



Department of Chemical Engineering
University of the Philippines Diliman

Innovating the Bachelor of Science in Chemical Engineering Program into a 4- year Curriculum

Rizalinda L. de Leon, PhD

Balangkas: Roundtable Discussion on Academic Program Review & Visioning Drive

15 February 2016, 2:30-5:30 pm

Claro M. Recto Hall, Faculty Center



Our Mandate:

*Lead in setting academic standards and
initiating innovations in teaching and
research in chemical engineering*



Our Mission

Train the chemical engineers who will lead the practice of profession in the country –

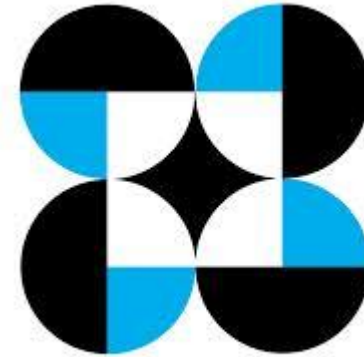
- **developing, designing processes;**
- **overseeing safe and efficient production of chemicals and other goods;**
- **developing standards, planning, policy;**
 - **training/human resource devt;**
 - **research/technology enterprise**



Where our graduates go...



Department of Environment
and Natural Resources



DEPARTMENT OF
SCIENCE AND TECHNOLOGY





Department of Chemical Engineering

University of the Philippines Diliman



Human Energy

OMNIPACK
art of outsourcing



P&G





World class chemical engineers...

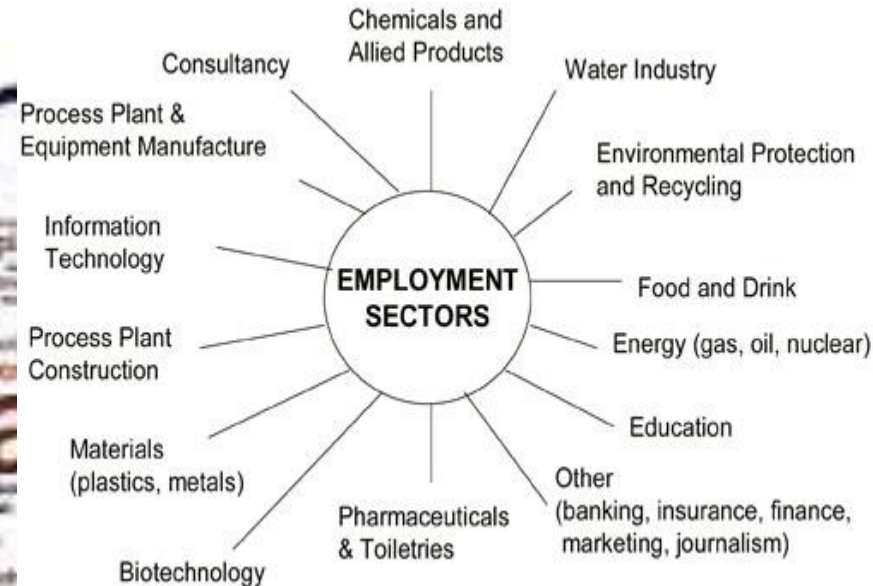


World class chemical engineers...

We intend to keep it that way.



Rationale



The diverse and ever-changing landscape of chemical engineering education



Rationale:

Enhanced competencies of K+12
graduates from the STEM track

Paradigm shift in basic education



The Review Process





WORKSHOP QUESTIONS ANSWERED

1. How do the K+12 STEM track courses compare with equivalent Math and Science courses?
2. How do the course STEM syllabi compare with their corresponding STEM syllabi in other countries?
3. Are the course topics crucially important or still relevant to a BS ChE graduate? (consider the **mission/vision** of the DChE on research and instruction, **student outcomes**, PRC licensure, CHED, etc..)
4. How do the courses compare with their corresponding course in other countries?



WORKSHOP QUESTIONS ANSWERED

5. Is there a need to update in terms of topics and course materials? Is there a need to restructure?
6. Considering the findings from the comparisons above, what are your recommended specific action plans? (e.g., remove/retain course, change prerequisite, institute a new course, institute a remedial program, etc..)
7. What would be the major concerns arising from these action plans? (SWOT analysis).



