



Geomatics contents: vertical coordination efforts within a new environmental engineering degree

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We are at the fourth year from starting a new degree in Natural Environmental Engineering (NEED) at the Technical University of Madrid (UPM). After three complete years, almost all the essential courses in the degree have been taught and it is time to summarize and check for any inconsistencies, gaps and overlaps. All the analyses are being carried out within a vertical coordination program that is required according to the rules imposed by the Spanish National Agency for Accreditation and Quality Assessment (ANECA) for official studies at University. Besides, in this case, a vertical coordination effort it is needed since this is a 4-year new degree never given in Spain before. Ideally, we will be able to detect any malfunctioning and make the required changes.

Up to now, coordination efforts have been done in the frame of all the courses within a semester but never in the frame of the whole degree. The former were mainly horizontal coordination works, which have been carried out by six different commissions (one per semester), with the main objective of temporally coordinate teaching activities (including field trips), exams, and deliveries of essays and practical works. However, few efforts have been done in a thematic or vertical sense. The main objectives of the vertical coordination program are: (i) to make a diagnosis of the degree of thematic, the thematic schedule and temporal reliability of all the courses as a whole within NEED, (ii) to reveal any possible malfunctioning that should be taken into account and solve as soon as possible, and (iii) to monitor during the next two years the way all the proposed changes will be implemented and the expected results. The present work shows some results concerning the first of the given objectives with special focus on all the courses related to geomatics contents.

The first objective was to make a diagnosis of the degree of thematic and temporal reliability of all the courses with geomatics contents as a whole within NEED. In this sense, the first step consisted of analyzing any course in relation to all the other courses in the degree. For doing so, any lecturer in charge of a course had to split it into pieces of minimum 1.5 ECTS size and try to find the connections of each part with all the other courses in the degree, defining if each part was behaving as source or sink for any particular course. The information given this way by all the lecturers and courses involved was analyzed using the Graph Theory, which is the study of graphs or mathematical structures used to model pairwise relations between objects. In particular, we applied effect-based network methodology to detect malfunctioning and overlapping among assignments and themes across the whole syllabus to make the required changes in order to solve it. Results show that the methodology was a good founder of inefficiencies and malfunctioning, and that it was very descriptive and easy to be applied.