to the fracture mechanics / structural integrity topic your interest in the topic is:

		Response Percent	Response Count
increased		80	4
decreased		0	0
do not know		20	1
		Answered questions: 5 Skipped questions: 1	






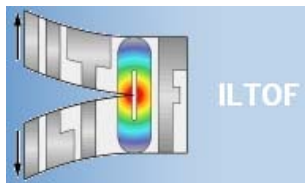
Please evaluate the impact of the course on your activity / knowledge:

		Response Percent	Response Count
excellent		50	3
very good		0	0
good		17	1
acceptable		17	1
poor		17	1
very poor		0	0
		Answered questions: 6 Skipped questions: 0	






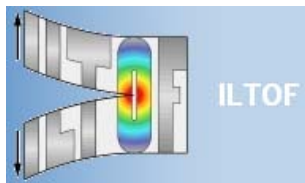
Was the explanation clear?

		Response Percent	Response Count
excellent		50	3
very good		17	1
good		0	0
acceptable		33	2
poor		0	0
very poor		0	0
		Answered questions: 6 Skipped questions: 0	






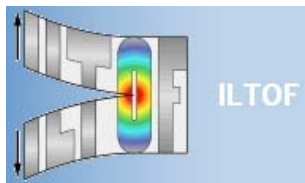
Overall evaluation of the course material provided:

		Response Percent	Response Count
excellent		50	3
very good		0	0
good		17	1
acceptable		33	2
poor		0	0
very poor		0	0
		Answered questions: 6 Skipped questions: 0	

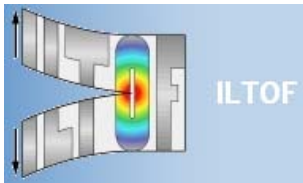


The examples provided in the lectures are:

		Response Percent	Response Count
excellent		50	3
very good		17	1
good		33	2
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 6 Skipped questions: 0	



ILTOF course 2: Fundamentals in linear elastic fracture mechanics



Fundamentals in linear elastic fracture mechanics

•**Author:**

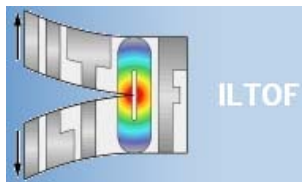
Prof. Dr. Alberto Carpinteri, Chair of Structural Mechanics, Politecnico di Torino

•**Addressee:**

The course is addressed to Master and Ph.D. students, post-doctoral fellows, young researchers, specialists in Fracture Mechanics working in the industry.

•**Aim:**

The course intends to provide the fundamental concepts of Linear Elastic Fracture Mechanics. A widening of knowledge is intended towards brittle fracture phenomena and microcracking processes.



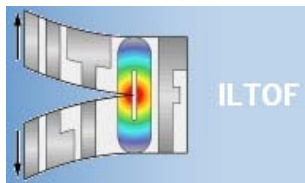
Disposition of the course

1. Griffith's Theory
2. Westergaard's method of complex potentials
3. Williams' method of series expansion
4. Irwin's fundamental relationship
5. Mixed Mode fracture criteria
6. Crack tip plastic zone
7. Brittleness number and size-scale transition




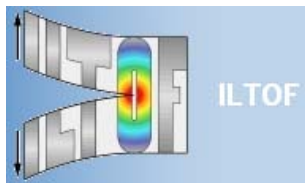
Your overall level of satisfaction: was the course “Fundamentals in linear elastic fracture mechanics” useful?

