



Master of Science in  
**Computational Mechanics**  
An International Course

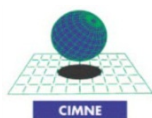


# Continuum Mechanics

## Introduction

C. Agelet de Saracibar

ETS Ingenieros de Caminos, Canales y Puertos, Universidad Politécnica de Cataluña (UPC), Barcelona, Spain  
International Center for Numerical Methods in Engineering (CIMNE), Barcelona, Spain



# Professors

## Prof. Carlos Agelet de Saracibar

Dr. Ingeniero de Caminos, Canales y Puertos

Professor of Continuum Mechanics and Structural Analysis

Department of Civil and Environmental Engineering

ETS Ingenieros de Caminos, Canales y Puertos

Universidad Politécnica de Cataluña, UPC BarcelonaTech

International Center for Numerical Methods in Engineering (CIMNE)

Office 104 B, Building C1, Campus Norte, UPC BarcelonaTech

Gran Capitán s/n

E-08034 Barcelona, Spain

T +34 93 401 6495

F +34 93 401 1048

E [agelet@cimne.upc.edu](mailto:agelet@cimne.upc.edu)

W [ageletdesaracibar.blogspot.com.es](http://ageletdesaracibar.blogspot.com.es)

# On-campus Schedule 2016-2017

MMNE+MSCM

## FIRST TERM SCHEDULE 2016-2017

September 2016														October 2016														November 2016														December 2016													
8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00													
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COLOUR	CODE	First Year	Room Number
		The Finite Element Method	FEM A1-105
		Continuum Mechanics	CM A1-105
		Advanced Fluid Mechanics	AFM A1-102
		Num. Meth. PDEs	PDE D1-101
		Communication Skills 1	CS A1-105
		Entrepreneurship	ENT A1-105

Attention: 14th and 21th October - Room: A2 2

COLOUR	CODE	Second Year	Room Number
		Advanced Discretization Methods	ADM A1-105
		Computational Mechanics Tools	CMT A1-105
		Communication Skills 2	CS A1-105

**On-campus Classes Schedule:**  
 Dates: 22 Sep - 7 Oct | M-F | 15:00-18:00  
 Room: A1-105

Dates: 14, 21 Oct | F | 15:00-18:00  
 Room: A2-205

# Methodology

## Continuum Mechanics: On-campus Course

- Erasmus Mundus Master of Science in Computational Mechanics
- Master in Numerical Methods in Engineering
- Master in Civil Engineering
- Master in Structural and Construction Engineering

## Continuum Mechanics: On-line Course

- Master in Numerical Methods in Engineering

# Methodology

## Continuum Mechanics: On-campus Course

- Language: english
- Intensive course:
  - 22-09-2016 to 07-10-2016 | M-F | 15:00-18:00 | Room A1 105
  - 14-10-2015 & 21-10-2016 | F | 15:00-18:00 | Room A2 205
- Mandatory class attendance
- Lecture notes in pdf and videos at the Master website
- Interactive lectures in ppt
- Interactive class assignments (CA) and Homeworks (HW), some of them will be collected and evaluated
- Open book final exam (FE) on 3 Nov 2016 from 11:00-13:30
- Final mark: 30% (CA+HW) + 70% FE

# Methodology

## Continuum Mechanics: On-line Course

- Video recording of lectures available at the Master website
- Lecture notes in pdf available at the Master website
- Class Assignments (CA) and Homeworks (HW). Solutions provided for autoevaluation. Not to be collected or evaluated
- Open book final exam (FE) on 3 Nov 2016 from 11:00-13:30
- Final mark: 100% FE (only for students officially registered to the on-line version of the Master on Numerical Methods)

# Methodology

## Continuum Mechanics: Final Exam

- **Open book** final exam
- The exam will take place on **3 Nov 2016 from 11:00-13:30**
- Exam will consists of **2 problems + 1 question**, similar to the ones done during the course
- Maximum time allowed: **2.5 hours**
- On-campus students: **Room A2 102**
- On-line students: Exams will be sent by email, being available at the starting of the evaluation. At the end of the exam, students must scan and send the exam by email. On-line students being in Barcelona may do the exam on the campus

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## Continuum Mechanics: Library

Recibidos (10) - carlos.ag... x f Yuja x C. Agelet de Saracibar: Co x www.cimne.com/cdl1/Te x

www.cimne.com/cdl1/Temas/TemasHome

Master on Numerical Methods in Engineering

OFFICIAL MASTER of UPC Barcelona Tech

Monday, September 22, 2014 User: Carlos Agelet de Saracibar

CIMNE Virtual » Courses » Master on Numerical Methods in Engineering (UPC) » Fall Semestre 1 » Continuum Mechanics

**Master on Numerical Methods in Engineering (UPC)**

Continuum Mechanics

Fall Semestre 1

Continuum Mechanics

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- Chapter 5. Stresses
- Chapter 6. Balance Lav

**Chapter 1. Tensor Algebra**

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**Continuum Mechanics**

**Chapter 1**

**Introduction to Vectors and Tensors**

ES 22:14 22/09/2014



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- Chapter 8. Plasticity
- Chapter 9. Fluid Mecha
- Chapter 10. Ideal Fluid
- Chapter 11. Newtonian
- Chapter 12. Variationa
- Appendix 1
- Video Lectures

### Chapter 1. Tensor Algebra

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## Continuum Mechanics

### Chapter 1

#### Introduction to Vectors and Tensors

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- Chapter 7. Linear Elasticity
- Chapter 8. Plasticity
- Chapter 9. Fluid Mechanics
- Chapter 10. Ideal Fluids
- Chapter 11. Newtonian Fluids
- Chapter 12. Variational Principles

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## Continuum Mechanics

- Chapter 1. Introduction to Vectors and Tensors (3h 30m)
- Chapter 2. Motions (4h 30m)
- Chapter 3. Strains (7h)
- Chapter 4. Infinitesimal Strains (3h)
- Chapter 5. Stresses (1h)
- Chapter 6. Balance Laws (9h)
- Chapter 7. Linear Elasticity (6h)
- Chapter 8. Plasticity
- Chapter 9. Fluid Mechanics (30 m)
- Chapter 10. Ideal Fluids
- Chapter 11. Newtonian Fluids (4h)
- Chapter 12. Variational Principles (2h)

# References

## Reference Books

- **G.A. Holzapfel**, Nonlinear Solid Mechanics: A Continuum Approach for Engineering, Wiley, 2000
- **O. Gonzalez, A.M. Stuart**, A first course in Continuum Mechanics, Cambridge Texts in Applied Mechanics, 2008
- **J. Bonet, R. Wood**, Nonlinear Continuum Mechanics for Finite Element Analysis, Cambridge University Press, 1997
- **J. Marsden, T.J.R. Hughes**, Mathematical Foundations of Elasticity, Courier Dover Publications, 1994
- **C. Truesdell, W. Noll**, The Nonlinear Field Theories of Mechanics, Springer-Verlag, 1992
- **J. Oliver, C. Agelet de Saracibar**, Mecánica de Medios Continuos para Ingenieros, Ediciones UPC, 2002