Aspects of the BS ChE Curriculum

- Vision/Mission
 - Program Educational Objectives
 - Program (Student) Outcomes
 - Pedagogy
 - Assessment
- Courses
- General Education
 - Math and Science courses
 - Allied Courses
 - Specialist Courses (Design & other Professional Courses)
 - Capstone Courses
 - Research Courses and Tracks
 - Electives



Allied Courses, Electives and Research Tracks

- Wider field
 - Greater leeway to choose according to leanings and interests
 - Addition of Chem 40 & 40.1 (Biochemistry)
- 12 units of electives:
- ChE research track electives (6u)
 - Business and Management Elective (3u)
 - Science and Technology Elective (3u)



Specific Indication of GE Courses

3 units of any GE courses from each of the following themes:

- 1) Kasaysayan ng Pilipinas
- 2) Wika, Kultura at Lipunan
- 3) Critical Perspectives in Arts & Communication / Philippine Arts & Culture
- 4) Sociology/Anthropology/ Social & Political Sciences
- 5) Ethics & Moral Reasoning / Philosophy
- 6) Journalism / Broadcast Communications / Communications Research / Linguistics
- 7) Science, Technology & Society / Living Systems
- 8) Written Communication in English
- 9) Oral Communication in English

		GE Objectives				
BS ChE Program Educational Objectives		Broaden intellectual and cultural horizons	Hone critical and creative thinking	Develop a passion for learning and scholarship	Cultivate a high sense of intellectual and moral integrity	Foster a commitment to service and social justice
	Take on leadership roles	✓	✓		✓	
	Apply and expand their knowledge and skills; responsive citizenship	✓		✓	✓	✓
	Demonstrate strong research and innovative capability	✓	✓	✓	✓	✓
	Strong commitment to the ethical practice of their profession ; to health, safety and environment and; service to society	✓	✓		✓	✓

GE Courses

Characteristics/Abilities	Kas 1	Fil 40	Ethics	STS / Living Systems	Crit. Pers. Arts / Phil. Arts and Culture	Socio/ Anthro/ Social, Policial Sciences	Journ/ BC/ CommRes / Lingg	Written Comm	Oral Comm
Technical oral/written communication ;								✓	✓
I.D. engineering problems /opportunities ; propose & implement solutions	✓		✓	✓		✓		✓	✓
Positive disposition for life-long learning ; do independent research	✓		✓	✓	✓	✓			
Contribute innovative solutions	✓	✓	✓	✓	✓	✓	✓	✓	✓
Apply engineering and management principles in multidisciplinary endeavors	✓	✓	✓	✓	✓	✓	✓	✓	✓

	Outcome	Introductory	Enabling	Demonstrative
(a)	Apply Math and Science	Math 53: Elementary Analysis I	ChE 101: Chemical Engineering Process Analysis I	ChE 125: Chemical Reaction Engineering
(b)	Design and Conduct Experiments	Chem 17: General Chemistry II	Chem 28.1: Inorganic Analysis Laboratory	ChE 135: Chemical Engineering Laboratory I
(c)	Design a System, Component or Process	ChE 130: Process Fluid Systems	ChE 132: Separation Processes I	ChE 142: Chemical Engineering Plant Design
(d)	Function in Multi-disciplinary Teams	Introductory EEE	Business and Management Elective	NSTP
(e)	Solve ChE Problems	ChE 131: Process Thermal Systems	ChE 133: Separation Processes II	ChE 142: Chemical Engineering Plant Design
(f)	Understand Responsibility	ChE 100.2: Seminar II	ChE 100.3: Seminar III	ChE 151: Process Safety, Health and Environment
(g)	Communicate Effectively	ChE 100.1: Seminar I	ChE 100.2: Seminar II	ChE 140: Chemical Process Industries and Economics
(h)	Understand Impact of Engineering	ChE 140: Chemical Process Industries and Economics	ChE 141: Chemical Process Simulation and Development	ChE 142: Chemical Engineering Plant Design
(i)	Life-long Learning	ChE 100.2: Seminar II	ChE 143: Chemical Engineering Research I	ChE 144: Chemical Engineering Research II
(j)	Contemporary Issues	Science and Technology Elective	ChE 140: Chemical Process Industries and Economics	ChE 151: Process Safety, Health and Environment
(k)	Techniques, Skills and Modern Tools	ChE 105: Mathematical Methods in ChE I	ChE 106: Mathematical Methods in ChE II	ChE 141: Chemical Process Simulation and Development
(l)	Engineering Management	ChE 100.2: Seminar II	Business and Management Elective	ChE 143: Chemical Engineering Research I



Comparison of Current and Proposed BS ChE programs

Current BS ChE Program

- Total 184 units
- 18.4 u / semester
- 26.3 h/week
- GE courses: 15 u (SSP),
15 u (AH)
9 u (MST)

Proposed BS ChE Program

- Total 155 units
- 19.38 u /semester
- 27.88 h/week
- GE Courses: 21 u + 6 u English Communication
- Institution of Courses: 22 u
- Deletion of Courses: 39 u
- Revision of Courses:
- Addition of Courses: 16 u?
- Reclassification: 9 u



Continuous student development

- seminar courses to be taken each academic year which include topics on ethics, professionalism, innovation and research

