



INDIAN INSTITUTE OF PETROLEUM & ENERGY

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Ref: IIPE/ 2nd AS Meeting/2021/002

Date: 25.06.2021

Minutes of the 2nd meeting of the Academic Senate, IIPE held on 25th June, 2021 at 11.00 AM offline and through Cisco WebEx (virtual meeting).

MEMBERS PRESENT: -

Prof. V.S.R.K Prasad, Director (in Chair);
Prof. S Neogi, IIT Kharagpur, SPOC, (Mentor Institute);
Shri. Rama Sakthivel, Site Manager, Shell Technology Centre Bangalore;
Shri. Mahesh Chand Gupta, CGM (Trg. & Skill Dev.), GAIL
Shri. Deepak V Shastry, Ex - Executive Director, (Training R&D and Start Up), GAIL
Special Invitee
Dr. Pratibha Biswal, Assistant Professor, Associate Dean (Students' Affairs);
Dr. P Aparoy, Asst. Professor, Associate Dean (R&D);
Dr. G Nagesh, Asst. Professor, Associate Dean (Planning Resources & Alumni);
Dr. Deepak Amban Mishra, Asst. Professor, Associate Dean (Academic Affairs & Admin);
Dr. Somnath Ghosh, Asst. Professor, Associate Dean (Faculty Affairs);
Dr. Rajat Jain, Asst. Professor, DIC (PE);
Dr. P Venkata Reddy, Asst. Professor, DIC (CHE);
Dr. Arun Kumar Pujari, Asst. Professor, DIC (Mech. Engg & other Engg Programs);
Dr. Ramunaidu, Assistant Professor, DIC Examination Cell;
Dr. T Hemanth Kumar, Asst. Professor;
Dr. Himangshu Kakati, Asst. Professor;
Dr. Ranjan Pramanik, Assistant Professor, Petroleum Engg;
Dr. C. Veerabhadra Rao, Assistant Professor, CSE;
Dr. B Murali Krishna, Registrar I/c, Member Secretary;

Members Absent with the permission of the Chair: -

Shri. Ratan Raju, Executive Director, HPCL, Visakh Refinery;
Shri. Saloma Yomdo, CGM (RES) & Head, COEES;

Agenda: -

1. Curriculum change in Chemical Engineering as per the advice of the industries
2. Curriculum change in Petroleum Engineering as per the advice of the industries
3. Curriculum change in Earth Sciences as per the advice of the industries
4. Curriculum change in Chemistry
5. Any other item with the permission of the Chair.

The Chairman in his introduction informed the necessity for the proposals made in the curricula modification. He informed that two committees were formed by the Joint Secretary, MoPNG to propose changes in the course curriculum for IPE and RGIPT, according to the requirements of the Industries. The committees chaired by Mr Pushp Kumar Joshi, Director (HR) of HPCL and Dr SSV Ramakumar Director (R&D) of IOCL respectively, worked towards proposing suggestions that would supplement industry needs and provide gainful employment to the students. (The detailed suggestions given by various industries are given in Annexure IA & IB).

Agenda Point 1: - Curriculum change in Chemical Engineering as per the advice of the industries

The following topics are to be added to the subjects mentioned below as per the industry experts' suggestions.

S.No.	Sem	Subject name	Subject code	Proposed additional topics
1	II	Intro to Chemical Engineering	CH 10002	Case studies: Application of the above concepts in context of Process flow diagrams for fertilizer. Petrochemical and Refinery dealt in Chemical Process Technology.
2	IV	Heat transfer	CH 20003	Introduction to Pinch analysis for simple heat exchanger network

3	V	Biochemical Engineering	CH 30006	Anaerobic digestion and fermentation for the food Industry.
4	V	Particle technology	CH 30003	Particle size distribution including (normal/Gaussian)
5	V	Reaction engineering - II	CH 30002	Scale-up parameters/methodology for a typical multiphase flow type reactor
6	VI	Process Equipment design	CH 30008	Fundamental aspects of process data sheet and interpretation of process data sheet for major equipment used in refinery - heat exchanger, distillation Column, Internals, Pump, Pipes, Control valve
7	VII	Process safety	BS 40001	Hydrocarbon storage, Handling of cryogenic fluids and metallurgy Awareness on Statutory Bodies & Regulations viz. PESO, OISD, ISO standards Industrial safety and hazards
8	VI	Elective -I Wastewater Management	CH30010	Up flow anaerobic sludge blanket, issues related to water treatment in large size industrial set up, clearing of water bodies /rivers in the context of Ganga Action plan and other initiatives.