		Response Percent	Response Count
excellent		50	3
very good		17	1
good		33	2
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 6 Skipped questions: 0	






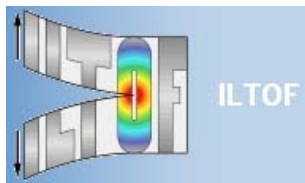
If you are new to the fracture mechanics / structural integrity topic your interest in the topic is:

		Response Percent	Response Count
increased		100	5
decreased		0	0
do not know		0	0
		Answered questions: 5 Skipped questions: 1	





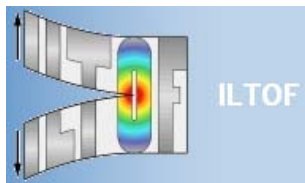
Please evaluate the impact of the course on your activity / knowledge:

		Response Percent	Response Count
excellent		50	3
very good		17	1
good		33	2
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 6	Skipped questions: 0





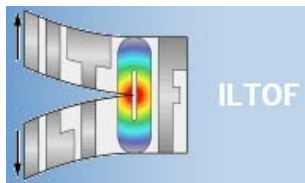
Was the explanation clear?

		Response Percent	Response Count
excellent		50	3
very good		0	0
good		50	3
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 6 Skipped questions: 0	



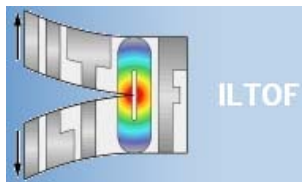
Overall evaluation of the course material provided:

		Response Percent	Response Count
excellent		50	3
very good		0	0
good		33	2
acceptable		17	1
poor		0	0
very poor		0	0
		Answered questions: 6 Skipped questions: 0	

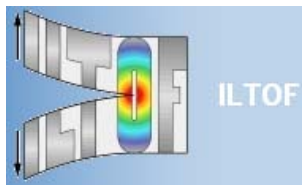


The examples provided in the lectures are:

		Response Percent	Response Count
excellent		40	2
very good		40	2
good		20	1
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 5 Skipped questions: 1	



ILTOF course 3: Advanced applications of nonlinear crack models



Advanced applications of nonlinear crack models

- **Author:**

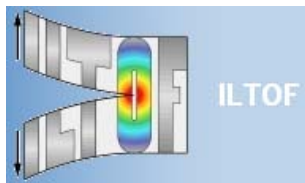
Dr. Ing. Marco Paggi, Assistant Professor of Structural Mechanics, Politecnico di Torino, Dept. of Structural Engineering and Geotechnics

- **Addressee:**

The course is addressed to Master and Ph.D. students, post-doctoral fellows, young researchers, specialists in Fracture Mechanics working in the industry.

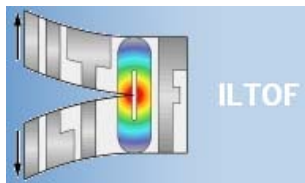
- **Aim:**

The course intends to provide an overview of advanced engineering applications of nonlinear crack models widely used in Fracture Mechanics, namely the *cohesive crack model* and the *bridged crack model*.



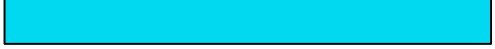


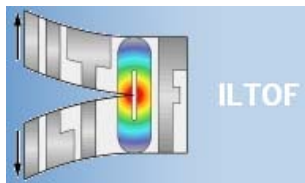
Disposition of the course

1. Modelling Mode I cohesive crack propagation using the Finite Element Method
2. Advanced applications of the cohesive crack model in Mode Mixity
3. Bridged crack model: multiple reinforcements
4. Advanced applications of the bridged crack model



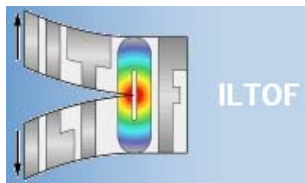
Your overall level of satisfaction: was the course “Advanced applications of nonlinear crack models” useful?

