

CT4150	Plastic Analysis of Structures	4
Instructor	Pierre Hoogenboom	
Instructor	Ton Vrouwenvelder	
Education Period	2nd Education Period	
Exam Period	2nd Exam Period, 4th Exam Period	
Course Language	English	
Course Contents	Plastic material behaviour and the consequences for structural behaviour. Incremental computations where the load is gradually increased from zero until the collapse limit (suitable for computer implementation). Upper- and lower-bound approximations (suitable for hand calculations). Discussion on the theory and its application to beams, portals, frames and inplane and laterally loaded plates. Fundamental aspects of yield criteria (Von Mises, Tresca, reinforced concrete). Interaction of bending moment, shear force and normal force. Normality rule. Upper- and lower-bound theorems and deformation capacity.	
Study Goals	After completion of this course you will know how plastic hinges develop in concrete and steel beams. You will understand commonly used material yield criteria and beam interaction diagrams. You will be able to calculate the ultimate load of beams, frames and plates. You will understand redistribution of the force flow in structures and you will understand the limitations of plasticity theory.	
Education Method	lectures	
Course Relations	CT3109, CT5144, CT5142	
Literature and Study Materials	Two lecture books are used. Both can be ordered at www.nextstore.nl Vrouwenvelder, A.C.W.M. and Witteveen, J. "Plastic Analysis of Structures, The plastic behaviour and the calculation of beams and frames subjected to bending", Lecture book Delft University of Technology, March 2003. Vrouwenvelder, A.C.W.M. and Witteveen, J. "Plastic Analysis of Structures, The plastic behaviour and the calculation of plates subjected to bending", Lecture book Delft University of Technology, March 2003.	
Assessment	Written examination, The exam mark is the final mark. It is allowed to use books and notes during the exam.	