Approval sought: -

IIPE seeks approval for the implementation of the curriculum change in Chemical Engineering as per the advice of the industries.

Resolution: -

It was resolved to incorporate the suggestions given by the expert from the industries.

Agenda Point 2: - Curriculum change in Petroleum Engineering as per the advice of the industries

A) Addition of a new elective '**Natural Gas Engineering**' in Elective 4.

Importance of Natural Gas; Composition of Natural Gas, Natural Gas Reservoir, Unconventional gas reserve. Properties of Natural Gas: Phase Behavior, properties of Natural Gas, Formation Volume Factor, etc., Determination of natural gas properties such as specific gravity, pseudocritical properties, viscosity, compressibility factor, gas density, formation and expansion volume, and compressibility.

Production of Natural Gas: Overview of well Completion and wellbore Performance.

Natural Gas Processing & surface facilities: Gas Compressor, Compressor design, Gas Flow Measurement, Principle of Separator, Design of Separator. Dehydration of Natural Gas, Design of Dehydration, Sweetening processes and sulphur recovery, Processing of LPG, CNG system, Conversion of gas to liquid

Gas Gathering system, transportation and Storage: Gas Gathering system, Transmission of Natural gas, Transportation and Measurement, Pipeline Design. Flow through pipeline, issues and solutions. Underground storage.

Gas Supply/Distribution: City Gas/CNG development, CNG stations, Design aspects for City Gas Network and CNG Stations, Maintenance and safety of City Gas Networks and CNG equipment.

B) New course structure for PE students (proposed to be adopted from 2020 batch onwards)

SEM	Proposed to be Removed/Shifted/Renamed	Proposed to be Added
I	No Change	
II	No Change	
III	1. Information Technology [2-0-3] (4 Cr)	1. Drilling Technology [3-1-0] (4 Cr)
IV	2. Phase Equilibria Thermodynamics [3-1-0] (4 Cr) 3. Transport in Porous Media [3-0-0] (3 Cr) 4. Fluid flow lab & Design [0-0-3] (2 Cr)	1. Elements of Reservoir Engineering [3-1-0] (4 Cr) 2. HC Production Engineering- I [3-1-0] (4 Cr) 3. Petroleum Geology Lab [0-0-3] (2 Cr)

V	<ol style="list-style-type: none"> 1. Drilling Technology 2. [3-1-0] (4 Cr) Reservoir Engineering I 3. [3-1-0] (4 Cr) HC Production Engineering- I 4. [3-1-0] (4 Cr) Instrumentation & Process Control [3-1-0] (4 Cr) 	<ol style="list-style-type: none"> 1. Information Technology [2-0-3] (4 Cr) 2. Transport in Porous Media [3-0-0] (3 Cr) 3. Advanced Reservoir Engineering [3-1-0] (4 Cr) 4. HC Production Engineering II [3-1-0] (4 Cr) 5. Advanced Drilling Technology [3-0-0] (3 Cr)
VI	<ol style="list-style-type: none"> 1. Reservoir Engineering II [3-1-0] (4 Cr) 2. HC Production Engineering II [3-1-0] (4 Cr) 3. Advanced Drilling Technology [3-0-0] (3 Cr) 4. IPC Lab [0-0-3] (2 Cr) 	<ol style="list-style-type: none"> 1. Oil and Gas Well Testing [3-1-0] (4 Cr) 2. Offshore & Deep Sea Technology [3-0-0] (3 Cr) 3. Enhanced Oil Recovery [3-0-0] (3 Cr) 4. Production Engineering Lab [0-0-3] (2 Cr)
VII	<ol style="list-style-type: none"> 1. Process Safety [1-0-0] (1 Cr) 2. Production Engineering Lab [3-0-0] (3 Cr) 	<ol style="list-style-type: none"> 1. Health Safety and Environment [2-0-0] (2 Cr)
VII I	No Change	

Elective-I	Petroleum Exploration	Bio Energy	Waste Water Management	Management Techniques for Industrial Sector	Instrumentation and Process Control (for PE students)
Elective-II	Unconventional Energy Resources	Solar Energy, Photovoltaic Energy		Advanced Separation	Advanced Material Design
Elective-III	Petroleum Engineering System Design	Nuclear wind and geothermal energy		Hazardous Waste treatment and safety devices	Analytical Techniques
Elective-IV	Natural Gas Engineering	Petroleum Refinery Engineering	Air Pollution	Advanced Reservoir Modelling	Microfluidics Technology
Elective-V	Prospecting, Field Development and Asset Management	Petrochemical Technology		Nano Materials for Hydrocarbon Industry	Process Modelling and Simulation

