PRESIDENCY UNIVERSITY

Private University Estd. in Karnataka State by Act No. 41 of 2013

SCHOOL OF ENGINEERING
DEPARTMENT OF CHEMISTRY

Ref. No PU/SOE/CHE/BOS-04/2020-21/MOM01 Date: 28th August 2020

Minutes of the 4th Meeting of Board of Studies (Chemistry – BOS – CHE)

The 4th meeting of Board of Studies (BOS) of the Chemistry is held today on 28th August, 2020 at 11:00 AM by virtual mode hosted from Presidency University Campus Itgalpur, Rajankunte, Yelahanka, Bengaluru.

The following members are present:

S. No.	Name	Designation with Affiliation	Position	Attendance
1	Dr. Anu Sukhdev	Associate Professor and HOD-Chemistry, School of Engineering, Presidency University, Bangalore – 64	Chairperson	Present
2	Dr. Dileep R	Associate Professor, Department of Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member	Present
3	Dr. Amita Somya	Associate Professor, Department of Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member	Present
4	Dr. Shashikala A.R	Associate Professor, Department of Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member	Present
5	Dr. Chaitanya Lakshmi G	Assistant Professor, Department of Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member	Present
6	Dr. Ranganatha S	Assistant Professor, Department of Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member	Present
7	Dr. Sachidananda K B	Assistant Professor, Department of Mechanical Engineering, School of Engineering, Presidency University, Bangalore – 64	Member	Present

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8	Mr. Ankur Niyog	Assistant Professor, Department of Petroleum Engineering, School of Engineering, Presidency University, Bangalore – 64	Member	Present
9	Prof. A Govindaraj	Principal Research Scientist, Solid State and Structural Chemistry Unit, IISc, Bengaluru	External Member (Academic)	Present
10	Dr. Gurumurthy Hegde	Prof.C N R Rao Chair, Centre for Nano-Materials & Displays, Professor, BMS College of Engineering, Bengaluru	External Member (Academic)	Present
11	Mr. Rajeeva Deekshit	Founder and CEO, Pyrex Technology, Bengaluru	External Member (Industry)	Present
12	Dr. Saravanan Chandrasekaran	Assistant Professor, Department of Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member Secretary	Present

The Chairperson and member secretary, BOS-Chemistry, welcomed the gathering and requested their active involvement and cooperation in the process of making the Engineering chemistry curriculum to be offered at Presidency University and called the meeting to order.

Agenda SOE-CHE 4.1: To approve the minutes of 03rd Board of Studies Meeting held on 17th Jan 2020

The minutes of the 3rd meeting of the Board of Studies of Chemistry held on 17th January, 2020 was placed before the members and the same was confirmed (Annexure SOE-CHE 4.1).

Resolution: 3rd BOS minutes of the meeting was approved by the committee members.

Agenda SOE-CHE 4.2: To consider and approve the Chemistry Course Content for all the Engineering Programs of 2020 batch as in Annexure 1

Annexure 1 – List of Programs; Annexure 2 – Course Details

The Chairperson shared the list of Engineering programs, course details of Engineering Chemistry theory (CHE 101) and Engineering Chemistry Lab (CHE 151) courses offered by Department of Chemistry to the committee members.

The committee members discussed the same at length. After detailed deliberations, the same were approved with minor modification like inclusion of introduction to biomaterials in module-2 and

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inclusion of reference book for module-1 in the Engineering Chemistry theory course content. Engineering Chemistry Lab course content was approved without any changes.

Resolution: Resolved that the Content of Engineering Chemistry, CHE 101 & CHE 151, for the Academic Year 2020-2021 approved (Annexure SOE-CHE 4.2.1 and 4.2.2).

Agenda SOE-CHE 4.3: Approval of updated list of External Examiners for various courses in all the programs of the Department

The updated list of examiners (Annexure SOE-CHE 4.3) was approved as placed.

Agenda SOE-CHE 4.4: Any other matter with the permission of the Chair

Virtual modes of teaching and examination for Theory and Lab courses:

The Chairperson explained about the alternate methods of teaching during this lockdown period (previous semester from March 2020 as well as upcoming semester from Sept 2020). The following points were discussed,

- From the middle of previous semester (mid of March 2020) online classes were conducted through Zoom platform to teach theory and practical courses to the students.
- MHRD recommended virtual labs and e-source material were used to conduct the online lab demonstration.
- University LMS (Learning Management System) platform Edhitch was used to share the notes, manual, assignment questions and other academic information with students. Also effectively utilised to conduct the weekly test, unit test and other pre-end term examinations.
- Microsoft teams platform will be used to deliver the online lectures.
- In-house lab demonstration video recordings and MHRD recommended virtual lab platform will also be used for demonstrating the lab experiments.

Value added program (VAP) courses:

The Chairperson explained about the value added program courses offered by department of Chemistry to the committee members (Annexure SOE-CHE 4.4).

The following points were discussed,

- Aim of the non-credit VAP courses were discussed in details.
- Number of courses offered to the students.
- Content of all the 13 courses were discussed in details.
- Planning on conducting the courses through Microsoft teams platform.

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- External member suggested to offer a value added course based on the course related to Eco-friendly solutions safe alternatives to hazardous acids, alkalies and solvents industries are using and develop the technologies to convert waste to wealth.
- The external members appreciated and approved the VAP course.

Other Suggestions by the External committee members:

- Suggested to reduce the liquid-crystal content from module -2.
- Suggested to include more experiments related to critical micelle concentration (CMC) and liquid crystal synthesis in Engineering Chemistry Lab course.

The BOS Committee has authorized the BOS Chairperson of Chemistry, to incorporate minor corrections / edits, if required.

The BOS Chairperson has conveyed that the decisions taken during the 4th meeting of BOS for Chemistry will be implemented for the 2020-2021 academic year, where ever applicable. The Chairperson has conveyed thanks to all the members and informed that the date of next BOS meeting will be notified soon.

The meeting ended with Vote of Thanks to the Chair.

BOS Committee:

S No	Name	Status	Signature with date
1.	Dr. Anu Sukhdev	Chairperson	Anu Sukhdev 28/10/2020
2.	Dr. Dileep R	Member	28/10/2020
3.	Dr. Amita Somya	Member	
4.	Dr. Shashikala A.R	Member	28/10/2020
5.	Dr. Chaitanya Lakshmi G	Member	
6.	Dr. Ranganatha S	Member	28/10
7.	Dr. Sachidananda K B	Member	
8.	Mr. Ankur Niyog	Member	28/10/20
9.	Prof. A Govindaraj	External Member (Academic)	
10.	Dr. Gurumurthy Hegde	External Member (Academic)	
11.	Mr. Rajeeva Deekshit	External Member (Industry)	
12.	Dr. Saravanan Chandrasekaran	Member Secretary	C. Sara

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ANNEXURE SOE-CHE 4.1

Minutes of the 3rd Meeting of Board of Studies (Chemistry – BOS – CHE)

The 3rd meeting of Board of Studies (BOS) of the Chemistry is held today on 17th January, 2020 at 10.30 AM in Room No. MG 13.

The following members are present:

S. No.	Name	Designation with Affiliation	Status
1	Dr. Anu Sukhdev	Associate Professor and HOD-Chemistry School of Engineering, Presidency University, Bangalore – 64	Chairperson
2	Dr. Shashikala A. R.	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member
3	Dr. Amita Somya	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Internal Member
4	Dr. Saravanan Chandrasekaran	Assistant Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Internal Member
5	Dr. Kirti Agarwal	Professor and HOD, Chemistry, BMS College of Engineering, Bangalore	External Member (Academic)
6	Dr. C. Shivakumara	Principal Research Scientist and Professor, SSSU, IISc, Bangalore	External Member (Academic)
7	Dr. Dileep R	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member Secretary

The following member is given leave of absence:

S. No.	Name	Designation with Affiliation	Status
1	Dr. H. B. Rudresh	Co-founder and CEO, Bangalore, Vijaya Metal Finishers	External Member (Industry)
2	Dr. Tanmoy Chakraborty	Associate Professor and Deputy Registrar	Special Invitee
3	Mr. Yarlagadda Dheeraj kumar	Assistant Professor, Petroleum Engineering, School of Engineering, Presidency University, Bangalore – 64	Internal Member
4	Mr. Muralidhara D. M.	Assistant Professor, Mechanical Engineering, School of Engineering, Presidency University, Bangalore – 64	Internal Member

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The Chairperson, BOS-Chemistry, welcomed the gathering and requested their active involvement and cooperation in the process of making the Engineering chemistry curriculum to be offered at Presidency University and called the meeting to order.

Agenda CHE 3.1: Approval of the proceedings of 2nd BOS held on 4th May 2019.

The minutes of the 2nd meeting of the Board of Studies of Chemistry held on 4th May, 2019 was placed before the members and the same was confirmed (Annexure CHE 3.1)

Agenda CHE 3.2: Discussion on curriculum feedback from stakeholders.

The Chairperson shared the summary of the feedback taken from the faculty and the students to the committee. Based on the suggestions the new module titled "Introduction to Computational Chemistry" was introduced in place of the module titled "Quantitative Methods of Analysis" in CHE 101 Engineering Chemistry course.

Resolution: The same has been implemented from the Academic year 2019-20.

Agenda CHE 3.3: Ratification of the modifications in the Course content of Engineering Chemistry CHE 101, (2019-23 batch) for the academic year 2019-20

The Chairperson presented the details of the Course contents. The members discussed the same at length. After detailed deliberations, the same were ratified. (Annexure CHE 3.3). The following points were discussed.

