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My Teaching Philosophy

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Some of the principles listed below have accompanied me throughout my thirty years or so of academic career. Most rules however have better crystallized in my mind only in the last decade, and even these rules continue to evolve as technology around us enables educational feats undreamed off just a few years back.

1) Every engineering course can and should have a design-oriented hands-on component, utilizing available simulation software tools. Most students nowadays bring laptop computers to class and can follow hands-on the professor's live demonstrations.
2) Every engineering course, no matter how many times taught before, can be continually improved, from semester to semester, through incorporation of modern software tools, new practical application examples and/or new web-based delivery methods.
3) As storage space on the web is no longer an issue, there is no excuse why a course's web page should not contain all previous semesters' material – lecture notes, old homework problems and solutions and the old online instructor's hints and discussion with the students regarding specific homework assignments, old test problems and solutions, design software tutorials and more.
4) As every professor knows from Day One, the best way of learning really in-depth a new subject (related to one's research interests) is to teach it. Need to set a target, two-three semesters down the road, and start compiling lecture material. Ten hours of preparation per one hour of delivery is not unusual, when teaching a new course, but the real fun begins when one teaches the same course the second time around.
5) Here is a real challenge: Will other faculty be able to teach the course that you are developing, following your curriculum? When the course is so unique, that only you can teach it, is there a "danger" of being forever "stuck" with teaching this course? If and when you may "tire" from teaching the course, may the course stop from being offered altogether?

6) As demonstrated successfully by many top universities, course full set of lecture videos should be shared with the world. Any one should be able to access it. No need to fear that students may lose their main incentive to register to school. The real learning come not so much from watching the lecture but rather from working hands-on on homework design assignments and being supervised doing so. A collection of well delivered lecture videos is an important resource to a university that creates such courses, from many viewpoints such as school reputation and students recruitment.
7) When preparing a lecture on a new topic, it is a good idea to try to "put oneself in the shoes of a B student who likes to ask a lot of questions".
8) When planning a new course and how to cover a specific technical subject, it is a good idea to create a list of "Frequently Asked Questions" that may lead progressively from ideas in their basic form to more involved forms of such ideas. As these questions are answered by the lecture material one is assured that the lectures flow in a logical order.
9) When planning how to cover a new topic, it is very beneficial to create a logical sequence of examples that go from the very simple to the more complex aspects of the topic. Also, numerical values and orders of magnitude are important and must be included. Each time a formula is presented, students must see some typical numerical values too, to feel things better.
10) Every professors, but especially those who are in the engineering field, should make a conscious effort to learn a "new trick" every day (it can be a new fact drawn from a research effort, a new example or derivation related to the course material or a new software trick, it doesn't matter which). This knowledge will eventually find its way to your courses, making them better. It is a special treat whenever such new piece of knowledge actually comes from a student while you teach the course (as I routinely demonstrate design software live in class, I can no longer even count how many new software tricks I have learned over the years directly from the students).
11) It is most beneficial to frequently talk to colleagues about course related matters. Need to share methods and success (or failure) stories and not be shy to adopt good ideas. [Some of my best teaching accomplishments were inspired by colleagues' practices].

12) Most students are visual learners. Therefore "one illustration (or simulation or live demonstration) may worth ten formulas". Learning with the aid of software tools is most effective if students are first given a "head-start" in class, and enough time, later at home, to absorb the ideas. Computer lab sessions must not however totally displace regular lecture time - a correct balance of lecture time vs. computer lab time is essential.
13) It is important to maintain a complete course calendar, with day-to-day planned activities for the entire semester, from Day One of the semester. Need to update the calendar from time to time during the semester taking out non-essential material, as it often takes longer than originally anticipated to cover certain specific subjects. Following a script helps to keep all course events (homework assignments and submissions, quizzes and tests, etc) well synchronized.
14) The Course Syllabus must be very explicit about the grading method and instructor's expectations from the students. Students need to understand not only what portion of the numerical grade is allocated to tests and homework assignments, and how the grade is converted from numbers to the letter grade system, and not only what it takes to receive a grade of A. It should also be clear what accomplishments constitute other grades (such as B, C etc.) in various assignments.
15) In some classes, if the number of students is not too large, students may be allowed to resubmit their corrected homework again and again, until they do it right. Most students need no more than one or two re-submissions per homework, and the re-grading time is really minimal. The educational benefits are enormous. This type of "open door" privilege should be extended only to works submitted on time by the first-time submission deadline, that contain a sufficient amount of good effort.
16) Final Grade uncertainty is a major source of anxiety for students. Students need to be well informed about their progress in class. That is why it is important that no final grade curving (or any grade curving) is ever done. As quizzes and homework results accumulate, students should be able to compute, on their own, their evolving numerical grade. Near the end of the semester as the pressure from all courses mount up, students are often forced to make reasonable time management decisions (such as whether or not to complete a multi-part homework assignment or free up more time to

prepare for the final exam). Informed students tend to be more productive in such decision-making situations.

17) A comprehensive final exam may work very well in some courses but, more frequently than not, may be a poor idea in others. Whenever a final exam is administered, some of my colleagues and I discovered that a "no risk quizzes" policy worked effectively in reducing students' stress, without hurting students' motivation during the semester. A "no risk quiz" is a grading method in which only quizzes whose grades are higher than the final exam's grade are included in the course average.

18) Extra credit homework and extra credit test problems often contribute significantly to the motivation and morale of the class. One should be careful though not to over-do it, to avoid a situation in which some of the better students may be able to skip the last two weeks of the course and miss on important lecture material.

19) Almost any engineering subject can be taught with enough hands-on depth, even if some pre-requisite topics may be missing. All the professor needs to do is to postulate the basic background facts, illustrate their meaning, and then head on with the subsequent subject material. This principle may sound highly controversial (when dealing with college students) but it is crucial in assuring success of outreach engineering courses aimed at high-school students. Some of the more fascinating engineering topics may be junior- or senior-level, and as such are shielded by large amount of pre-requisite science and engineering courses. If we still want to expose young kids to such topics, we need to think creatively how to do it.

20) Student-Instructor relationship does not end when a course final grade is delivered to the Registrar's office. Students, later on, may need academic advice, letters of reference, Senior Project guidance and industry job referrals. Many students fail to grasp it, and may risk losing the instructor's respect after being caught cheating. An instructor should make an effort to alert the class to some of the long-term effects of cheating and to the course’s Code of Ethics.

21) One joke is worth ten formulas. Five years later, the joke may be the only thing that a student may remember from your course. We often pass on, from generation to generation, course related jokes that we heard from our old professors. Some jokes

though are new, and are serendipitously created as a course is taught time and again. [The classic "We could not test the Solar Cooker projects at home because it was too dark outside" (means to say, all the students built their three-week project on the night before the due date), really happened to me on the first semester of teaching EGN 1002 Fundamentals of Engineering. It is now used as joke every semester]. A joke delivery should often be a planned event.

22) Finally, a professor should not be over-committed to any rigid collection of teaching philosophy rules. Some circumstances may, for example, necessitate a grade curving. It is sometimes important to deviate in mid-course from a scripted course calendar, allowing more review sessions in place of one or two relatively unimportant topics. It is important, after teaching the same course N times in a row to take a rest of a few years, and then come back with fresh ideas. It is also important sometimes to overcome the impulse of taking on a commitment to teach one more new course - we have only a finite amount of time to do research, and over-committing time to teaching may be a grave mistake.

I believe that all the above rules, even though they may evolve, tend to be true most of the time. I think that these rules have served me, and more importantly the students, pretty well over the years.