Combined theory and application

- for better appreciation of chemical engineering sciences in industrial practice

Timely reinforcement of concepts

- laboratory courses immediately follow design courses

Balance of depth and breadth

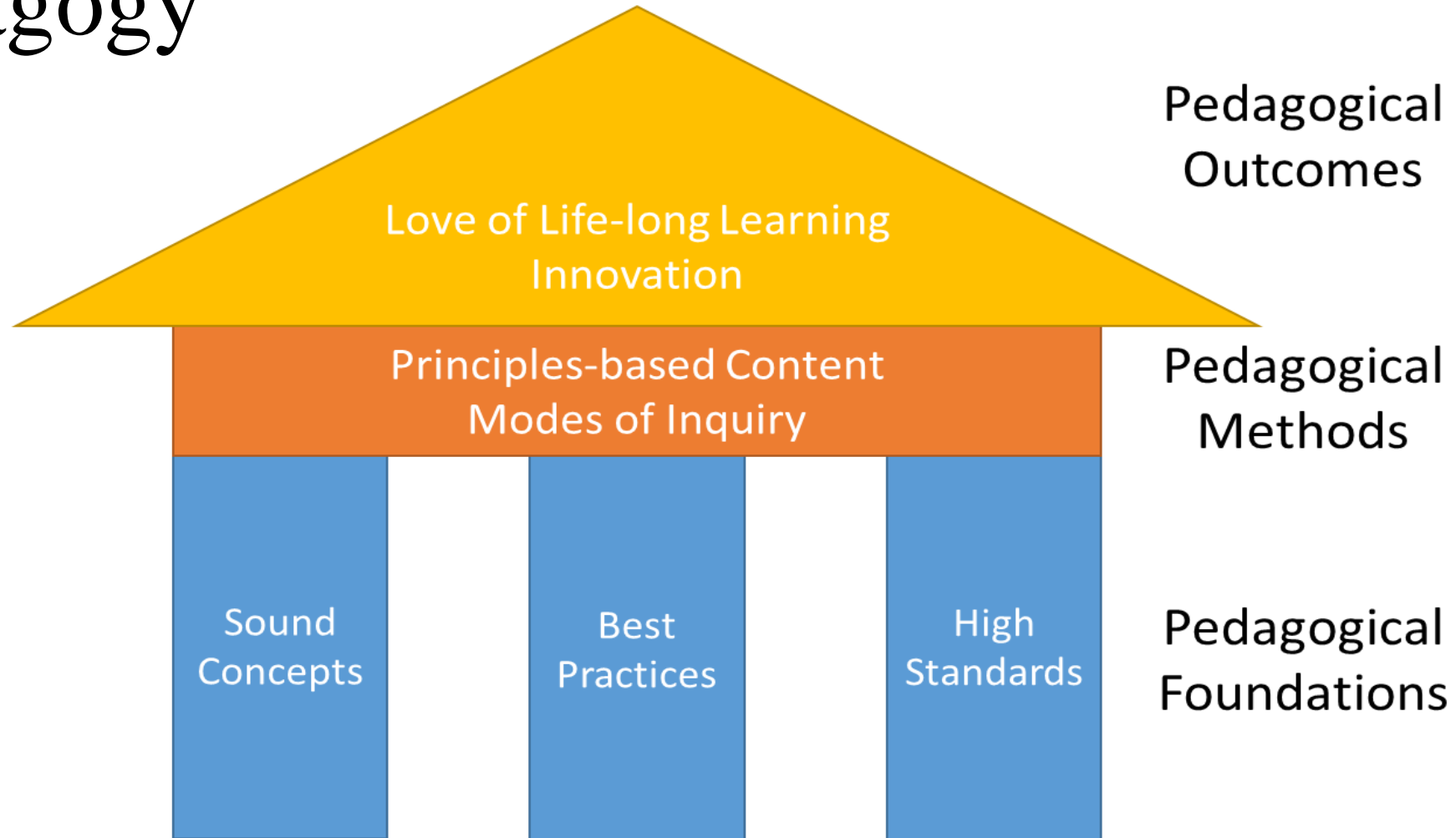
- introduction to emerging fields are related to design courses

Convergent and integrative approach

- better preparation for the capstone courses (plant design and undergraduate research)



Pedagogy





Assessing the outcomes

Capstone courses

- ChE 141/142 – Process Flowsheet Development and Plant Design
- ChE 143/144 – Undergraduate Chemical Engineering Research
- ChE 136 – Process Project
- Additional Assessment Tools

Post-Graduation Assessment

- Chemical Engineering Licensure Examinations
- Employment Tracking
- Continuous Quality Improvement System