SEM	Existing credits					Proposed Changes			
	L	T	P	Credit		L	T	P	Credit
1	16	4	8	25		16	4	8	25
2	16	3	9	25		16	3	9	25
3	12	2	14	22		13	3	11	22
4	15	2	11	23		15	3	11	24
5	14	4	3	20		16	2	6	22
6	17	2	6	23		17	1	6	22
7	13	1	9	22		14	1	6	21
8	8	0	12	18		8	0	12	18
Total	111	18	72	178		115	17	69	179

Detail proposal is attached as Annexure II

C) The suggestions given by the industries in the existing/offered courses for inclusion of new topics (Refer Annexure IB)

D) Suggestions sent by Dr. Saloma Yomdo, CGM, OIL are given below:

(i) In Semester-VII (Reservoir Simulation), in the Syllabus content on "Multiphase flow in one-dimension, simultaneous solution methods, Implicit Pressure Explicit Saturation method" Fully Implicit and Adoptive Implicit methods may also be added along with Implicit Pressure and Explicit Saturation method, as Fully Implicit is the most widely used solver technique in industry standard simulators and IMPES is generally used in Streamline simulators. Also, merits and demerits of the different solution techniques may be added.

(ii) 'Petroleum Economics' may be clubbed/included in the VII or VIII semester.

Approval sought: -

IPE seeks approval for the implementation of the curriculum change in Petroleum Engineering as per the advice of the industry experts.

Resolution: -

It was resolved to accept the proposal presented by HoD Petroleum Engineering for implementation from 2021-22 session with minor additions as follows:

1. Natural Gas Engineering course should include one chapter on LNG and the course can be floated from Autumn 2020-21 session.
2. Experiments from Fluid flow lab should be included in the production lab
3. Fundamentals of Heat Transfer need to be included in Transport through the porous media course.
4. Instrumentation and Process Control may be offered as elective in 7th Semester.

5. Carbon Capture and Sequestration should be included in EOR.
6. It was resolved to include suggestions made by Mr. Mahesh Chandra Gupta, related to inclusion of new topics in the offered/existing courses and should be taught by respective course coordinator/faculty.
7. It was resolved to include suggestions given by Dr. Saloma, OIL for the course of Reservoir Simulation. The "Economics" course is being offered in 6th semester to the students.

Agenda Point 3: - Curriculum change in MSc Applied Geology as per the advice of the industries

Addition of 2 new electives:

1. Applied Micro-Palaeontology (3credits)

Systematic Micropaleontology: foraminifera, calcareous nannoplankton, ostracodes, pteropods, calpionellids, calcareous algae, bryozoa, radiolaria, diatoms, and silicoflagellates, ebridians, conodonts, dinoflagellates, acritarchs, tasmanitids, chitinozoa, spores and pollen. Microfossils' guide. Assemblages. Biostratigraphic units. Biostratigraphic scales and correlations. Paleoecological, paleogeographic, paleoclimatic and paleoceanographic interpretations.

Surface and subsurface sampling methods for micro palaeontological studies; brief description of major microfossil groups used in hydrocarbon exploration; paleo-environmental interpretation using microfossils; bio stratigraphic classification, dating and correlation of stratigraphic sequences, standard planktonic foraminiferal zones; application of micropalaeontology in sequence stratigraphy; case studies from Indian sedimentary basins.

2. Managerial Economics (3 credits)

The Central Concepts of Economics and Nature and Scope of Managerial Economics: The Concepts of Scarcity, Choice, Opportunity Costs and Efficiency; The Modern Mixed Economy-Market and Government; The basic process of decision making: Demand, Supply and Markets; Equilibrium and Surplus; Quotas, and Price Ceilings

Behavior of the Consumer-Demand and Demand Analysis: Demand analysis of consumer and Elasticities of Demand; Demand estimation and Forecasting

Behavior of the Firm-Production and Cost Analysis: Production Theory: Short-run and Long-run Production Functions; Cost Theory: Short-run and Long-run Cost Functions

Market Structure and Pricing: Market structure and degree of competition; Price determination under different Market Structure- Short-run and Long-run Analysis,

Regulations and Risks: Regulations and Role of Government in the Economy; Risk and Uncertainty in Managerial Decision Making-Mergers and Acquisitions

Project Evaluation and Long-run Investment Decisions: Capital Budgeting and its Process-NPV, IRR; Project Evaluation: Capital Rationing and Profitability Index

Approval sought: -

IPE seeks approval for the addition of 2 new electives (Applied Micropaleontology and Managerial Economics) in MSc Applied Geology as per the advice of the industries.

