cdio™ European Regional Meeting 2016

LINEAR MODELLING

A *CDIO* PROOF ONLINE ENGINEERING COURSE

JANUARY 26, 2016

DR. SONELL SHROFF

TU Delft

THE COURSE AND I

Dr. Sonell Shroff

Assistant Professor

Aerospace Structures and Materials

Designing and teaching an online course!

2012

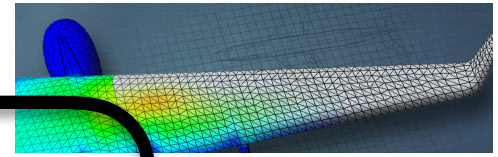
Computational Fluid and Solid Mechanics

BSc to MSc

Only FEM*

Theory and Practical

2013



Linear Modelling

MSc Mandatory course

Only FEM*

Theory and Practical

**2013 Blended Online Learning

**2014 First Purely Online Students

*FEM: Finite Element Method

THE USP

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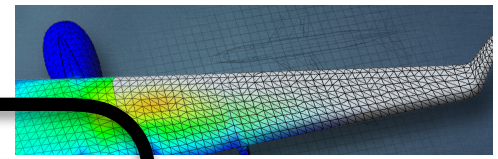

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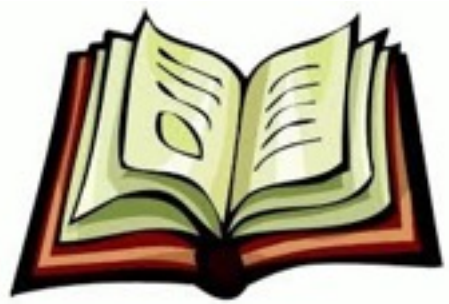
2 hour theory lecture

conceive/develop



2 hour practical session

implement/operationalise

*Theory lectures are actual recorded classroom sessions

THE USP

Linear Modelling

Learning Objectives

*Mathematical derivations

*Solving numerical problems

*Setting up practical problems using own code/ commercial software

*Interpret results from fe analysis

*Verify/Validate numerical results vs literature or experiments

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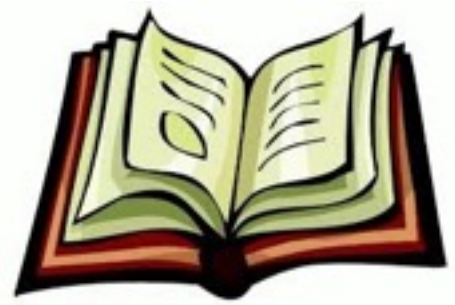

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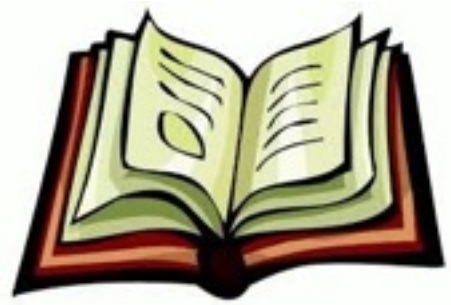


*Setting up practical problems using own code/ commercial software

CONCEPTION AND DEVELOPMENT

Ingredients

*Fundamentals

*Basic building blocks

*Hands-on problem solving in the classroom/virtually

*Everything that can be solved reasonably is handwritten!

*Extension to problems are discussed “online”

Experiences!

High level of preparation

Appreciation of discussion

Allowing sufficient time for discussion

Frustration of not joining in live

Pace

Time is off the essence!