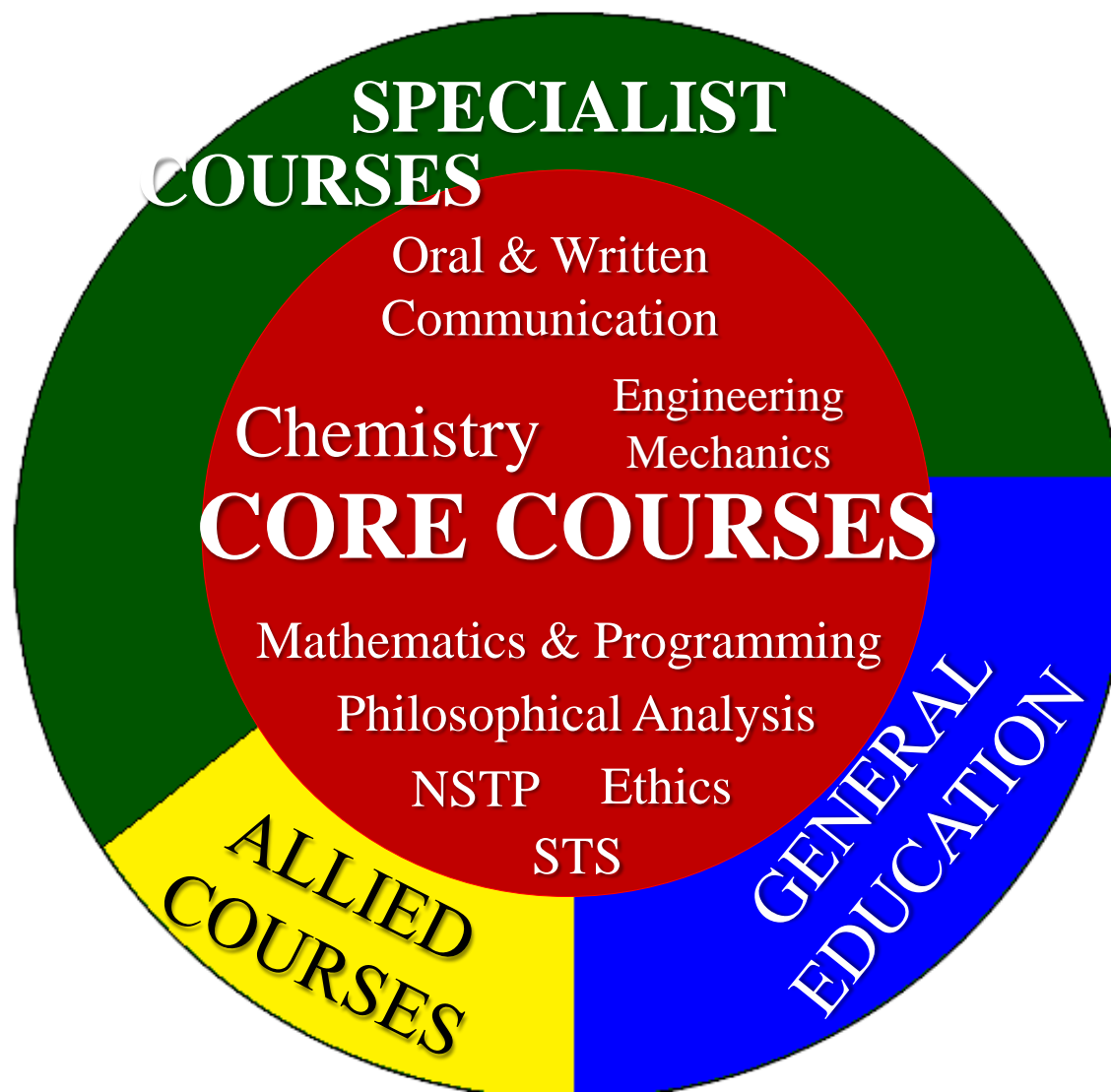
Support Needed from the University

- Additional Faculty Items (*computation of faculty teaching equivalent indicates we need 29 faculty members assuming each is given 9 units of teaching load and 3 units of research or study, but we only have 19 items + a few borrowed items*)
- Institution of a Student Internship Office
- Facilitate the Review of General Education Requirements (*so we can finalize our proposal*)
- Facilitate the Review of Service Courses (*so we can finalize our proposal*)
- Upgrade of the Chemical Engineering Pilot Plant Facility



'TATAK UP'

SYNERGY of
overall
educational
experience in
UP





UNIVERSITY OF THE PHILIPPINES DILIMAN



Honor
&
Excellence



COLLEGE OF ENGINEERING

UNIVERSITY OF THE PHILIPPINES DILIMAN



KNOWLEDGE
PROGRESS
&
SERVICE



Maraming Salamat!



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