- Computational Chemistry was introduced in place of Quantitative Methods of analysis
- Minor changes in the course content were made in order to cater all branches of Engineering uniformly
    - Ni-Metal Hydride batteries were included in place of Ni-Cd, Li-ion batteries
    - Solid state Chemistry was excluded from the course content
    - Cement, Refractories in Engineering Materials Module were replaced with Liquid crystals
    - Electro less plating of Copper on PCBs was included in place of Electroless Plating of Nickel.
    - The concept of determination of dissolved oxygen and Chemical oxygen demand in waste water treatment was included
    - In Water technology external water treatments like Zeolite method, Lime soda method were excluded

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- In Polymers, mechanisms, elastomers and Fibers were excluded and the determination of molecular weight of a polymer and polymerization techniques were included
- Solid State Chemistry was removed in the course content

➢ Water Technology and Corrosion Science, were merged into one module (Module IV)

➢ Electrochemistry and Batteries and Fuels and Combustion were merged into ENERGY SYSTEMS (Module III)

➢ The entire syllabus was outlined into 4 modules

Resolution: Resolved that the Content of Engineering Chemistry, CHE 101, for the Academic Year 2019-20 be ratified.

Agenda CHE 3.4: Approval of the Updated list of Examiners

The updated list of examiners (Annexure CHE 3.4) was approved as placed.

Agenda CHE 3.5: Any other matter with the permission from the Chair

The external members appreciated the introduction of computational chemistry in the course. The suggested to explore the possibility of practical aspects of computational chemistry in the course.

The committee discussed the possibility of introducing value added courses on

- Safety training
- Moral education and professional ethics

The BOS Committee has authorized the BOS Chairperson of Chemistry, to incorporate minor corrections / edits, if required.

The BOS Chairperson has conveyed that the decisions taken during the 3rd meeting of BOS for Chemistry will be implemented for the 2019-2020 academic year, where ever applicable. The Chairperson has conveyed thanks to all the members and informed that the date of next BOS meeting will be notified soon.

The meeting ended with Vote of Thanks to the Chair.

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ANNEXURE SOE-CHE 4.2.1

List of Programs:

1. Bachelor of Technology in Civil Engineering, abbreviated as B. Tech. (Civil Engineering);
2. Bachelor of Technology in Computer Science and Engineering (Cyber Security) abbreviated as B. Tech (CSE-Cyber Security)
3. Bachelor of Technology in Computer Science and Engineering (Artificial Intelligence and Machine Learning), abbreviated as B. Tech (CSE-AI & ML)
4. Bachelor of Technology in Computer Science and Engineering (IOT), abbreviated as B. Tech (CSE-IOT)
5. Bachelor of Technology in Computer Science and Engineering (Block Chain), abbreviated as B. Tech (CSE-Block Chain).
6. Bachelor of Technology in Computer Science and Engineering (Data Science), abbreviated as B. Tech (CSE-Data Science)
7. Bachelor of Technology in Computer Science and Technology (Big Data), abbreviated as B. Tech. (CSE-Big Data).
8. Bachelor of Technology in Computer Science and Technology, abbreviated as B. Tech CST
9. Bachelor of Technology in Computer Science and Engineering, abbreviated as B. Tech CSE
10. Bachelor of Technology in Information Science and Engineering, abbreviated as B. Tech ISE
11. Bachelor of Technology in Information Science and Technology, abbreviated as B. Tech IST
12. Bachelor of Technology in Computer Engineering, abbreviated as B. Tech CE
13. Bachelor of Technology in Computer and Communication Engineering, abbreviated as B. Tech CCE
14. Bachelor of Technology in Electronics and Computer Engineering, abbreviated as B. Tech ECOM
15. Bachelor of Technology in Electronics and Communication Engineering, abbreviated as B. Tech. (Electronics and Communication Engineering)
16. Bachelor of Technology in Electrical and Electronics Engineering, abbreviated as B. Tech. (Electrical and Electronics Engineering);
17. Bachelor of Technology in Mechanical Engineering, abbreviated as B. Tech. (Mechanical Engineering); and
18. Bachelor of Technology in Petroleum Engineering, abbreviated as B. Tech. (Petroleum Engineering).

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SCHOOL OF ENGINEERING
DEPARTMENT OF CHEMISTRY

Ref. No PU/SOE/CHE/BOS-05/2021-22/MoM Date: 06th August, 2020

Minutes of the 5th Meeting of Board of Studies (Chemistry – BOS – CHE)

The 5th meeting of Board of Studies (BOS) of the Chemistry is held today on 06th August, 2021 at 10.30 AM through virtual mode.

The following members are present:

S. No.	Name	Designation with Affiliation	Status
1	Dr. Abdul Sharief	Professor, Dean, School of Engineering, Presidency University, Bangalore – 64	Chairperson
2	Dr. Anu Sukhdev	Associate Professor and HOD-Chemistry School of Engineering, Presidency University, Bangalore – 64	Member Secretary
3	Dr. Dileep R	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member
4	Dr. Saravanan Chandrasekaran	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member
5	Dr. P. Selvam	Professor and Head NCCR, IIT Madras	External Member
6	Dr. S. Sampath	Professor IPC, IISc, Bangalore	External Member
7	Mr. Rajeeva Deekshit	Founder and CEO, Pyro Technologies Bengaluru	External Member (industry)
8	Dr. Shashikala A. R.	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Special Invitee

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The member secretary/ HoD extended a warm welcome to the members, particularly to the external members and introduced all the members in the committee. The chairman of 5th BoS meeting, Dr Abdul Sharief delivered the opening remarks by requesting BoS members to deliberate on each agenda and to provide constructive suggestions for the effective implementation of the proposed courses in the CBCS system.
With the permission of chairperson, the member secretary had presented the following agenda points and deliberations were recorded.

Agenda SOE-CHE 5.1: To approve the minutes of 4th BOS held on 28th August 2020.

Resolution SOE-CHE 5.1: The minutes of the 4th meeting of the Board of Studies of Chemistry held on 28th August 2020 was placed before the members and the same was discussed and approved by the members (**Annexure 1**)

Agenda SOE-CHE 5.2: Discussion on the feedback obtained on Curriculum from Industry, Students, Alumni and Faculty.

Resolution SOE-CHE 5.2: The member secretary presented the gist of feedback obtained on existing curriculum from Industry, students, alumni & faculty members as listed in **Annexure 2** and highlighted the necessity of revamping the curriculum towards flexible Choice based Credit System (CBCS).

Agenda SOE-CHE 5.3: Discussion on the Proposed CBCS Course grid and the Course catalogues for the 2021 admitted students

The member secretary presented the salient features of proposed program structure and a sample CBCS Course grid. The member secretary presented all the course catalogues (**Annexure 3)** which was duly approved after much deliberations with following discussions:

- CHE 1001: Environmental studies
    - A concept of health and safety may be incorporated
- CHE 1002: Industrial Chemistry
    - Module 2: lubricants and lubrication must be included
    - Module 3: Basics of catalysis may be introduced as it will be the basis of concepts like cracking, reforming etc.
- CHE 1003: Fundamentals of Sensors
    - Concept of lithography may be taken to explain the applications

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- A visit to IISc by the students to show MEMS facility will be beneficial
- Gas sensors and techniques may be introduced as examples when discussing applications

➢ CHE 1004: Smart materials for IOT

- Specific examples as sensors for IOT may be introduced
- Aspect of cyber physical system will be a good topic for students
- Specify the materials (organic and inorganic materials)
- Synthesis and characterization must be related

➢ CHE1005: Computational Chemistry

- Expertise is very much required
- Can be a very good course for engineering students
- Project works may be given in this course on simulation and modelling

➢ CHE1006: Introduction to Nanotechnology

- Basics of Nano chemistry needs to be introduced
- Understanding of Nanotechnologies by physicists and chemists at a global level should be dealt with
- Quantum approach to explain size dependent properties may be introduced
- Applications towards health and hygiene will be advantageous
- Recommended an additional text book for the course

➢ CHE1007-Biodegradable electronics

- More specific examples and their mechanisms can be given
- Recommended course for Electronics and Mechanical engineering students

➢ CHE1008-Energy and Sustainability

- Recommended course for mechanical and petroleum engineering students

➢ CHE1009-3D printing with polymers

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- Appreciated the course and the contents therein
- Recommended CAD concept to be dealt by external experts

➢ CHE1010-Bioinformatics

- Suggested to check with the respective branches to include specific examples and applications

➢ CHE1011-Chemical and Petrochemical catalysts

- Appreciated the course and the contents therein
- Suggested to change the title of Module 4 to "Homogeneous and Enzyme Catalysts"
- Recommended an additional text book for the course

➢ CHE1012- Introduction to Composite materials

- Suggested to limit the depth of chemistry concepts and include specific examples for design students

➢ CHE1013-Chemistry for Engineers

- Module 1 title may be changed to "Energy Conversion and storage"
- Module 3 title may be changed to "Materials for semiconductor Electronics"

➢ CHE1014-Surface Coating technology and Corrosion Science

- Coating techniques like painting and powder coating will be important concepts
- Limit the basics of electrochemistry

➢ CHE1015-waste 2 fuel

- Suggested to change the title of the course to "waste 2 fuels and chemicals"
- Suggested to include the concept of conversion of municipal and agricultural waste

➢ CHE1016-Forensic science

- Suggested to include lab visits for students to appreciate the values of the course

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Agenda SOE-CHE 5.4: Any other matter with the permission from the Chair

The external experts suggested to have at least one mandatory chemistry course like Computational chemistry, Nanotechnology, Sensors, Materials Science etc., which is very important for any engineering discipline to apply the fundamental knowledge for the development of technology. These courses can be very well appreciated by the student.