		Response Percent	Response Count
excellent		25	1
very good		25	1
good		50	2
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 4	Skipped questions: 0





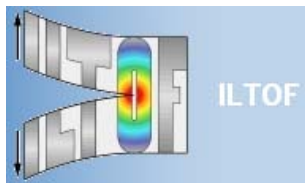
If you are new to the fracture mechanics / structural integrity topic your interest in the topic is:

		Response Percent	Response Count
increased		100	4
decreased		0	0
do not know		0	0
		Answered questions: 4 Skipped questions: 0	





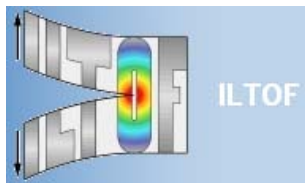
Please evaluate the impact of the course on your activity / knowledge:

		Response Percent	Response Count
excellent		75	3
very good		0	0
good		25	1
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 4	Skipped questions: 0





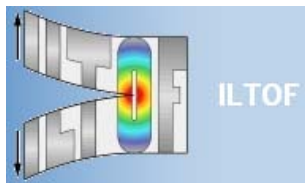
Was the explanation clear?

		Response Percent	Response Count
excellent		25	1
very good		50	2
good		25	1
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 4 Skipped questions: 0	



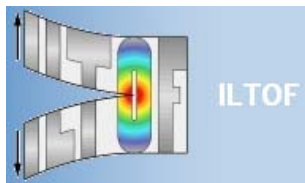
Overall evaluation of the course material provided:

		Response Percent	Response Count
excellent		75	3
very good		0	0
good		25	1
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 4 Skipped questions: 0	

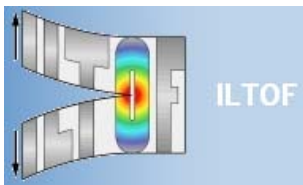


The examples provided in the lectures are:

		Response Percent	Response Count
excellent		50	2
very good		25	1
good		0	0
acceptable		25	1
poor		0	0
very poor		0	0
		Answered questions: 4 Skipped questions: 0	



ILTOF course 4: Miscellanae



MISCELLANEA

•**Author:**

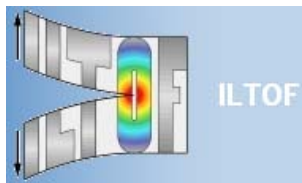
Dr. Ing. Marco Paggi, Assistant Professor of Structural Mechanics, Politecnico di Torino, Dept. of Structural Engineering and Geotechnics

•**Addressee:**

The course is addressed to Master and Ph.D. students, post-doctoral fellows, young researchers, specialists in Fracture Mechanics working in the industry.

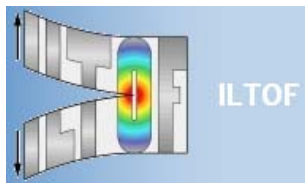
•**Aim:**

- provide an overview of industrial applications based on linear elastic fracture mechanics theories
- introduce statistical approaches used in fracture mechanics
- show the main experimental techniques for the fracture mechanics characterization of ductile and quasi-brittle materials.





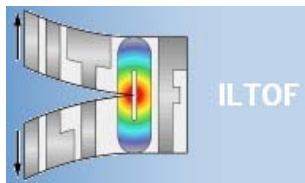
Disposition of the course

1. Numerical methods for linear elastic fracture mechanics: modelling of stress-singularities and examples of crack propagation
2. Experimental determination of fracture mechanics parameters for ductile and quasi-brittle materials
3. Weibull theory and probability approaches to material strength
4. Size-scale effects on tensile strength: statistical distribution of defects.




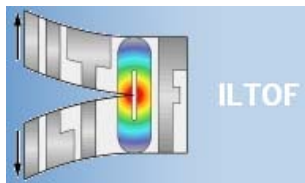
Your overall level of satisfaction: was the course “Miscellanea” useful?

