Thanks for your e-mail dated 2009OCT27, inviting feedback from DCIS members concerning two recent course proposals respectively in our undergraduate and postgraduate Software Engineering programs. Elaborated below please find some of my comments and thinking for your convenience, to forward the same to our FST Pedagogical Council:

Undergraduate Course: *Introduction to Natural Language Processing, 3-credit elective course*
Postgraduate Course: *Web Mining, 3-credit elective course*

- **General Feedback:** First of all, I applaud our DCIS’s initiative to invite individual course proposals to substantiate our program offerings. It is really important for us to render meaningful course proposals in our existing programs to tailor how best we could offer the most suitable and compatible “Computing Curricula” at both the undergraduate and postgraduate levels. And I agree that a rigorous process is needed to assess any course offerings in order to enrich in a quality manner our academic programs. Briefly speaking, I believe that the two course proposals, in terms of the domains of knowledge in the computing discipline, have the potential to contribute greatly to the learning of our DCIS students, and it is worthwhile to investigate how best the two courses should be designed according to the vision and mission of our university, that of our faculty, and that of our program, just to enable our students’ arriving at the expected learning outcomes yet to be elaborated.

- **Specific Feedback:**

  1. In the context of designing courses for higher education, it is understood that much of the creativity and power in teaching lies in the choice of texts and ideas which become the focus of study, the planning of experiences for students and the means by which achievement is assessed. These define the boundaries of the experience for student learning. Of course the way in which the curriculum is brought to life is equally important, but the power of teacher-student interaction in the form of various teaching-learning-assessing activities is not to be ignored, but cultivated by specific elements of *mindfulness* articulated in course design.

  2. Many teachers in higher education work in departmental environments that are quite new to the concept of scholarly teaching; hence, little thought goes into the design of the curriculum. Their opportunities to contribute to the design of the courses on which they teach may be limited to those units for which they have responsibility. Understandably, the limited impact that is possible in one unit (or course) of study running over one semester can hardly be magnified when all of the elements (courses) which make up the program of study are not designed to support one another. Ideally, an integrated curriculum must be in place to provide students with the opportunity to explore key concepts and develop essential skills in the contexts supported by different courses. Yet,
a holistic design of the program of study does not seem to exist in our DCIS program. Unfortunately, this perspective may seem anachronism with the advent of modular courses. But ceding more responsibility to students for structuring their own education requires greater clarity about what each module can offer and how they might be linked together to form a coherent whole. Where is our DCIS’s coherent whole, if there is not even a clear set of learning outcomes articulated for each course in the program, and for the program as a whole?

3. An important theme in designing courses for higher education is visible teaching and visible learning. This is characterized by our willingness to re-conceptualize what we faculty are doing, openness to different perspectives and clarity about what we hope to achieve. Willingness to explore beliefs and values held by academic colleagues, students, and other stakeholders is important if the curriculum is to achieve any coherence. Clear purpose acts as a guiding principle in many choices to be made. The need to design courses which foster student engagement with the subject matter and reward deep learning must be taken into account. In order to empower students’ learning capacity for persistence in order to pursue ideas to fruition, a learning-centered syllabus must be conceived and included in the course proposal, with an attempt to answer the following questions (Rubin, 1985, p.56):

- Why would a student want to take this course?
- What are the course objectives? Where do they lead, intellectually and practically?
- What are the pre-requisites? What does the faculty member assume that the students already know? Will the missing necessary skills be taught during the course?
- Why do the parts of the course come in the order they do?
- Will the course be primarily lecture, discussions, or group work?
- What does the professor expect from the students?
- What is the purpose of the assignments?
- What will the tests test: memory; understanding; ability to synthesize, to present evidence logically, to apply knowledge in a new context?
- Why have the books been chosen? What is their relative importance in the course and in the discipline?