The BOS Committee has authorized the Member Secretary (in consent with the chairperson) to incorporate minor corrections/ edits, if required. The Chairperson and member secretary expressed special thanks to all the members and requested to extend the same support for the future activities.
The meeting ended with Vote of Thanks by Dr. Dileep.

BOS Committee:

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6	Dr. S. Sampath	Professor IPC, IISc, Bangalore	External Member
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8	Dr. Shashikala A. R.	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Special Invitee

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DEPARTMENT OF CHEMISTRY

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Resolution SOE-CHE 5.2: The member secretary presented the gist of feedback obtained on existing curriculum from Industry, students, alumni & faculty members as listed in **Annexure 2** and highlighted the necessity of revamping the curriculum towards flexible Choice based Credit System (CBCS).

Agenda SOE-CHE 5.3: Discussion on the Proposed CBCS Course grid and the Course catalogues for the 2021 admitted students

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Agenda SOE-CHE 5.4: Any other matter with the permission from the Chair

The external experts suggested to have at least one mandatory chemistry course like Computational chemistry, Nanotechnology, Sensors, Materials Science etc., which is very important for any engineering discipline to apply the fundamental knowledge for the development of technology. These courses can be very well appreciated by the student.

The BOS Committee has authorized the Member Secretary (in consent with the chairperson) to incorporate minor corrections/ edits, if required. The Chairperson and member secretary expressed special thanks to all the members and requested to extend the same support for the future activities.
The meeting ended with Vote of Thanks by Dr. Dileep.

BOS Committee:

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Ref. No PU/SOE/CHE/BOS-04/2020-21/MOM01 Date: 28th August 2020

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The following members are present:

S. No.	Name	Designation with Affiliation	Position	Attendance
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2	Dr. Dileep R	Associate Professor, Department of Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member	Present
3	Dr. Amita Somya	Associate Professor, Department of Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member	Present
4	Dr. Shashikala A.R	Associate Professor, Department of Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member	Present
5	Dr. Chaitanya Lakshmi G	Assistant Professor, Department of Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member	Present
6	Dr. Ranganatha S	Assistant Professor, Department of Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member	Present
7	Dr. Sachidananda K B	Assistant Professor, Department of Mechanical Engineering, School of Engineering, Presidency University, Bangalore – 64	Member	Present

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8	Mr. Ankur Niyog	Assistant Professor, Department of Petroleum Engineering, School of Engineering, Presidency University, Bangalore – 64	Member	Present
9	Prof. A Govindaraj	Principal Research Scientist, Solid State and Structural Chemistry Unit, IISc, Bengaluru	External Member (Academic)	Present
10	Dr. Gurumurthy Hegde	Prof.C N R Rao Chair, Centre for Nano-Materials & Displays, Professor, BMS College of Engineering, Bengaluru	External Member (Academic)	Present
11	Mr. Rajeeva Deekshit	Founder and CEO, Pyrex Technology, Bengaluru	External Member (Industry)	Present
12	Dr. Saravanan Chandrasekaran	Assistant Professor, Department of Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member Secretary	Present

The Chairperson and member secretary, BOS-Chemistry, welcomed the gathering and requested their active involvement and cooperation in the process of making the Engineering chemistry curriculum to be offered at Presidency University and called the meeting to order.

Agenda SOE-CHE 4.1: To approve the minutes of 03rd Board of Studies Meeting held on 17th Jan 2020

The minutes of the 3rd meeting of the Board of Studies of Chemistry held on 17th January, 2020 was placed before the members and the same was confirmed (Annexure SOE-CHE 4.1).

Resolution: 3rd BOS minutes of the meeting was approved by the committee members.

Agenda SOE-CHE 4.2: To consider and approve the Chemistry Course Content for all the Engineering Programs of 2020 batch as in Annexure 1

Annexure 1 – List of Programs; Annexure 2 – Course Details

The Chairperson shared the list of Engineering programs, course details of Engineering Chemistry theory (CHE 101) and Engineering Chemistry Lab (CHE 151) courses offered by Department of Chemistry to the committee members.

The committee members discussed the same at length. After detailed deliberations, the same were approved with minor modification like inclusion of introduction to biomaterials in module-2 and

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inclusion of reference book for module-1 in the Engineering Chemistry theory course content. Engineering Chemistry Lab course content was approved without any changes.

Resolution: Resolved that the Content of Engineering Chemistry, CHE 101 & CHE 151, for the Academic Year 2020-2021 approved (Annexure SOE-CHE 4.2.1 and 4.2.2).

Agenda SOE-CHE 4.3: Approval of updated list of External Examiners for various courses in all the programs of the Department

The updated list of examiners (Annexure SOE-CHE 4.3) was approved as placed.

Agenda SOE-CHE 4.4: Any other matter with the permission of the Chair

Virtual modes of teaching and examination for Theory and Lab courses:

The Chairperson explained about the alternate methods of teaching during this lockdown period (previous semester from March 2020 as well as upcoming semester from Sept 2020). The following points were discussed,

- From the middle of previous semester (mid of March 2020) online classes were conducted through Zoom platform to teach theory and practical courses to the students.
- MHRD recommended virtual labs and e-source material were used to conduct the online lab demonstration.
- University LMS (Learning Management System) platform Edhitch was used to share the notes, manual, assignment questions and other academic information with students. Also effectively utilised to conduct the weekly test, unit test and other pre-end term examinations.
- Microsoft teams platform will be used to deliver the online lectures.
- In-house lab demonstration video recordings and MHRD recommended virtual lab platform will also be used for demonstrating the lab experiments.

Value added program (VAP) courses:

The Chairperson explained about the value added program courses offered by department of Chemistry to the committee members (Annexure SOE-CHE 4.4).

The following points were discussed,

- Aim of the non-credit VAP courses were discussed in details.
- Number of courses offered to the students.
- Content of all the 13 courses were discussed in details.
- Planning on conducting the courses through Microsoft teams platform.

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- External member suggested to offer a value added course based on the course related to Eco-friendly solutions safe alternatives to hazardous acids, alkalies and solvents industries are using and develop the technologies to convert waste to wealth.
- The external members appreciated and approved the VAP course.

Other Suggestions by the External committee members:

- Suggested to reduce the liquid-crystal content from module -2.
- Suggested to include more experiments related to critical micelle concentration (CMC) and liquid crystal synthesis in Engineering Chemistry Lab course.

The BOS Committee has authorized the BOS Chairperson of Chemistry, to incorporate minor corrections / edits, if required.

The BOS Chairperson has conveyed that the decisions taken during the 4th meeting of BOS for Chemistry will be implemented for the 2020-2021 academic year, where ever applicable. The Chairperson has conveyed thanks to all the members and informed that the date of next BOS meeting will be notified soon.

The meeting ended with Vote of Thanks to the Chair.

BOS Committee:

S No	Name	Status	Signature with date
1.	Dr. Anu Sukhdev	Chairperson	
2.	Dr. Dileep R	Member	
3.	Dr. Amita Somya	Member	
4.	Dr. Shashikala A.R	Member	
5.	Dr. Chaitanya Lakshmi G	Member	
6.	Dr. Ranganatha S	Member	
7.	Dr. Sachidananda K B	Member	
8.	Mr. Ankur Niyog	Member	
9.	Prof. A Govindaraj	External Member (Academic)	
10.	Dr. Gurumurthy Hegde	External Member (Academic)	
11.	Mr. Rajeeva Deekshit	External Member (Industry)	
12.	Dr. Saravanan Chandrasekaran	Member Secretary	

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ANNEXURE SOE-CHE 4.1

Minutes of the 3rd Meeting of Board of Studies (Chemistry – BOS – CHE)

The 3rd meeting of Board of Studies (BOS) of the Chemistry is held today on 17th January, 2020 at 10.30 AM in Room No. MG 13.

The following members are present:

S. No.	Name	Designation with Affiliation	Status
1	Dr. Anu Sukhdev	Associate Professor and HOD-Chemistry School of Engineering, Presidency University, Bangalore – 64	Chairperson
2	Dr. Shashikala A. R.	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member
3	Dr. Amita Somya	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Internal Member
4	Dr. Saravanan Chandrasekaran	Assistant Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Internal Member
5	Dr. Kirti Agarwal	Professor and HOD, Chemistry, BMS College of Engineering, Bangalore	External Member (Academic)
6	Dr. C. Shivakumara	Principal Research Scientist and Professor, SSSU, IISc, Bangalore	External Member (Academic)
7	Dr. Dileep R	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member Secretary

The following member is given leave of absence:

S. No.	Name	Designation with Affiliation	Status
1	Dr. H. B. Rudresh	Co-founder and CEO, Bangalore, Vijaya Metal Finishers	External Member (Industry)
2	Dr. Tanmoy Chakraborty	Associate Professor and Deputy Registrar	Special Invitee
3	Mr. Yarlagadda Dheeraj kumar	Assistant Professor, Petroleum Engineering, School of Engineering, Presidency University, Bangalore – 64	Internal Member
4	Mr. Muralidhara D. M.	Assistant Professor, Mechanical Engineering, School of Engineering, Presidency University, Bangalore – 64	Internal Member

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The Chairperson, BOS-Chemistry, welcomed the gathering and requested their active involvement and cooperation in the process of making the Engineering chemistry curriculum to be offered at Presidency University and called the meeting to order.

Agenda CHE 3.1: Approval of the proceedings of 2nd BOS held on 4th May 2019.