		Response Percent	Response Count
excellent		50	1
very good		0	0
good		50	1
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 2 Skipped questions: 0	





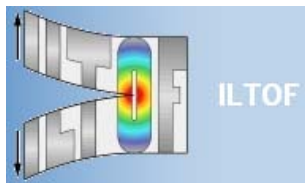
If you are new to the fracture mechanics / structural integrity topic your interest in the topic is:

		Response Percent	Response Count
increased		100	2
decreased		0	0
do not know		0	0
		Answered questions: 2 Skipped questions: 0	





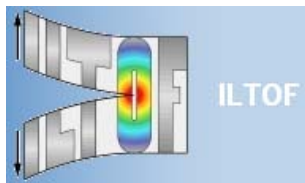
Please evaluate the impact of the course on your activity / knowledge:

		Response Percent	Response Count
excellent		50	1
very good		50	1
good		0	0
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 2 Skipped questions: 0	





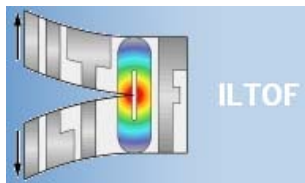
Was the explanation clear?

		Response Percent	Response Count
excellent		50	1
very good		50	1
good		0	0
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 2 Skipped questions: 0	





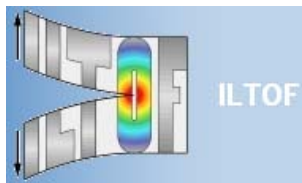
Overall evaluation of the course material provided:

		Response Percent	Response Count
excellent		50	1
very good		0	0
good		50	1
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 2 Skipped questions: 0	

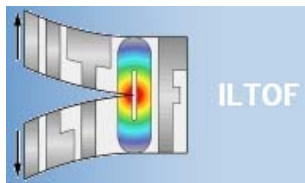


The examples provided in the lectures are:

		Response Percent	Response Count
excellent		50	1
very good		50	1
good		0	0
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 2	Skipped questions: 0



ILTOF course 6: Application of fracture mechanics, fatigue and creep principles to avoid or predict failure in engineering problems



Application of fracture mechanics, fatigue and creep principles to avoid or predict failure in engineering problems

•Authors:

The course is taught by the several lecturers from the Kielce University of Technology and from the Silesian University of Technology:

- Andrzej Neimitz
- Jerzy Okrajni
- Ihor Dzioba
- Jarosław Gałkiewicz

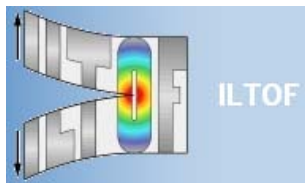
•Aim:

The objectives of this course is to demonstrate the way the fracture mechanics, fatigue and creep principles can be used in the engineering applications.



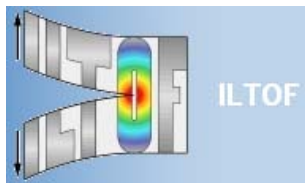
Disposition of the course

1. Introduction
2. Fracture Modulus
3. Fatigue Modulus
4. Creep Modulus
5. Case Studies



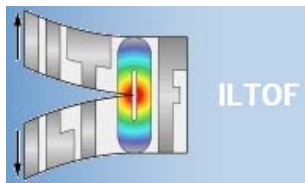
Your overall level of satisfaction: was the course “Application of fracture mechanics, fatigue and creep principles to avoid or predict failure in engineering problems” useful?

		Response Percent	Response Count
excellent		100	2
very good		0	0
good		0	0
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 2 Skipped questions: 0	




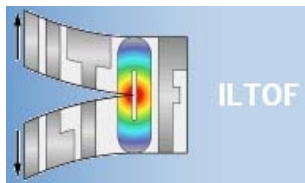
If you are new to the fracture mechanics / structural integrity topic your interest in the topic is:

		Response Percent	Response Count
increased		100	2
decreased		0	0
do not know		0	0
		Answered questions: 2	Skipped questions: 0




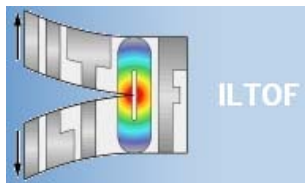
Please evaluate the impact of the course on your activity / knowledge:

		Response Percent	Response Count
excellent		100	1
very good		0	0
good		0	0
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 1 Skipped questions: 1	




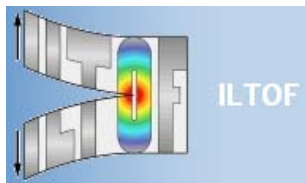
Was the explanation clear?