4. Our current CIS degree undergraduate and graduate programs are yet to articulate clearly the intended learning outcomes (ILOs) for our students at the end of their study. Indeed, an ILO is a statement describing what and how a student is expected to learn after exposure to teaching. ILOs apply at the institutional level, as a statement of what the graduates of the university are supposed to be able to do; at the degree program level, as a statement of what graduates from particular degree programs should be able to do; and at the course level, as a statement of what students should be able to do at the completion of a given course. It should be noted that graduate attributes as articulated by the university can provide useful guidelines for designing program outcomes, which, in turn, are addressed by the outcomes of specific courses under the program. Oftentimes, it is important to stipulate the kind of knowledge to be learned, declarative or functioning, and to use a verb and a context that indicates clearly the level at which it is to be learned and how the performance is to be assessed.

5. Our current CIS degree undergraduate and graduate programs need badly a well-crafted assessment program to ensure the quality of our student learning. Such an assessment
program, long overdue in our program, should ensure a meshing of goals, instruction, and assessment. Simply put, to ensure that every student has the opportunity to reach the required level of proficiency in each area that has been identified, several major tasks on our part, must be accomplished:

a) A list of the basic competencies for all students must be developed and approved by the University;
b) These competencies must be described in terms that are measurable and demonstrable;
c) A comprehensive plan must be developed to make sure that the basic competencies are learned and reinforced throughout the entire time a student is enrolled;
d) Each disciplinary area responsible for a portion of the core curriculum must describe and include in the goals of each of their courses the appropriate learning outcomes that it introduces or reinforces;
e) For these courses a consistent set of assessment techniques and instruments must be developed;

Thereby, a curriculum must be developed sequentially, beginning with our institutional statement of goals and ending with the assessment of each student before and after graduation. As we move through the design process, from defining program goals to developing course goals and then unit-by-unit objectives, the statements become increasingly specific. The design of each course, the selection of instructional methods, and student assessment will be based on these statements. The process of moving from a statement of goals to deciding on and implementing a program and related individual courses to the curriculum requires careful planning. If, for example, computer programming skills are identified as a basic competency that each student in Software Engineering majors, must have by graduation, programming with specific computer languages must be initially taught and then reinforced, and no student should be able to graduate without receiving appropriate instruction and practice in this skill. Courses must also be analyzed to identify where this skill is introduced and then reinforced, and the curriculum must be structured so that every student has the opportunity to acquire computer programming skills. Once all key competencies are determined, a curriculum committee might use a basic competency checklist (mostly a matrix) to assign specific competencies to individual courses or other formal learning experiences. The same checklist could also describe the level at which the competency will be taught, indicating in which courses the competency will be introduced, used, further developed, and assessed. If we are responsible for one of the required courses in our program, one of our major responsibilities will be determining which of the basic competencies can be taught or reinforced within it. Developing fundamental competencies such as teamwork, creative problem solving, collaborative project development, can be an integral part of most courses. Most importantly, under this assessment program, no student should be able to pass through our curriculum without having the opportunity to learn and use each of the identified core competencies.

6. The curriculum is the heart of a student’s college experience (undergraduate and postgraduate included). It is a university’s primary means of helping students develop in directions valued by its faculty. In today’s Macau, we are being urged to assess especially carefully the quality of our curricula (courses included). We as faculty are responding to this challenge as a practical means of both attracting and retaining more students and ensuring their success and producing high-quality outcomes for everyone. A number of important characteristics of effective curricula emerge from the professional literature in
higher education. Such characteristics are relevant to both college-wide and more specialized disciplinary curricula and to curricula at both the undergraduate and graduate levels (http://www.thenationalacademy.org/readings/designing.html):

**A coherent philosophy**
A curriculum should be based on a carefully thought-out philosophy of education and should be clearly connected to an institution’s stated mission.

**Clear purpose and goals**
A curricula mission statement and written curricula goals (intended student learning outcomes or results) articulate curricula purpose and aims – what graduates should know and be able to do and those attitudes and values a faculty believes are appropriate to well-educated men and women. These goals and their more specific objectives are described in considerable detail and in behavioral language that will permit designing the curriculum and assessing its degree of achievement (its actual outcomes).

