Teaching Calculus and Numerical Analysis using CAS according to Bologna Process

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Lecture Proposal for the TI-Nspire & Derive Strand

ABSTRACT

The objective of this work is designing, experimenting and evaluating a particular proposal for Calculus and Numerical Analysis teaching in university education. We are mainly interested in the teaching of these subjects in engineering schools, following the European Higher Education Area agreements. Our purpose is to show students the close relation between both subjects. This is achieved by facing real problems in engineering which are described by means of a mathematical model and need the use of numerical methods for their practical resolution. We introduce mathematical models that rely on concepts previously studied in Calculus. These models will be by themselves a practical motivation for the definition of those concepts. Usually, the exact resolution of those models by formal calculations is not possible. Thus, the use of numerical methods to obtain approximate solutions is required. This enlightens the need of the Numerical Analysis subject. In fact, both subjects have been merged into one in the new structure of some engineering degrees.

In this lecture, we propose new course materials, computer lab activities and didactical strategies, all of them based on the use of mathematical software such as Matlab, Derive and/or free software.

On the other hand, Moodle e-learning platform provided by the University of Málaga and some other universities in Spain will be a useful tool for the coordination and development of the course. We will encourage the use of this web platform and the integration of the different course materials, activities and other resources in it.

Keywords
Calculus, Numerical Analysis, Bologna process, CAS, web based education.