		Response Percent	Response Count
excellent		100	2
very good		0	0
good		0	0
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 2 Skipped questions: 0	




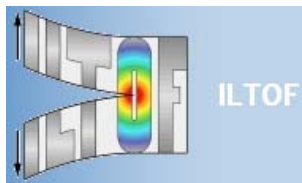
Overall evaluation of the course material provided:

		Response Percent	Response Count
excellent		100	2
very good		0	0
good		0	0
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 2 Skipped questions: 0	

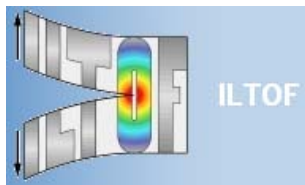


The examples provided in the lectures are:

		Response Percent	Response Count
excellent		100	1
very good		0	0
good		0	0
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 1 Skipped questions: 1	



ILTOF course 9: Statistical methods in fatigue testing



Statistical methods in fatigue testing

•Authors:

The course is taught by the several lecturers from the Fraunhofer Institute for Industrial and Financial Mathematics (ITWM):

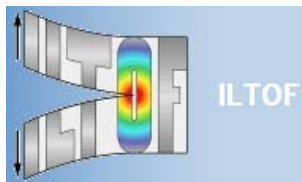
Dr. Klaus Dreßler, Dr. Michael Speckert, Dipl.-Math. Sascha Feth, Dipl.-Math. Nikolaus Ruf

•Addressee:

The course is aimed at researchers and engineers working in the field of durability testing, who want to get a better understanding of the capabilities and limitations of statistics with regards to their subject.

•Aim:

The course intends to provide an introduction to statistical methods in the context of durability testing, in particular high-cycle fatigue.



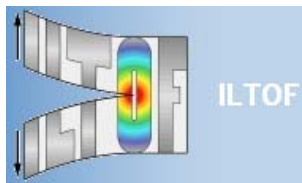
Disposition of the course

Module 1:

- Basic Methods in Statistics, Part I
- Basic Methods in Statistics, Part II

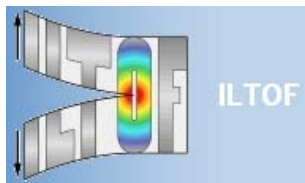
Module 2:

- Design and Analysis of Fatigue Experiments, Part I
- Design and Analysis of Fatigue Experiments, Part II



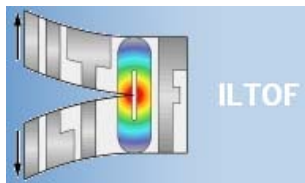
Your overall level of satisfaction: was the course “Statistical methods in fatigue testing” useful?

		Response Percent	Response Count
excellent		100	1
very good		0	0
good		0	0
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 1	Skipped questions: 1




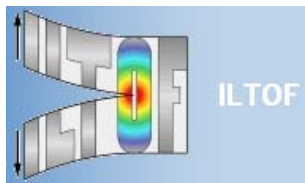
If you are new to the fracture mechanics / structural integrity topic your interest in the topic is:

		Response Percent	Response Count
increased		100	1
decreased		0	0
do not know		0	0
		Answered questions: 1 Skipped questions: 1	




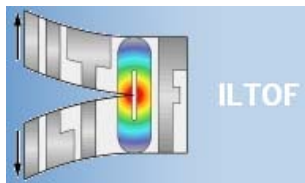
Please evaluate the impact of the course on your activity / knowledge:

		Response Percent	Response Count
excellent		100	1
very good		0	0
good		0	0
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 1 Skipped questions: 1	




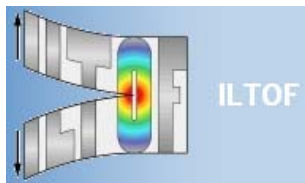
Was the explanation clear?