Feeling of being part of the group

IMPLEMENTATION AND OPERATIONALISE

Ingredients

*Real life structural problems

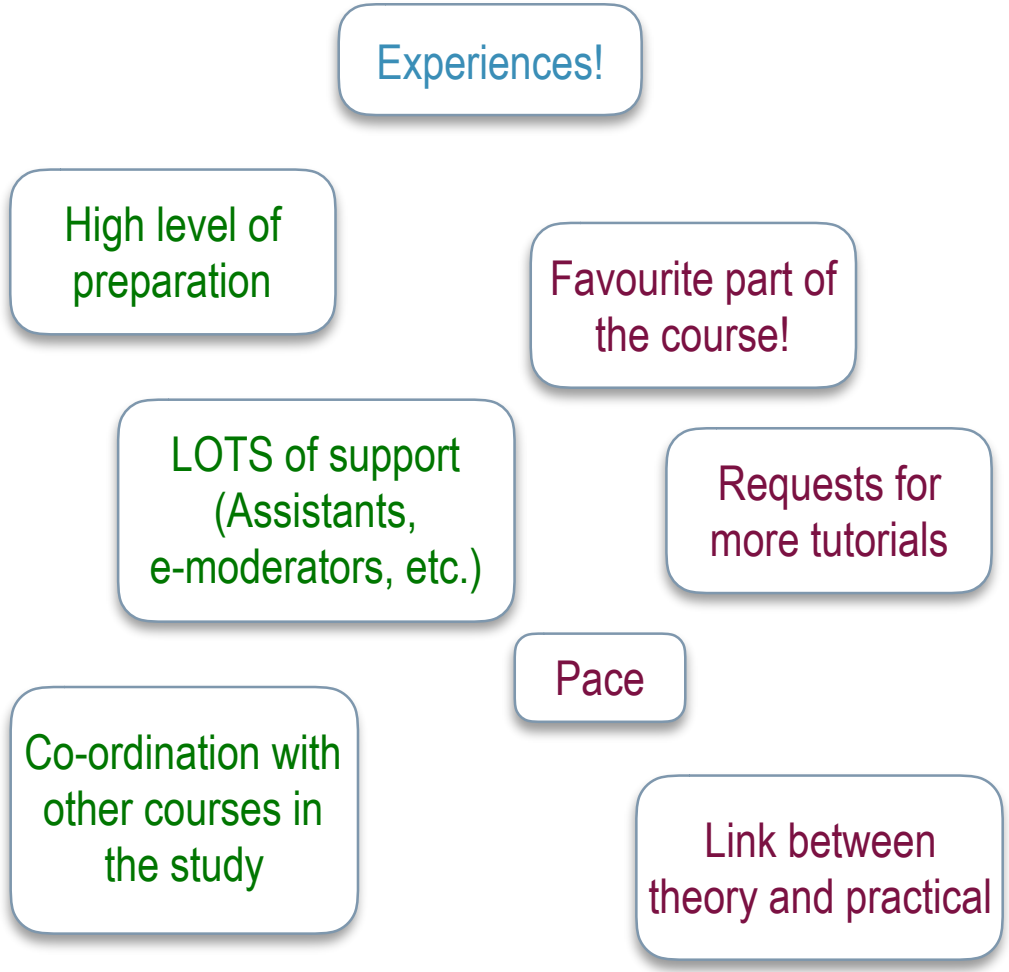
*Physical interpretation before numerical setup

*Choice of multiple software (Closed and Open source)

*Tutorial videos with sufficient explanation and reasoning

*Aerospace related assignments

*Long running assignments for feedback and improvement



HIGHER EDUCATION FOR ENGINEERS

Motivations

*MSc thesis ready

*PhD ready

*Industry “ready”

*Broader scope for jobs

*Increased understanding of physical meaning of simulations

*Create your own tools

*Use ready tools more efficiently

Experiences!

Lower effort to get students started

Helps with job upgrade

Short, heavily loaded course suited for dedicated students

Motivates to follow full MSc

Too fast and short for engineering professionals

Faster problem recognition

Link between theory and practical

SUCCESS AND FAILURE

Still a long way to go….

*10 paid fully online students in 2015

*Attracting professionals from Boeing, NCAIR (India), etc.

*PhD students from all over EU

*Students spread over the entire world

*Practical sessions not video recorded/ live

*No exam strategy is highly appreciated

*10% drop-out rate

Experiences!