The minutes of the 2nd meeting of the Board of Studies of Chemistry held on 4th May, 2019 was placed before the members and the same was confirmed (Annexure CHE 3.1)

Agenda CHE 3.2: Discussion on curriculum feedback from stakeholders.

The Chairperson shared the summary of the feedback taken from the faculty and the students to the committee. Based on the suggestions the new module titled "Introduction to Computational Chemistry" was introduced in place of the module titled "Quantitative Methods of Analysis" in CHE 101 Engineering Chemistry course.

Resolution: The same has been implemented from the Academic year 2019-20.

Agenda CHE 3.3: Ratification of the modifications in the Course content of Engineering Chemistry CHE 101, (2019-23 batch) for the academic year 2019-20

The Chairperson presented the details of the Course contents. The members discussed the same at length. After detailed deliberations, the same were ratified. (Annexure CHE 3.3). The following points were discussed.

- Computational Chemistry was introduced in place of Quantitative Methods of analysis
- Minor changes in the course content were made in order to cater all branches of Engineering uniformly
    - Ni-Metal Hydride batteries were included in place of Ni-Cd, Li-ion batteries
    - Solid state Chemistry was excluded from the course content
    - Cement, Refractories in Engineering Materials Module were replaced with Liquid crystals
    - Electro less plating of Copper on PCBs was included in place of Electroless Plating of Nickel.
    - The concept of determination of dissolved oxygen and Chemical oxygen demand in waste water treatment was included
    - In Water technology external water treatments like Zeolite method, Lime soda method were excluded

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- In Polymers, mechanisms, elastomers and Fibers were excluded and the determination of molecular weight of a polymer and polymerization techniques were included
- Solid State Chemistry was removed in the course content

- Water Technology and Corrosion Science, were merged into one module (Module IV)
- Electrochemistry and Batteries and Fuels and Combustion were merged into ENERGY SYSTEMS (Module III)
- The entire syllabus was outlined into 4 modules

Resolution: Resolved that the Content of Engineering Chemistry, CHE 101, for the Academic Year 2019-20 be ratified.

Agenda CHE 3.4: Approval of the Updated list of Examiners

The updated list of examiners (Annexure CHE 3.4) was approved as placed.

Agenda CHE 3.5: Any other matter with the permission from the Chair

The external members appreciated the introduction of computational chemistry in the course. The suggested to explore the possibility of practical aspects of computational chemistry in the course.

The committee discussed the possibility of introducing value added courses on

- Safety training
- Moral education and professional ethics

The BOS Committee has authorized the BOS Chairperson of Chemistry, to incorporate minor corrections / edits, if required.

The BOS Chairperson has conveyed that the decisions taken during the 3rd meeting of BOS for Chemistry will be implemented for the 2019-2020 academic year, where ever applicable. The Chairperson has conveyed thanks to all the members and informed that the date of next BOS meeting will be notified soon.

The meeting ended with Vote of Thanks to the Chair.

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ANNEXURE SOE-CHE 4.2.1

List of Programs:

1. Bachelor of Technology in Civil Engineering, abbreviated as B. Tech. (Civil Engineering);
2. Bachelor of Technology in Computer Science and Engineering (Cyber Security) abbreviated as B. Tech (CSE-Cyber Security)
3. Bachelor of Technology in Computer Science and Engineering (Artificial Intelligence and Machine Learning), abbreviated as B. Tech (CSE-AI & ML)
4. Bachelor of Technology in Computer Science and Engineering (IOT), abbreviated as B. Tech (CSE-IOT)
5. Bachelor of Technology in Computer Science and Engineering (Block Chain), abbreviated as B. Tech (CSE-Block Chain).
6. Bachelor of Technology in Computer Science and Engineering (Data Science), abbreviated as B. Tech (CSE-Data Science)
7. Bachelor of Technology in Computer Science and Technology (Big Data), abbreviated as B. Tech. (CSE-Big Data).
8. Bachelor of Technology in Computer Science and Technology, abbreviated as B. Tech CST
9. Bachelor of Technology in Computer Science and Engineering, abbreviated as B. Tech CSE
10. Bachelor of Technology in Information Science and Engineering, abbreviated as B. Tech ISE
11. Bachelor of Technology in Information Science and Technology, abbreviated as B. Tech IST
12. Bachelor of Technology in Computer Engineering, abbreviated as B. Tech CE
13. Bachelor of Technology in Computer and Communication Engineering, abbreviated as B. Tech CCE
14. Bachelor of Technology in Electronics and Computer Engineering, abbreviated as B. Tech ECOM
15. Bachelor of Technology in Electronics and Communication Engineering, abbreviated as B. Tech. (Electronics and Communication Engineering)
16. Bachelor of Technology in Electrical and Electronics Engineering, abbreviated as B. Tech. (Electrical and Electronics Engineering);
17. Bachelor of Technology in Mechanical Engineering, abbreviated as B. Tech. (Mechanical Engineering); and
18. Bachelor of Technology in Petroleum Engineering, abbreviated as B. Tech. (Petroleum Engineering).

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ANNEXURE SOE-CHE 4.2.2

Course details: Theory

Course Name:	ENGINEERING CHEMISTRY					
Course Code:	CHE 101	Credit Structure :	L	T	P	C
			4	0	0	4

Learning Objective:

The objective of the course is to impart technological aspects of applied chemistry and to lay a foundation for practical application of chemistry in engineering aspects

COURSE OUTCOMES:

On successful completion of the course, the student shall be able to

CO1: relate the importance of chemical sciences in solving engineering problems.
CO2: describe the applications of polymers and liquid crystals for various industries.
CO3: discuss the importance of various chemical and electrochemical sources in energy systems.
CO4: Explain the fundamental principles in water treatment and corrosion process

COURSE DESCRIPTION:

The primary objective of the course is to introduce the students to the concepts of applications of chemistry in Engineering. It should cultivate in them an ability to identify chemistry in finely engineered products used in households and industry. It aims to strengthen the fundamental concepts of chemistry and then builds an interface with the industrial applications. It deals with applied and industrially useful topics, such as Computational chemistry, Engineering materials such as Polymers and liquid crystals, Energy systems, Water Technology and Corrosion.

COURSE CONTENT (SYLLABUS):

Module I: INTRODUCTION TO COMPUTATIONAL CHEMISTRY [6 Hrs]

Intra and intermolecular forces: Chemical bonding- ionic, covalent and metallic bond; Van der Waals forces, ion-dipole, dipole-dipole, induced dipole interactions, and Hydrogen bonding.

Computational chemistry: Visualization of chemical structures; molecular modelling-definition, Density functional theory-definition, Chemoinformatics-definition, Software for chemoinformatics. Applications of computational chemistry.

Module II: ENGINEERING MATERIALS [12 Hrs]

Limitations of conventional materials in engineering designs.

Polymers-Classification with examples, Techniques of polymerization (any 2), Plastics: Thermoplastics and thermosetting plastics; Compounding of resins into plastics; Preparation, properties and applications of Teflon, Bakelite and Nylon, Glass Transition temperature and its significance,

Numerical problems on determination of Molecular weight of polymers, Polymer composites-definition, constituents, properties and industrial applications. Conducting polymers, criteria for conduction and applications.

Biodegradable polymers-introduction and applications;

Liquid Crystals- Introduction, Classification and applications of liquid crystals in Displays (LCDs)

Module III: ENERGY SYSTEMS [12 Hrs]

Electrochemical energy sources: Basic principles of Electrochemistry, Batteries: Classification of batteries, Construction, working, applications of classical and modern batteries, Fuel cells: H2-O2 fuel cell and applications, Super capacitors and applications.

Chemical energy sources: Fuels: Classification, Calorific value, Determination of calorific value and numerical problems therein, Petroleum: Cracking, Catalytic reforming, knocking. Bio-diesel - synthesis and applications

Module IV: WATER TECHNOLOGY and CORROSION SCIENCE [15 Hrs]

Water technology: Introduction, Hardness of water, units of hardness, numerical problems on determination of hardness by EDTA method. Disadvantages of hard water-Boiler feed water and its treatment, Ion exchange processes. Boiler troubles.

Potable water- Specifications, Treatment of water for municipal supply, Desalination by Reverse osmosis, Waste water-COD and DO by Winkler method, Sewage treatment –Applications of Nano technology in water treatment.

Corrosion science: Introduction to corrosion- causes and effects, electrochemical theory, factors and types.

Corrosion control methods: Protective coatings: Organic coatings; Cathodic protection; Electroplating of Chromium; Electroless plating of Copper on PCBs.

BOOKS:

Textbook(s)

T1. Wiley, “Engineering Chemistry”, Wiley.

Reference Book(s)

R1. Dr. K. Pushpalatha, “Engineering Chemistry”, Revised Edition, Wiley.

R2. Jain and Jain, “Engineering Chemistry”, 17th Edition, Dhanpat Rai Publishing Company. New Delhi, 2019.

R3. Koch, W., & Holthausen, M. C. (2015). A chemist's guide to density functional theory. John Wiley & Sons.

R4. Shikha Agarwal, "Engineering Chemistry-Fundamentals and Applications", Cambridge University Press, 2015.

R5. Elements of Physical Chemistry, 6th Edition, Peter Atkins and Julio De Paula, Oxford publishing, 2013.

R6. F.W. Billmeyer, Text Book of Polymer Science, John Wiley & Sons, 4th Edition, 1996.

R7. M.G. Fontana, N. D. Greene, Corrosion Engineering, McGraw Hill Publications, New York, 3rd Edition, 1996.

R8. Jurs, P.C., 1996. Computer software applications in chemistry. John Wiley & Sons.