		Response Percent	Response Count
excellent		100	1
very good		0	0
good		0	0
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 1 Skipped questions: 1	




Overall evaluation of the course material provided:

		Response Percent	Response Count
excellent		100	1
very good		0	0
good		0	0
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 1 Skipped questions: 1	

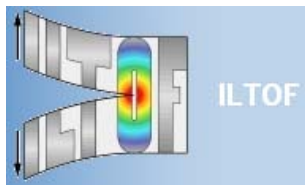


The examples provided in the lectures are:



		Response Percent	Response Count
excellent		100	1
very good		0	0
good		0	0
acceptable		0	0
poor		0	0
very poor		0	0
		Answered questions: 1 Skipped questions: 1	

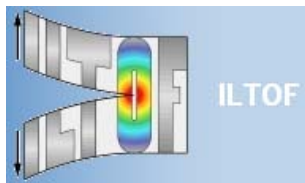


Overall result





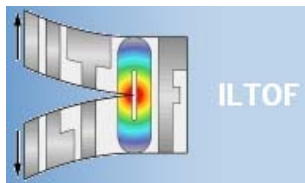
Your overall level of satisfaction: was the course useful?

		Response Percent	Response Count
excellent		52	11
very good		14	3
good		24	5
acceptable		10	2
poor		0	0
very poor		0	0
		Answered questions: 21	Skipped questions: 4








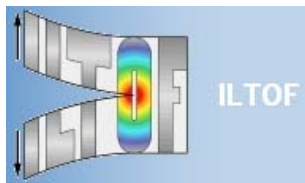
If you are new to the fracture mechanics / structural integrity topic your interest in the topic is:

		Response Percent	Response Count
increased		95	18
decreased		0	0
do not know		5	1
		Answered questions: 19 Skipped questions: 6	







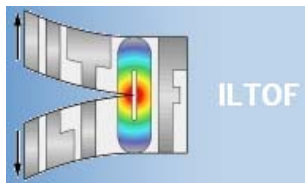
Please evaluate the impact of the course on your activity / knowledge:

		Response Percent	Response Count
excellent		62	13
very good		10	2
good		19	4
acceptable		4,5	1
poor		4,5	1
very poor		0	0
		Answered questions: 21 Skipped questions: 4	



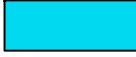


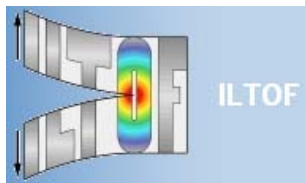
Was the explanation clear?

		Response Percent	Response Count
excellent		52	11
very good		19	4
good		19	4
acceptable		10	2
poor		0	0
very poor		0	0
		Answered questions: 21 Skipped questions: 4	







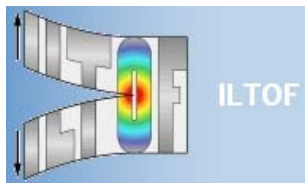
Overall evaluation of the course material provided:

		Response Percent	Response Count
excellent		62	13
very good		0	0
good		24	5
acceptable		14	3
poor		0	0
very poor		0	0
		Answered questions: 21 Skipped questions: 4	



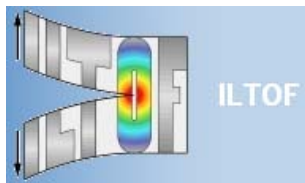
The examples provided in the lectures are:

		Response Percent	Response Count
excellent		52	11
very good		19	4
good		19	4
acceptable		10	2
poor		0	0
very poor		0	0
		Answered questions: 19 Skipped questions: 6	

