UCL Université catholique de Louvain

LMECA2195

2014-2015

Gasdynamics and reacting flows

5.0 credits	30.0 h + 30.0 h	2q

Teacher(s) :	Papalexandris Miltiadis ;
Language :	Français
Place of the course	Louvain-la-Neuve
Inline resources:	> http://icampus.uclouvain.be/claroline/course/index.php?cid=LMECA2195 Homework announcements. Compulsory, available on the site i-campus of the course
Main themes :	Governing equations of compressible flows Steady and unsteady compressible flows in one dimension Steady compressible flows in two and three dimensions Supersonic combustion ' detonations Subsonic combustion - deflagrations, explosions Introduction of multiphase compressible flows
Aims :	With respect to the reference AA of the programme of studies ``Master in Mechanical Engineering", this course contributes to the development and acquisition of the following skills AA1.1, AA1.2, AA1.3 AA2.2, AA2.4, AA2.5 AA3.2, AA3.3 AA4.1, AA4.2, AA4.3, AA4.4 AA5.1, AA5.4, AA5.6 AA6.1, AA6.4 Study of compressible gaseous flows, including supersonic flows. Study of reacting flows in which compressibility effects are deemed important. Presentation of industrial and technological applications. *The contribution of this Teaching Unit to the development and command of the skills and learning outcomes of the programme(s) can be accessed at the end of this sheet, in the section entitled "Programmes/courses offering this Teaching Unit".*
Evaluation methods :	Written exam, with open books and notes. The score on the exam counts for 70% of the overall score on the course. 3 homework assignments. The score on each assignment counts for 10% of the overall score on the course
Teaching methods :	Course lectures Session of exercices
Content :	-- Steady and unsteady compressible flows in one dimension Euler equations, characteristic decomposition, boundary conditions. Simple waves, shock waves. Rankine-Hugoniot relations, shcok formation, Riemman problem. Piston-induced flow. Wave interactions. Viscosity effects. Introduction to numerical methods. -- Steady compressible flows in two and three dimensions Prandtl-Meyer expansion. Supersonic flow around projectiles. Method of characteristics. Oblique shocks. Supersonic combustion -- Detonations. Introduction. Chapman-Jouguet theory. ZND theory. Stability analysis. Multi-dimensional structure. Applications. Subsonic combustion -- Deflagrations. Introduction, balance equations, review of chemical kinetics. Structure of laminar premixed flames. Structure of laminar diffusion flames.
Bibliography :	P.A. Thompson, Compressible Fluid Dynamics, 1988. Compulsory. Additional notes of the course LMECA2195. Compulsory, available on the site i-campus of the course. Homework announcements. Compulsory, available on the site i-campus of the course H.W. Liepmann & mp; A. Roshko, Elements of Gas dynamics, Dover Edition, 1993. Recommended
Cycle and year of study :	> Master [120] in Electro-mechanical Engineering > Master [120] in Mechanical Engineering
Faculty or entity in charge:	MECA