Course Philosophy

A few words on the origin of the course: ELEC 101 was created by asking a simple question - “Could the students discover major concepts in engineering if we created the right environment?” Sabharwal has toyed with this idea for several years now and even attempted a course design driven by the above question for graduate courses like Information Theory and Error Control Codes. However, he had no luck in designing a good semester-long course for such advanced concepts. In Jan 2009, Sabharwal floated the idea of a new freshman course based on the “self-discovering major concepts” idea over a lunch discussion (no beers involved on this one) and the course was born.

On implementing the course philosophy: Engineering concepts are discovered when trying to achieve an engineering objective. So ELEC 101 is completely driven by engineering objectives. Each week starts with an engineering objective (see examples in the Lectures), the basic requirements and constraints are laid out and the students are asked to pitch their ideas on how to achieve that objective. At this stage, only gentle guidance is provided but no effort is made to conclude if a solution will work or not. Then the students attempt to implement their proposed solutions in the class (during lectures) and report back what they observe. This experiment-driven methodology itself is learnt via experimentation. After the students have performed experiments, the class moves into discussion phase again. Both successful and unsuccessful solutions are discussed and our job as an instructor is to systematize their observations. In this phase, the new concepts (like SNR, information content of a signal, importance of a feedback loop etc) are discovered and more often than not, suggested by the students not simply lectured by the instructor.

Dead ends are important: Dead ends are perhaps more important than the solutions. Engineering curricula, unfortunately, does not expose our students to dead ends and the methodology to solve them. Why are all laboratory exercises in engineering courses designed to guarantee success? Worst, we reward high grades on right answers on a piece of paper and not if the student really understood and appreciated the complex concepts.