Module #	BIOMECHANICS OF SOFT TISSUES			
Informations	Credit Points : ECTS	Workload : 50h	Mode : Elective module	Offered : 2nd semester
Institution in charge	National Technical University of Athens			
Instructor	D. A. Eftaxiopoulos			
Contents	I. Biomechanical topics in soft tissues (Macroscopic models of tissues, interstitium and membranes. Tissue engineering redirected to tumor tissue exploration. Mechanisms of injury of the knee. Water and solid constituents of soft tissues). II. Solids and multi-species mixtures as open systems : a continuum mechanics perspective (Elements of continuum mechanics. Multi-species mixtures as thermodynamically open systems. Anisotropic and conewise elasticity. Hyperelasticity. Poroelasticity. Viscoelasticity. Thermoelasticity. Transfers of mass, momentum, and energy. Waves). III. Electro – chemo - mechanical couplings in tissues with a fixed electrical charge (Directional averaging for fiber-reinforced tissues. Electro – chemo - mechanical couplings. Chemomechanical couplings in articular cartilage. Passive transport in the interstitium and circulation. Coupled transports in tissues with a fixed electrical charge. Effects of the pH on transport and mechanics. Finite element analysis of couplings in the extracellular matrix. Cornea and annulus fibrosus). IV. Growth of biological tissues (Tissue Engineering. Growth of soft tissues. Elastic-growing solids. Elastic-growing mixtures. Solid tumors)			
Examination	Written final examination and optional exercise or little project submission (30% contribution to the final grade for the latter).			
Requirement for examination	None			
Learning outcomes	On successful completion of the course the student will have learned: • How key continuum mechanics concepts are used in constitutive modeling, experimental setups and computational procedures, regarding the study of coupled fields in mixtures of solids and fluids. • Techniques to simulate the mechanical response of several			

	soft tissues (articular cartilage, cornea, annulus fibrosus).