Continuum Mechanics usually considers the theoretical and computational description of standard single-phasic materials in the framework of either solid mechanics, fluid mechanics or gas dynamics. However, growing complexity in material modelling combined with the request of users leads to a growing interest in porous-media mechanics, where porous solid materials with fluid or gaseous pore content are investigated on a macroscopic scale.

Within this framework, the contribution contains the theoretical and numerical framework for the description of geomechanical and biomechanical problems including elastic, elastoplastic and viscoelastic solid behaviour partly combined with electro-active properties, the coupling phenomena of porous solids with pore fluids, no matter if the fluids have to be treated as inert fluids or fluid mixtures.

The numerical procedure is embedded in the PANDAS software, where PANDAS is either used as the solver or as a numerical tool coupled to powerful solvers like Abaqus. Various computational examples are presented to illuminate the possibilities and challenges of porous-media mechanics.