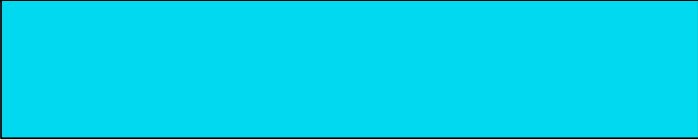



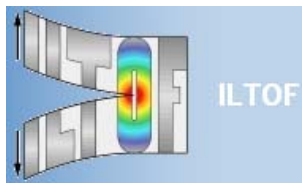
Comments on the course material provided:

Course:	Comment:	Response Count
Fracture mechanics and complexity sciences	Some materials are in Italian → makes understanding difficult	1
Fundamentals in linear elastic fracture mechanics	Print versions would be good (white background) Fonts/symbols in some diagrams too tiny	1
Advanced applications of nonlinear crack models	Lecture very impressive and quiet clear in concepts	1
Miscellanea	Some figures upside down, probably not scanned correctly	1
	Answered questions: 4 Skipped questions: 21	

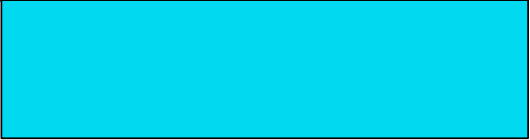



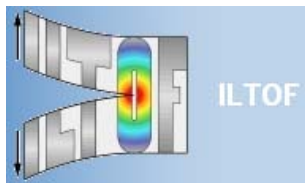
Did you use the other facilities of the Itof website (library, the links...)?

		Response Percent	Response Count
Yes		73	16
No		27	6
		Answered questions: 22 Skipped questions: 3	



Did you add material to the Itof website (library items, pages...)?

		Response Percent	Response Count
Yes		55	12
No		45	10
		Answered questions: 22	Skipped questions: 3

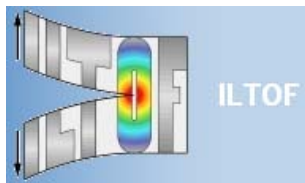


Reasons for not using the other facilities:

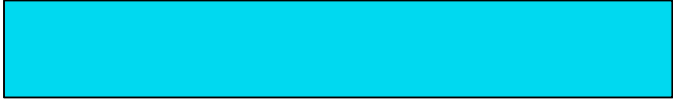

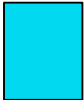
- Limited time (4x)
- References already given in lessons (1x)

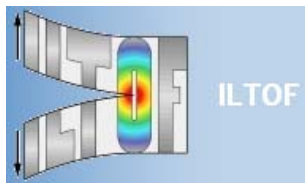
Reasons for not adding material:

- Limited time (5x)
- I do not have the required expertise (5x)





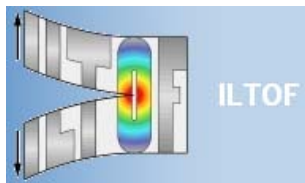
Are you interested in engaging a discussion with peers (other students)

		Response Percent	Response Count
Yes		77	17
No		14	3
Don't know		9	2
		Answered questions: 22 Skipped questions: 3	



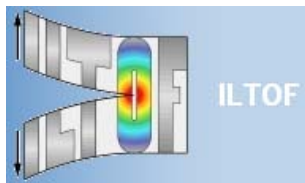
Are you interested in engaging a discussion with lecturers?

		Response Percent	Response Count
Yes		95,5	21
No		4,5	1
Don't know		0	0
		Answered questions: 22 Skipped questions: 3	



Additional fracture mechanics / structural integrity courses you would like to attend:

- Applications of the Finite Element Method in Fracture Mechanics (3x)
- A course on structural fatigue (1x)
- A course on crack propagation under cyclic loads (1x)
- All lectures on ILTOF are interesting (1x)



Suggestion for further improvements:

- Discussion forum (students and lecturers) to clear doubts
- Slides should be downloadable