**A theoretically sound process**
Student learning activities are chosen that are capable of developing the desired outcomes, as indicated by empirical research on learning and college student development. A curriculum has its desired effect primarily through its courses. Therefore, the choice of course experiences and the specific quality and efficacy of these experiences in producing the stated intended outcomes for all students is fundamental to the quality of any curriculum. Current empirically based education theory is essential to effective instruction and thus the improvement of curricular quality. For example, there is little evidence that using traditional lectures will develop in students the higher-order cognitive abilities such as critical thinking and principled ethical reasoning a faculty may value. Nevertheless, lecturing is still the predominant method of instruction in many institutions today.

**A rational sequence**
Educational activities are ordered in a developmental sequence that carefully considers pre-requisite knowledge to form a coherent curriculum based on the stated intended outcomes of both the curriculum and its constituent courses.

**Continuous assessment and improvement of quality**
Reliable and valid assessment is preplanned to monitor on a continuing basis the effectiveness of the curriculum in fostering learning and student development – the actual achievement of the defined institutional and curricular outcome goals. In many or most institutions there exist two potentially quite different curricula: one, the array and sequence of courses offered by the institution and intended by the faculty to be taken, and a second, composed of the specific courses actually taken and the sequence followed by a student. The intent, content, educational experience, and thus outcomes of the two may be – and, as judged from research, can be – quite different from each other. Careful monitoring of actual student course-taking behavior through transcript analysis can reveal the degree to which students are experiencing the faculty’s intended educational process to achieve their intended outcomes.

**High-quality academic advising**
An effective curriculum – one that produces the results it claims in all of a college’s diverse student body – depends for its success upon a high-quality program of academic advising. Modern academic advising is developmental, starting with each student’s
values and goals, and helps all students design curricular, co-curricular and other experiences that can help them achieve their own goals and the institution’s intended learning outcomes.

7. Clearly defined intended curricular outcomes enable a faculty to understand, communicate about, and control (manage) learning through the curriculum more effectively. In particular, such outcome goals and objectives should perform the following for our teaching and learning activities (Gardiner, 2006):

- Provide the solid foundation of clearly specified intended outcomes.
- Provide specific direction for the continuous monitoring – assessment and evaluation – of the actual outcomes the curriculum produces.
- Reduce the potential for untoward teaching to the test – corruption of the curriculum by instruction directed toward chosen assessment indicators. Instead, both the instruction and the indicators are aligned with the outcomes previously defined by the faculty.
- Obviate the dumbing down of curricula in response to increased student diversity and under-preparedness by providing firm, clearly identified, high outcome standards and by requiring the educational process to change in response to altered student needs.
- Guard against grade inflation and the consequent reduction in student, and perhaps faculty, quality of effort and the devaluation of degrees.
- Help an institution resist academic drift, where a college or program with one mission or curricular purpose gradually and unconsciously drifts away toward some other purpose or purposes.
- Enable a faculty to deal more straightforwardly and rationally with conflict over curricular content, such as disputes related to departmental turf.
- Help everyone involved – faculty members, students, administrators, trustees, parents, legislators – understand the institution or program and the results it claims to produce.
- Increase the perception of institutional openness, candor, and integrity among all of the institution’s customers and stakeholders.


Obviously, lists like this are never complete. Many of the suggestions, once one thinks about them, are obvious. Unfortunately, we often find that we faculty and administrators have created many of our own problems by rushing, and by not worrying about mindful details. As difficult as the process of course and curriculum design can be, it is also challenging, exciting and most rewarding. Finally, but not the least, as Ruben (2003) points out:

*The academy needs a new, more encompassing vision of excellence – a vision that takes account of opposing views of higher education’s purpose and underscores the importance, inter-dependence, and useful tensions among the goals of academic excellence and those of service and operational excellence. It should identify the academy as a place that not only advances knowledge but also one that applies, tests, and uses that knowledge – one that practices what we teach and that genuinely aspires to excellence in all that we do.*


With that note, please kindly accept, once again, my sincere thanks for the opportunities to share with you my comments and findings in this brief memo in the occasion of our DCIS’s data gathering for our input on the two course proposals attached.
All the best!

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Enclosure: A sample course proposal “Web Technology and Life” designed according to the ideas of outcomes-based teaching and learning. It is taken from my General Education course pool, with courtesy from Professor Simon Ho.