R9. Stephen Wilson (auth.) - Chemistry by Computer: An Overview of the Applications of Computers in Chemistry-Springer US (1986)

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Course details: Lab

Course Name:	ENGINEERING CHEMISTRY LAB					
Course Code:	CHE 151	Credit Structure :	L	T	P	C
			0	0	2	1

Learning Objective:

The basic objective of the course is to provide students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence.

COURSE OUTCOMES: On successful completion of the course the students shall be able to:

CO1: Identify various apparatus and equipment for the experimentation
CO2: Estimate the chemical samples by different types of titrimetric and instrumental analysis
CO3: Interpret the recorded data with appropriate representations
CO4: Demonstrate effectively during technical group discussions

COURSE DESCRIPTION:

This lab course intends to train the students to develop their experimental skills and apply fundamental chemical principles in problems related to chemistry in engineering. The experiments are designed to support the theory lectures and the hands-on experience will thus enhance students' in understanding the concepts.

This lab course includes the estimation of total hardness of water by EDTA complexometric method, determination of the total alkalinity of a given water sample, estimation of Iron (II) in Mohr's salt, estimation of calcium oxide in cement, determination of Chemical Oxygen Demand (COD) of Industrial Waste Water sample, determination of pKa value of weak acid using pH meter, Estimation of copper colorimetrically, determination of Iron (II) by potentiometry, determination of viscosity co-efficient of a liquid using Ostwald's Viscometer, estimation of strength of mixture of acids by conductometry method.

LIST OF SKILL SETS

The students shall be able to develop:

1. An attitude of enquiry.
2. Ability to interpret events and results.
3. Observe and measure physical phenomena.
4. Select suitable equipment, instrument and materials.
5. The ability to follow standard test procedures.

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COURSE CONTENT (SYLLABUS):

Experiment:1: Estimation of total alkalinity of water using standard HCl solution. **[2 Hrs]**

Experiment: 2: Estimation of total hardness of water by EDTA complexometric method. **[2 Hrs]**

Experiment: 3: Estimation of calcium oxide in cement solution by rapid EDTA method. **[2 Hrs]**

Experiment: 4: Determination of Chemical Oxygen Demand (COD) of Industrial Waste Water sample. **[2 Hrs]**

Experiment: 5: Estimation of Iron (II) in Mohr's salt using standard potassium permanganate solution. **[2 Hrs]**

Experiment: 6: Determination of pK_a value of weak acid using pH meter. **[2 Hrs]**

Experiment: 7: Potentiometric estimation of Iron (II) using standard potassium dichromate solution. **[2 Hrs]**

Experiment: 8: Estimation of copper by colorimetric method. **[2 Hrs]**

Experiment: 9: Estimation of strength of mixture of acids by Conductometric titration. **[2 Hrs]**

Experiment: 10: Determination of viscosity co-efficient of a liquid using Ostwald's Viscometer. **[2 Hrs]**

Book:

"Engineering Chemistry Lab Manual", Presidency University.

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ANNEXURE SOE-CHE 4.3

DETAILS OF EXTERNAL EXAMINERS

Sl. No.	Faculty Name	Designation	University / Institute
1	Dr. M.S. Dharmaprakash	Professor	BMSCE
2	Dr. Ratnakaram Venkata Nadh	Professor-HOD	GITAM School of Technology (Bengaluru campus)
3	Dr. Malathi Challa	Assistant Professor	Ramaiah Institute of Technology
4	Dr. Ramakrishnappa T	Associate Professor-HoD	BMSIT
5	Dr. Lakshmi B.	Associate Professor	Reva University
6	Dr. Manjunath H	Assistant Professor	GITAM School of Technology (Bengaluru campus)
7	Dr. Kalyan Raj	Professor and HoD	BMSCE
8	Dr. Manjunath A. S.	Associate Professor-HoD	Don Bosco Institute of Technology
9	Dr. Madhusudhana Reddy	Professor and HoD	Reva University
10	Dr. Anantharaju	Associate Professor and HoD	Dayananda Sagar College of Engineering
11	Dr. Viswanatha R.	Assistant Professor and HoD	Jyothy Institute of Technology
12	Dr. P. Murali Krishna	Assistant Professor	Ramaiah Institute of Technology
13	Dr. Nagabushan B M	Professor and Head	Ramaiah Institute of Technology
14	Dr. Jyoti Roy Chowdhury	Assistant Professor	BMSIT
15	Dr. Nagashree K	Assistant Professor	BMSCE
16	Dr. Subha JP	Professor	Donbosco institute of technology
17	Dr. Ananthag G S	Assistant Professor	BMSCE
18	Dr. Nagarajiah	Assistant Professor	Reva University
19	Dr. Vishnumurthy K A	Assistant Professor	RV college of Engineering

DETAILS OF INTERNAL EXAMINERS

Sl. No.	Faculty Name	Designation
1	Dr. Anu Sukhdev	Associate Professor-HoD
2	Dr. Dileep R.	Associate Professor
3	Dr. Amita Somya	Associate Professor
4	Dr. Shashikala A.R.	Associate Professor
5	Dr. Saravanan Chandrasekaran	Assistant Professor
6	Dr. Aparna Roy	Assistant Professor
7	Dr. Anjali K.	Assistant Professor
8	Dr. Gokulakrishnan Subramanian.	Assistant Professor
9	Dr. Chaitanya Lakshmi.G	Assistant Professor

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10	Dr. Nikhath Fathima	Assistant Professor
11	Dr. Ranganatha S.	Assistant Professor
12	Dr. Sumbul Rahman	Assistant Professor
13	Dr. Sunil Kumar K. R.	Assistant Professor

NOTE: The chairperson is authorized to include the examiners (internal and external) as the need arises.

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ANNEXURE SOE-CHE 4.4

List of Value added program (VAP) courses

S.No	Title of the Course	Course Code	Faculty/Faculties Offering the course
1	Biodegradable Electronics	CHE V 001	Dr. Saravanan Chandrasekaran, Dr. Aparna Roy and Dr. Anu Sukhdev
2	Food, Nutrition and Agriculture	CHE V 002	Dr. Dileep and Dr. Gokulakrishnan
3	Industrial Waste Management	CHE V 003	Dr. Chaitanya Lakshmi G and Dr. Nikhath Fathima
4	Introductory Biomedical Engineering and Healthcare IT	CHE V 004	Dr. Dileep and Dr. Gokulakrishnan
5	Material Characterization	CHE V 005	Dr. Sumbul Rahman and Dr. Anjali K
6	Materials Electrochemistry	CHE V 006	Dr. Ranganatha S
7	Materials for Electronics	CHE V 007	Dr. Anjali K and Dr. Saravanan Chandrasekaran
8	Materials for Engineering Applications	CHE V 008	Dr. Sunil Kumar K R, Dr. Chaitanya Lakshmi G and Dr. Gokulakrishnan
9	Nanotechnology	CHE V 009	Dr. Sunil Kumar K R, Dr. Chaitanya Lakshmi G and Dr. Nikhath Fathima
10	Polymer Science	CHE V 010	Dr. Aparna Roy, Dr. Saravanan Chandrasekaran and Dr. Sumbul Rahman
11	Polymer Technology	CHE V 011	Dr. Anu Sukhdev, Dr. Sumbul Rahman and Dr. Saravanan Chandrasekaran
12	Renewable energy sources	CHE V 012	Dr.Shashikala A.R
13	Sustainable Development	CHE V 013	Dr. Amita Somya

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ANNEXURE- 2 for Agenda SOE-CHE 5.2 [Discussion on the stake holders' feedback on curriculum]

<u>Gist of the feedback on Curriculum obtained from Industry Experts, Faculty Members, Students and Alumni</u>

Preamble: It is the Vision of the Presidency University to offer the best academic experience to the students through the advanced and relevant Course content and hence the University is in constant touch with all the stake holders to elicit their feedback on the curriculum followed.

Though the University was in the process of upgradation of its curriculum annually from its inception in 2015, the BOG has directed the academic community to revamp the whole curriculum from 2021 as the current curriculum is of 5 years old and many new curriculum concepts are getting evolved elsewhere in the world.

In view of this, a detailed feedback on the existing curriculum was obtained from all the stake holders [Industry experts, faculty members, students &Alumni] and gist of their feedback is presented below:

- Adequacy of the Core Courses: The courses look to be adequate, yet the students' needs to have more choice in its selection
- **Adequacy of the Core Courses: Though all the traditional laboratory courses are part of the curriculum, some more courses need to be oriented towards laboratory exposure**
- **Fulfilment of professional needs: Scope for multi-disciplinary course learning is very limited and hence wide variety of courses of multi-disciplinary nature to be introduced**
- Adequacy of the course credit: Total credit requirement is very heavy for a four-year degree program; it has to be brought it down considerably
- Exposure of Computing Knowledge and skills to non-computing programs are very limited the same needs to be enhanced

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- The scope for learning general courses [Not directly connected with the program] is very limited, the same needs to be enhanced
- **Curriculum design must follow the concepts of Outcome Based Education (OBE) and the same must reflect in the curriculum structure**
- **The courses must be identified w.r.t. its ability to imbibe the foundation skills, entrepreneurial skills and employability skills**
- **The courses also must attempt in inculcating gender sensitization, environmental sustainability and Human values and professional ethics among the students**
- **The need for offering some of the courses as a tradition although they may not considerably influence on the other courses of the program may be discarded and they may be offered as open electives so that only such interested or needy students may learn the same.**

The academic community and the DAC have seriously worked on all the above suggestions and studied the curriculum of many leading universities before suggesting the new structure.

In accordance with the UGC regulations and as per the NAAC requirement, the current curriculum, is designed with CBCS and OBE in mind.

