

Course Design for Year 1 Design Engineering EEE Modules

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I have committed to help Peter Childs to plan and deliver the module(s) relevant to electrical and electronic engineering to the first year of the Design Engineering students, who will start their degree programme from October 2015. In planning this module, I have formulated the following strategic approaches, which may also be relevant in the planning of other topics for this degree programme.

1. **Less is more** – Students on this programme will be guided through a general engineering degree combined with aspects of art and design as would be found in an art college. The biggest risk is to cramp too much material into the curricula, resulting in “teach much and learn little”. Therefore in designing this module, I must focus in reducing the course content to what are **absolutely essential** for a design engineer to know about electrical and electronic engineering (EEE) and no more.
2. **Concepts with rigour** – The dangers of focusing on breadth and generality are two folds: students only learn the subject with knowledge and understanding that are skin-deep, and the delivery is superficial and lacks rigour. Therefore in designing the course, I should always ask: “what underlying principle am I trying to get across to students?” Furthermore the delivery of the content must encourage a rigorous approach to the fundamentals that underpins the engineering discipline.
3. **Top-down and not bottom-up** – Much of EEE teaching are rather bottom-up. For example students are taught about electronics moving in semiconductor materials, from which we build transistors, which form circuits and gates, and then microprocessors and amplifiers etc. For design engineers, this is not appropriate. The topic of EEE must be taught top-down, focusing on the wood and not the trees, so that everything they learn are in context and relates to design engineering. This approach is more likely to keep students on this course motivated throughout.
4. **Confidence versus ignorance** – The goal of the first year curriculum in EEE and computing should be to instill in students the confidence that they can get to grips with these two important subjects. As long as they know what they don’t know, but are confident that they can learn whatever is required when the time comes, we have achieved our teaching goals. For years I have been telling my student: *“Don’t be afraid of being ignorant, but do worry about being ignorant of your ignorance.”*
5. **Formal teaching versus problem-based learning** – Formal instructions, I believe remains the most efficient way in teaching a group of students a subject that has inherent structure and form. EEE is such a topic. Nevertheless, students must also learn through the application of their knowledge in a practical way so that their learning become deep and memorable. Therefore I plan to provide lectures, tutorials, problem classes and a project. This means that there needs to be sufficient time to deliver the EEE module to incorporate all these components.