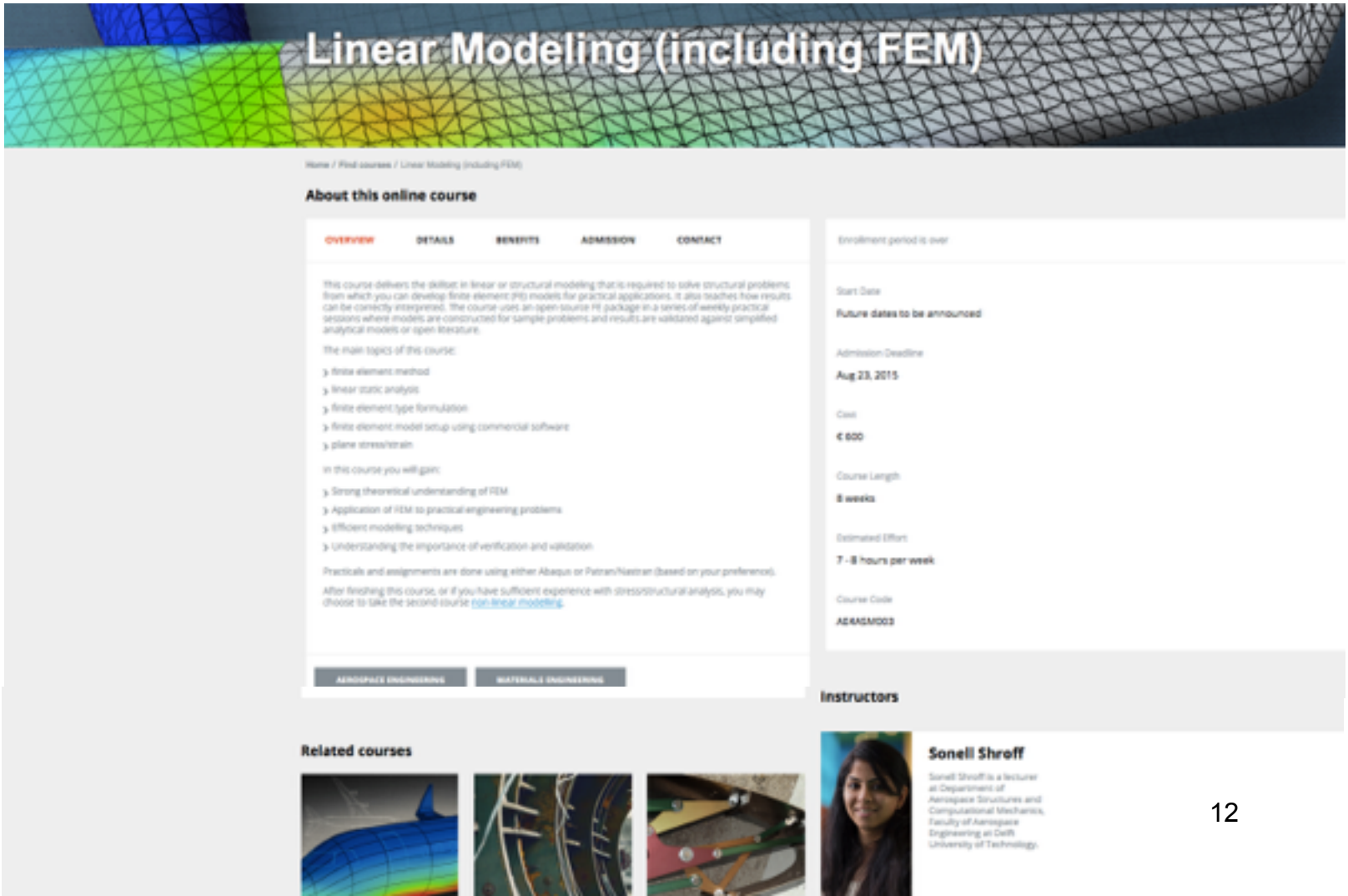
Personalise experience

Assignments with variable deadlines and questions

Intensive e-moderation

INTERESTED IN LEARNING MORE?

https://online-learning.tudelft.nl/courses/linear-modeling-fem/



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