It is the strong opinion of the PU academic community that the current curriculum addresses to most of the points raised in the feedback and also serve in offering the best to the students.

In view of the above the CBCS- OBE based curriculum which will be presented in the next agenda may please be recommended for approval of the Academic Council.

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Course Code: CHE1001	**Course Title:** Environmental Studies **Type of Course:** Open Elective/ Pass-fail course		**L- P- C**	2	0	0
Version No.	1.0				
Course Pre-requisites	NIL				
Anti-requisites	**NIL**				
Course Description	This course provides basic scientific knowledge and understanding of how our world works from an environmental perspective. Topics covered include: basic principles of ecosystem function; biodiversity and its conservation; human population growth; water resources, solid waste management; water, air and soil pollution; climate change; energy resources, and sustainability.				
Course Outcomes	On successful completion of this course the students shall be able to: 1) outline the need for eco-balance 2) Acquire basic knowledge about global climate change with particular reference to the Indian context. 3) Identify ways to protect the environment				
Course Content:					
Module 1	**Environment and Ecosystem**	Assignment	Data Collection	**05 Classes**	
Topics: Significance and need for environmental studies, Applications of environmental science in various engineering disciplines; Environmental ethics; Ecosystem, earth - life support system and ecosystem components; Energy flow in ecosystem; Biogeochemical cycles; Effect of human activities on these cycles.					
Module 2	**Biodiversity**	Assignment	Data Collection	**06 Classes**	
Topics: Importance, types, factors affecting biodiversity; Species interaction - Extinct, endemic, endangered and rare species; mega-biodiversity; Hot-spots; Ecological succession; Genetically Modified crops; Threats and Conservation of biodiversity.					
Module 3	**Sustaining Natural Resources**	Case study	Data analysis	**07 Classes**	
Topics: Food, soil conservation and pest management – Water resources: Water footprint and virtual water – Desalination – Energy resources-Renewable and non-renewable, efficiency and conservation.					
Module 4	**Environmental pollution and challenges**	Case study	Data analysis	**07 Classes**	
Topics: Environmental hazards: Biological, Chemical, Nuclear, Biomedical, noise, e-waste; Risk and evaluation of hazards; Types of pollution: Air and water – Pollution sources, effects and mitigation. Water quality management; Solid waste management (land); Climate disruption, global warming and ozone depletion.					
Module 5	**Human Population Change and Environment**	Assignment	Data Collection	**05 Classes**	
Topics: Urban environmental problems; Health and Hygiene, Consumerism and waste products; Promotion of economic development – Impact of population age structure – Women empowerment. Sustaining human societies: Economics, environment, policies and education.					
Targeted Application & Tools that can be used: Application areas are Energy, Environment and sustainability					

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Tools: Statistical analysis of environmental pollutants using excel origin etc.

Project work/Assignment:

1. **Write a State of Environment (SoE) report of your town/city/state/country**
2. **A video recorded statement/presentation of their own ideas on environmental mitigation**
3. Individual students will carry out analysis of polluted solid, liquid and gaseous samples and propose suitable mitigation measure(s). A detailed and in-depth report needs to be submitted for each case. This may include preparation of reagents, sample preparation (extraction), chemical analysis carried out, instruments and tools used, data collected and processed, inferences made and conclusions arrived at. Necessary theory support be given in the form of reference links to ebooks (or details like page numbers), journals and websites. A plagiarism check report be submitted which may carry weightage in report evaluation.

Text Book

1. G. Tyler Miller and Scott Spoolman (2020), Living in the Environment, 20th Edition, Cengage Learning, USA

Reference Books

1. David M. Hassenzahl, Mary Catherine Hager, Linda R. Berg (2017), Visualizing Environmental Science, 5th Edition, John Wiley & Sons, USA.
2. William P. Cunningham and Mary Ann Cunningham (2017), Principles of Environmental Science: Inquiry & Applications, 8th Edition, McGraw-Hill Education, USA.

Skill Sets

All topics in theory component are relevant to Environment and Sustainability.

Lab/Project Skill sets

1. An attitude of enquiry.
2. Ability to interpret events and results.
3. Ability to work as a leader and as a member of a team.
4. Observe and measure physical phenomena.
5. Write reports.
6. Select suitable equipment, instrument and materials.
7. The ability to follow standard test procedures.
8. An awareness of the Professional Ethics.
9. Need to observe safety precautions.

Catalogue prepared by	Department of Chemistry
Recommended by the Board of Studies on	BOS NO: 5th BOS held on 06/08/21
Date of Approval by the Academic Council	

REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE

Course Code: CHE1002	**Course Title:** Industrial Chemistry **Type of Course:** Program Core- Theory and Lab	**L- P- C**	2	1	3
Version No.	1.0				
Course Pre-requisites	Basics of Atomic structure, Chemical bonding, periodic table and hydrocharbon chemistry				
Anti-requisites	**NIL**				
Course Description	The primary objective of the course is to introduce the students to the concepts and applications of chemistry in Engineering. The course also aims to enhance the knowledge of chemical composition and properties of chemical molecules as alternate fuels. It will also cultivate in them an ability to identify chemistry in each piece of smart engineered products used in households and industry. It targets to strengthen the fundamental concepts of chemistry and then builds an interface with their industrial applications. The associated laboratory provides an opportunity to lay foundation for practical application of chemistry in engineering aspects				
Course Outcomes	On successful completion of this course the students shall be able to: 4) identify the suitable polymers to replace the conventional materials 5) Discuss the importance of different surfactants in various fields 6) describe the processes involved in the oil refineries 7) apply the knowledge of electrochemistry principles for protection of different metals from corrosion.				
Course Content:					
Module 1	**Polymer Chemistry**	Case study	Data Collection and analysis	**7 Classes**	
Polymers: Introduction, Zeigler Natta Polymerization, Polymerization techniques, Plastics as engineering materials: Thermo plastics and thermosetting plastics-advantages, limitations and industrial applications. Compounding and moulding process (injection and Compression molding) Polymer composites, Conducting polymers and biodegradable polymers					
Module 2	**Introduction to Surfactants and Lubricants**	Assignment	Data Collection	**4 Classes**	
Topics: Surfactant Chemistry: Basic terminology: Surfactants, classification, micelle formation, emulsifying agents, foaming agents, wetting agents (basics), and Industrial application of surface active agents. Lubricants: classification and mechanism of lubrication					
Module 3	**Fuels and Combustion**	Case study and Assignment	Data analysis	**07 Classes**	
Topics: Fuels and Combustion Fuels –Classification, Calorific value determination, **Solid fuels**: Proximate and Ultimate analysis of Coal; **Liquid Fuels**: Petroleum: Basics of Catalysis, types and importance in Cracking and reforming; Knocking, Synthetic petrol, Power alcohol; **Gaseous Fuels**: Natural gas, CNG, LPG. Alternate fuels: Bio-diesel Combustion: flue gas analysis; Rocket propellants and Explosives – classification, storage and handling					
Module 4	**Corrosion and its control**	Case study	Data analysis	**07 Classes**	

Dry and Wet Corrosion – detrimental effects to buildings, machines, devices and decorative art forms, emphasizing Differential aeration, Pitting, Galvanic and Stress Corrosion cracking. Factors that enhance corrosion and choice of parameters to mitigate corrosion.
Corrosion Control – Cathodic protection- Sacrificial anodic protection, Advanced protective coatings : electro plating, electroless plating, PVD and CVD

List of laboratory tasks

1. Determination of total acid number of an oil (Comprehensive)
2. Determination of pKa of a weak acid using pH meter (Knowledge)
3. Potentiometric estimation of iron in the given rust solution using standard $K_2Cr_2O_7$ solution. (Comprehensive)
4. Determination of calorific value of a solid fuel using Bomb calorimeter (Comprehensive)
5. Synthesis of polyaniline and its conductivity measurement (Comprehensive)
6. Estimation of copper from industrial effluents by colorimetric method and smart phone digital imaging method (material analysis) (Knowledge)
7. Determination of Viscosity of different natural /synthetic polymers Using Ostwald Viscometer (Knowledge)
8. Determination of Critical Micelle Concentration (Comprehensive)
9. Electroplating technique (Knowledge)
10. Estimation of water hardness by EDTA method and its removal (by zeolite/ ion exchange method) (Comprehensive)
11. Estimation of water quality monitoring using conductivity method(Comprehensive)

Preparation of a working model relevant to syllabus and its demonstration

1. Preparation of gas sensing polymeric material for sensing (student can fabricate a chemical sensor and demonstrate) (Application)
2. Student can select any mitigation method (preferably coating methods) to control corrosion (Application)

Targeted Application & Tools that can be used:

Application areas are Polymer, oil and gas, Boiler, automotive and mechanical industries
Tools: Statistical analysis of Corrosion in materials using tools like Design expert software (ANOVA, RSM, etc.)

Project work/Assignment:

Assignment: 1 Report writing on recycling plastic waste into plastic lumber
Assignment 2: Identify a corrosion problem encountered in your immediate surroundings and discuss your choice of mitigation

Text Book

1. Engineering Chemistry, Shika Agrawal (2018), Cambridge University Press

Reference Books

1. Engineering Chemistry, Jain and Jain (18th Edition) Dhanpat Rai Publishing Company
2. An introduction to Surfactants (2014) Tharwat F. Tadros, De Gruyter Publishers

Skill Sets

All topics in theory component are relevant to Environment and Sustainability.