Resolution: -

It was resolved to accept the proposed 2 new electives along with the presented course content.

Agenda Point 4: - Curriculum change in Chemistry

Particulars	Existing	Proposing
Code	BS 10002	BS 10002
Title	Physical Chemistry	General Chemistry
Credit	04	04
No of Hour	50	50
Content	<p>Thermodynamics of Chemical Processes: Concept of entropy, Chemical potential, Equilibrium conditions for closed systems, Phase and reaction equilibria, Maxwell relations, Real gas and real solution. [20L]</p> <p>Electrochemical Systems: Electrochemical cells and EMF, Applications of EMF measurements: Thermodynamic data, activity coefficients, solubility product and pH, corrosion. [08L]</p> <p>Kinetics of Chemical Reactions: Reversible, consecutive and parallel reactions, Steady state approximation, Chain reactions, Photochemical kinetics. [08L]</p> <p>Bonding Models in Inorganic Chemistry: Molecular orbital theory, Valence-bond theory, Crystal field theory. [08L]</p>	<p>Thermodynamics of Chemical Processes: Concept of entropy, Chemical potential, Equilibrium conditions for closed systems, Phase and reaction equilibria, Maxwell relations, Real gas and real solution. [20L]</p> <p>Electrochemical Systems: Electrochemical cells and EMF, Applications of EMF measurements: Thermodynamic data, activity coefficients, solubility product and pH, corrosion. [08L]</p> <p>Kinetics of Chemical Reactions: Reversible, consecutive and parallel reactions, Steady state approximation, Chain reactions, Photochemical kinetics. [08L]</p> <p>Basic hydrocarbon chemistry: Alkane, Alkene, Alkyne: (their) structure, stereochemistry, physical and chemical properties, chemical reactivity, separation. [08L]</p> <p>Basic Concept of Spectroscopy:</p>

	Basic Concept of Spectroscopy: Fundamentals of Microwave, IR and UV-VIS Spectroscopy, Selection rule, Determination of molecular structure. [06L]	Fundamentals of Microwave, IR and UV-VIS Spectroscopy, Selection rule, Determination of molecular structure. [6L]
Basis to change	Chemical bonding deals with the theoretical models to predict shape-structure and certain chemical properties. The concept on Basic Hydrocarbon chemistry will help the learner to deal with their core courses in both Chemical Engineering and Petroleum Engineering.	

Approval sought: -

IPE seeks approval to change the name of the 'Physical Chemistry' course to 'General Chemistry'; to add a chapter on organic chemistry and to implement the suggested changes in Chemistry from autumn 2021-22 session.

Resolution: -

It was resolved to accept the proposal and rename the subject as 'General Chemistry' with the changes as proposed.

Agenda Point 5: - Any other item with the permission of the Chair.

Proposed syllabus for UG/PG courses in Computer Science

Approval sought: -

IPE seeks approval to add one new course and modify four courses at UG level and to add one audit course of computer science in the PG program to the existing syllabus of B.Tech Chemical Engineering and Petroleum Engineering and for the PG programs to be offered. They are as mentioned below:

- 1) Fundamentals of Cyber Security
- 2) Programming and Data Structures
- 3) Object Oriented Programming
- 4) Operations Research
- 5) Data Analytics and AI for Process Industry
- 6) Cyber Security

Resolution: -

After a prolonged deliberation, the resolutions made are as follows:

- It was accepted to rename 'Information Technology' as 'Object Oriented Programming' with no change in the course content.
- It was also resolved to accept the suggested changes in 'Programming and Data Structure' and 'Data Analytics and AI for Process Industry'.
- The course content of the proposed course on 'cyber security' will be reviewed further by the honorable senate member Mr. Rama Sakthivel from Shell India. It is resolved to offer this program as an audit program for both UG and PG programs.
- A course with name 'Process Optimizations' may be floated as an introductory subject for the 'Operations Research' course.

As there are no more topics to be discussed, the meeting ended with a note of Vote of Thanks proposed by Dr B. Muralikrishna, the I/c Registrar of IPE, the ex-officio Secretary.



M. d. Muralikrishna
Registrar (I/c)

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