

Using Excel as the Primary Tool to teach a Reservoir and Stormwater Engineering Undergraduate Course

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ABSTRACT

Engineers require a high level of skill in Excel, as most use the tool on a regular basis throughout their professional careers. Despite the proliferation of computers in the last decade, anecdotal evidence suggests that the majority of engineering undergraduate students leave High School with only a rudimentary understanding of the capability of Excel. Most see it as a tool to present graphs of their data.

Though engineers working in the field of hydrology and hydraulics require the skills to run a variety of models, they don't always have access to them. Even when the use of specific models is the norm, there are always requirements to undertake pre- and post-processing of data that are inputs and outputs, respectively, to these models. Excel provides the logical tool for undertaking this processing as it can be configured to undertake these tasks in an efficient and timely manner. A range of data quality checks can also be incorporated into the spreadsheet; an important part of water resources engineering tasks.

One of the important parts of designing spreadsheets is to make them as flexible and re-usable as possible. That is, create a template that requires only the ingestion of a new dataset to undertake analyses. The students participating in the Reservoir and Stormwater course at the University of the Sunshine Coast (USC) build a portfolio of Excel spreadsheets that not only help develop their understanding of the fundamental principles of the subject, but also provide them with a valuable portfolio that implements the methods. They can build on this suite of spreadsheets throughout their career.

The primary objectives of the Reservoir and Stormwater Engineering course are to prepare engineering students to design and analyse the hydrological characteristics of water storages and urban stormwater systems. The course is based on standard engineering procedures for designing the size of water storage reservoirs and stormwater drainage and management systems in urban areas.

Topics covered include capacity-yield and behavioural characteristics of surface reservoirs, stormwater system design, including detention and retention storage designs, and the capabilities of urban rainfall-runoff models for simulating the quantity, and environmental impacts, of stormwater runoff. Using Excel as the tool for studying these methods provides the means of achieving the objectives as well as facilitating the development of high-level skills in Excel. This paper will explore the implementation in Excel of all the methods taught in this course.