Lab Skill sets

10. An attitude of enquiry.
11. Ability to interpret events and results.
12. Ability to work as a leader and as a member of a team.
13. Observe and measure physical phenomena.
14. Write reports.
15. Select suitable equipment, instrument and materials.
16. The ability to follow standard test procedures.
17. An awareness of the Professional Ethics.
18. Need to observe safety precautions.

Catalogue prepared by	Dr. Anu Sukhdev Dr. Dileep R

REGISTRAR PRESIDENCY UNIVERSITY Registrar BANGALORE

	Dr. Saravanan
Recommended by the Board of Studies on	BOS NO: 5th BOS held on 06/08/21
Date of Approval by the Academic Council	

REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE

Course Code: CHE1003	**Course Title:** Fundamentals of Sensors **Type of Course:** Open Elective (Theory Only)	**L- P- C**	3	0	3
Version No.	**1.0**				
Course Pre-requisites	**NIL**				
Anti-requisites	**NIL**				
Course Description	The purpose of this course is to enable the students to appreciate the need for sensor technology and to develop the basic abilities of modelling, fabricating and analyzing the sensor system. The course is both conceptual and analytical in nature that impart fair knowledge on materials for sensors. The course develops the critical thinking, analytical skills and product manufacture. The course also enhances knowledge of science to develop the technologically important materials.				
Course Outcomes	On successful completion of this course the students shall be able to: 1) Discuss important topics associated with the Sensor technology and requirement of basic Components. 2) Identify the suitable materials and techniques for manufacturing of sensor devices for a given application. 3) Select advanced techniques and tools for suggesting suitable sensing systems to solve multi-disciplinary challenges in industry and society.				
Course Content:					
Module 1	Fundamental concepts and Characteristics of Sensors	Assignment	Data Collections		**10 classes**
Topics: Introduction to Sensors, Principles of Sensing, Signals and Systems; Sensor Classification; Units of Measurements; Terminology of Sensors, basics of Lithography					
Module 2	Sensor Materials and Technologies	Case Study	Programming tools		**12 classes**
Topics: Materials, Surface Processing, MEMS and Nano-Technology Modeling organic electronic materials for Sensors using programming tools.					
Module 3	Fabrications and sensing mechanisms	Case study	Data collection and analysis		**12 classes**
Topics: Device fabrications – techniques, challenges and performances. Sensing mechanisms with different analytes.					
Targeted Application & Tools that can be used: Application Area is Sensor technology for Smart house, smart cities and internet of things (IoT) Tools – SCM (software for chemistry and materials), Molview, Biovia Materials Studio etc.,					

Project work/Assignment:

Assignment: 1 Prepare a comprehensive report on the recent literatures on sensor materials and applications

Assignment 2: Preparation of sensor materials for humidity or gas sensing applications.

A lab/facility visit to the IISc for the MEMS lab for the students

Text Book:

Sensor Technology Handbook, Edited by Jon S Wilson, Elsevier, 2005, ISBN: 978-0-7506-7729-5, https://doi.org/10.1016/B978-0-7506-7729-5.X5040-X.

References

1. Smart Sensors at the IoT Frontier, Edited by Hiroto Yasuura, Chong-Min Kyung, Yongpan Liu, Youn-Long Lin, Springer International Publishing AG 2017, eBook ISBN: 978-3-319-55345-0, https://doi.org/10.1007/978-3-319-55345-0.
2. Sensor Technologies: Healthcare, Wellness and Environmental Applications, Edited by Michael J. McGrath, Cliodhna Ni Scanaill, Dawn Nafus, Published by Apress, 2014. Ebook ISBN: 9781430260141, 1430260149.
3. Janata, Jiri, "Principles of Chemical sensors", 2014, 2nd edition, Springer, New York.
4. Jon. S. Wilson, “Sensor Technology Hand Book”, 2011, 1st edition, Elsevier, Netherland.
5. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stamatis Karnouskos, Stefan Avesand, David Boyle, “From Machine to Machine to Internet of Things”, Elsevier Publications, 2014, ISBN 978-0-12-407684-6, https://doi.org/10.1016/C2012-0-03263-2.

Skill Development

1. Foundation skills
2. Employability skills
3. Environmental sustainability
4. Write reports
5. Select suitable equipment, instrument and materials

Catalogue prepared by	Dr. Saravanan Chandrasekaran Dr. Anu Sukhdev Dr. Sunil Kumar K R
Recommended by the Board of Studies on	BOS NO: 5th. BOS held on 06/08/21
Date of Approval by the Academic Council	

REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE

Course Code: CHE1004	**Course Title: Smart materials for IOT** **Type of Course: Open Elective (Theory only)**		**L- P- C**	3	0	3
Version No.	1.0				
Course Pre-requisites	**NIL**				
Anti-requisites	**NIL**				
Course Description	The purpose of this course is to enable the students to appreciate the need for smart materials for IOT and to develop the basic abilities of synthesizing, characterizing and fabricating different smart materials. The course is both conceptual and fundamental in nature which leads to explore the knowledge of chemistry and computers. The course develops the critical thinking and skills for producing new materials. The course also enhances the literature survey abilities through assignments.				
Course Outcomes	On successful completion of this course the students shall be able to: CO1: describe the fundamental concepts of electronic materials CO2: classify the smart materials for IOT applications. CO3: apply the knowledge of synthetic chemistry for preparation and characterization of new smart materials. CO4: select appropriate fabrication techniques to fabricate the new IOT devices.				
Course Content:					
Module 1	Smart materials	Assignment, case studies	Data Collections	**11 classes**	
Topics: **Introduction to Smart materials for IOT:** Introduction and basic terminologies of IOT. Types of materials – organic- polymers, conducting polymers and biopolymers, inorganic-metal and metal oxides and their hybrid materials for internet of things (IOT). National and international status on research and development, commercial and market status of IOT devices.					
Module 2	Synthesis and Characterization	Assignment	Programming tools	**16 classes**	
Topics: **Synthesis and Characterisation of IOT materials:** Synthesis of smart materials (organic - polymers, conducting polymers and biopolymers, inorganic-metal and metal oxides and their hybrid materials) for gas, humidity and proximity sensors by using various techniques for IOT applications. Characterization of smart materials by using various techniques. Modeling organic electronic materials for IOT using SCM (software for chemistry and materials).					
Module 3	Fabrication Techniques and applications	Case studies	Data Collections and analysis	**06 classes**	
Topics: **IOT device fabrication techniques and applications:** Cyber physical systems (CPS) – device fabrication techniques, challenges and performances and application. Case studies.					

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Targeted Application & Tools that can be used:

Application Area is electronic devices for smart house and smart cities.

Tools: Chart preparation with data on country wise current market status of smart materials for IOT application in excel sheet or origin software.

Project work/Assignment:

Assignment: 1] Write a report on recent and future trends of development of smart materials for IOT.

Assignment 2] Preparation of smart materials for sensor application (gas and moisture sensor).

Text books

1. Emerging 2D Materials and Devices for the Internet of Things, 1st Edition, Information, Sensing and Energy Applications, Editors: Li Tao, Deji Akinwande, eBook ISBN: 9780128183878, Paperback ISBN: 9780128183861, Elsevier, 2020.

References

1. Introduction, classification and applications of smart materials: an overview. doi:10.3844/ajassp.2013.876.880.
2. Internet of Things, A Hands-on-Approach by Arshdeep Bahga and Vijay Madisetti, Book website: www.internet-of-things-book.com.
3. William D. Callister, Jr. and David G. Rethwisch, Materials Science and Engineering, An Introduction, Eighth Edition, 2010, John Wiley & Sons, Inc.
4. The Internet of Things, Samuel Greengard, Cambridge, MA: MIT Press, 2015, 232 pp.,
5. Smart Sensors at the IoT Frontier, Edited by Hiroto Yasuura, Chong-Min Kyung, Yongpan Liu, Youn-Long Lin, Springer International Publishing AG 2017, eBook ISBN: 978-3-319-55345-0, https://doi.org/10.1007/978-3-319-55345-0.

Skill Development

1. Foundation skills
2. Employability skills
3. Environmental sustainability
4. Select suitable equipment, instrument and materials

Catalogue prepared by	Dr. Saravanan Chandrasekaran Dr. Sumbul Rahman
Recommended by the Board of Studies on	BOS NO: 5th. BOS held on 06/08/21
Date of Approval by the Academic Council	

REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE

Course Code: CHE1005	**Course Title: Computational Chemistry** **Type of Course: Open Elective (Theory only)**		**L- P- C**	2	0	2
Version No.	1.0				
Course Pre-requisites	**NIL**				
Anti-requisites	**NIL**				
Course Description	Students will learn fundamentals of chemical bonding and molecular structures, search, visualize, analysis of chemical data and applications of computational methods to scientific community. The students shall be trained to apply computational methods to understand chemical properties and processes. A thorough understanding of the content of this course will prepare the students to advance in the rapidly growing fields of chemistry and computational science.				
Course Out Comes	On successful completion of the course the students shall be able to: 1] Explain chemical bonding and forces and methods of representation of molecular structures 2] Compute molecular structures using softwares 3] Describe chemical data mining and data analysis 4] Perform calculations on measurements of chemical data				
Course Content:					
Module 1	Molecular structures	Term paper/Assignment/Case Study	Programming/Simulation/Data Collection/any other such associated activity		**8 Classes**
Chemical bonding, inter and intramolecular forces, representation of 2D and 3D molecular structures, computational methods for search, visualization, analysis, management, and mining of chemical and biochemical data and information.					
Module 2	Chem-informatics	Term paper/Assignment/Case Study	Programming/Simulation/Data Collection/any other such associated activity		**8 Classes**
Cheminformatics, Chemical databases – Material safety data sheet, tools for analysis of chemical property, analytical chemistry, and spectral analysis, applications of quantitative structure activity relationship.					
Module 3	Chemo-metrics	Term paper/Assignment/Case Study	Programming/Simulation/Data Collection/any other such associated activity		**7 Classes**
Chemometrics and Statistics in Chemistry; basic training on statistical methods – data plotting, model fitting, correlation and regression analysis, fitting and analysis of chemical reaction kinetics**.**					
Targeted Application & Tools that can be used: Computer aided tools like Chemsketch, Molview, Microsoft excel, Origin Lab and Chemdraw.					
Project work/Assignment: Mention the Type of Project /Assignment proposed for this course					

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1. Draw, analyze properties of organic molecules using computational tools.
2. Perform calculations on measurements of chemical data using appropriate softwares
3. Data collection, modelling, fitting and error analysis.

Text Book

1. Computational Chemistry : A Practical Guide for Applying Techniques to Real World Problems, by David Young, Wiley-Interscience; 2001, ISBN: 0471333689

References

1. Computational Chemistry (Oxford Chemistry Primers, 29)by Guy Grant and W.G. Richards, Oxford University Press, 1995, ISBN 019855740X

2. An Introduction to Computational Chemistry by Frank Jensen, 1998, John Wiley & Son Ltd; ISBN: 0471984256

3. Essentials of Computational Chemistry : Theories and Models by Christoper Cramer, 2002, John Wiley & Sons; ISBN: 0471485527

4. Molecular Modelling: Principles and Applications by Andrew R. Leach , 2001, Prentice Hall; ISBN: 0582382106

Skill Set

Catalogue prepared by	Dr. Gokulakrishnan Dr. Ranganatha S
Recommended by the Board of Studies on	BOS NO: 5th BOS held on 06/08/21
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REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE

Course Code CHE1006	**Course Title:** Introduction to Nanotechnology **Type of Course:** Open Elective (Theory Only)	**L- P- C**	3	0	3
Version No.	**1.0**				
Course Pre-requisites	**NIL**				
Anti-requisites	**NIL**				
Course Description	**Nanotechnology course addresses the need for greater technical awareness in the general student population, it will also extend the breadth of nanotechnology education for science and engineering majors. The main objective of this course is to educate the students to learn the basics of nanoscience and nanotechnology. This course will make them to understand nanostructure synthesis, characterization and fabrication techniques. It will expose them to the emerging areas of advanced nanotechnologies and their potential applications in various fields.**				
Course Out Comes	**On successful completion of the course the students shall be able to:** **CO 1] Describe the fundamental principles of nanotechnology.** **CO 2] Discuss the synthesis, characterization and fabrication techniques involved in nanotechnology.** **CO 3] Summarize the nanotechnology potentialities and future applications.**				
Course Content:					
Module 1	Basics of Nanotechnology and Different Classes of Nanomaterials	Term paper	Data Collection	**10 Classes**	
Topics: Chemistry and physics of nanomaterials, Introduction to nanosystem, Dimensionality and size dependent phenomena of nanomaterials, Quantum approach to explain size dependent properties, Properties at nanoscale, Classification of nanomaterials.					
Module 2	Synthesis, Fabrication and Characterization of Nanomaterials	Term paper/Case study	Data Collection	**12 Classes**	
Topics: **Chemical methods:** Solvothermal and photochemical synthesis, and chemical vapor deposition (CVD); **Physical methods:** Ball milling, Electrodeposition techniques; **Nanofabrication:** lithography, Nano imprinting; Characterization of nanomaterials.					
Module 3	Applications in Nanotechonology	Assignment	Programming	**10 Classes**	
Topics: Solar energy conversion and catalysis, Nanoelectronics, Polymers with a special architecture, liquid crystalline systems, nanomaterials for data storage, photonics and plasmonics, Chemical and biosensors, Nanomedicine and nanobiotechnology.					
Targeted Application & Tools that can be used: The targeted applications are the use of advanced nanotechnologies for energy conversion and storage, sensors, diagnosis and treatment of diseases. **Tools: Molview, Biovia Materials Studio etc.,**					
Assignments: Literature survey and report submission					
Assignment: 1 - Collect the recent literature on Nanotechnology advancements in energy systems.					

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Assignment: 2 - Role and future trends of Nanotechnology in biomedical applications.

Text Book

1. Emil Roduner, Nanoscopic Materials: Size-Dependent Phenomena and Growth Principles 1st Edition, Royal Society of Chemistry, 2015
2. Bharat Bhushan, Handbook of Nanotechnology, Springer, 2005

References

1. T. Pradeep, "A Textbook of Nanoscience and Nanotechnology", Tata McGraw Hill Education Pvt. Ltd., 2012
2. G.A. Ozin and A.C. Arsenault, Nanochemistry: A chemical approach to nanomaterials, Royal Society of Chemistry, 2009.
3. Hari Singh Nalwa, "Nanostructured Materials and Nanotechnology", Academic Press, 2008
4. A. Nabok, "Organic and Inorganic Nanostructures", Artech House, 2009
5. Guozhong Cao. Ed Nanostructures and Nanomaterials: Synthesis, Properties, and Applications, World Scientific Series in Nanoscience and Nanotechnology, 2011.

Skill Development

Topics relevant to development of

1. Foundation skills
2. Research literature survey and writing reports
3. Selecting suitable materials and instruments for analysis
4. Drawing and modelling of chemical structures
5. Innovative thinking

Catalogue prepared by	Dr. SUNIL KUMAR K R Dr. APARNA ROY
Recommended by the Board of Studies on	BOS NO: 5th BOS held on 06/08/21
Date of Approval by the Academic Council	

REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE

Course Code: CHE1007	**Course Title:** Biodegradable electronics **Type of Course:** Open Elective (Theory only)	**L- P- C**	2	0	2
Version No.	1.0				
Course Pre-requisites	**NIL**				
Anti-requisites	**NIL**				
Course Description	The main objective of the course is to introduce the students to the concepts of applications of chemistry in biodegradable electronic engineering. It should cultivate an ability to identify chemistry in finely engineered products used in households, electronic and automobile industry. It aims to strengthen the fundamental concepts of chemistry of materials and then builds an interface with the industrial applications. It deals with applied and industrially useful topics, such as fundamental of biodegradable polymers, E-waste management, preparation, fabrication and characterization of biodegradable electronic materials.				
Course Outcomes	On successful completion of the course, the student shall be able to CO1: describe the fundamental importance of chemical sciences for the development of advanced biodegradable electronic device materials. CO2: discuss the preparation, characterization and application of synthetic and natural polymers for various electronic devices. CO3: explain the importance of manufacturing techniques to fabricate the biodegradable electronics and their biodegradation studies.				
Course Content:					
Module 1	Introduction of biodegradable polymers and E-waste	Assignment	Data collection		**10 Classes**
Topics: Historical developments in polymer, introduction to biodegradable polymers, recent developments of biodegradable materials for electronic device applications, advantages and disadvantages; definition of E-waste, resource available from E-waste, existing techniques to recover the valuable metals from E-waste, environmental and economical aspects of E-waste and their management.					
Module 2	Materials for biodegradable modern electronics devices and characterization techniques	Assignment and Case studies	Data collection and analysis		**9 Classes**
Topics: Materials for biodegradable modern electronic devices- organic, wearable and implantable smart materials and their characterization techniques.					
Module 3	Biodegradable device fabrications techniques and biodegradation studies	Assignment	Program task		**5 Classes**
Topics: Biodegradable device fabrication techniques and biodegradation studies of E-waste materials.					
Targeted Application & Tools that can be used:					

Application Area is degradable electronic devices
Professionally Used Software: Chemdraw/Sketchup/Tinkercad

Project work/Assignment:

Project Assignment: 3D modeling of a suitable polymer material that can be used to fabricate biodegradable electronics applying software or 3D designing of a biodegradable electronic component using a suitable software and write a report on it.
Assignment: 1] Write a report on future aspects of biodegradable electronics.

Text book

1. Adam Comelius Bert (Ed.,), Biodegradable Electronics, Organic electronics, Melanin, Chromo publishing, 2011.

References

1. Catia Bastioli (Edited), Handbook of Biodegradable Polymers, Rapra Technology Limited, UK, 2005
2. Li, Rongfeng; Wang, Liu; Yin, Lan. "Materials and Devices for Biodegradable and Soft Biomedical Electronics" *Materials* 2018, 11 (11), 2108. doi.org/10.3390/ma11112108.
3. Tan, Mein Jin; Owh, Cally; Chee, Pei Lin; Kyaw, Aung Ko Ko; Kai, Dan; Loh, Xian Jun. Bio-degradable Electronics: Cornerstone for sustainable electronics and transient applications. J. Mater. Chem. C, 2016, 4, 5531-5558. doi:10.1039/C6TC00678G.
4. Mihai Irimia-Vladu, "Green" electronics: biodegradable and biocompatible materials and devices for sustainable future, **Chem. Soc. Rev.**, 2014, **43**, 588-610.
5. Mihai Irimia-Vladu, Eric D. Glowacki, Niyazi S. Sariciftci, and Siegfried Bauer (Edited), Green Materials for Electronics, Wiley-VCH, 2018.

Skill Development

1. Foundation skills
2. Employability skills
3. Environmental sustainability
4. Select suitable equipment, instrument and materials

Catalogue prepared by	Dr. Saravanan Chandrasekaran Dr. Aparna Roy Dr. Anu Sukhdev
Recommended by the Board of Studies on	BOS NO: 5th BOS held on 06/08/21
Date of Approval by the Academic Council	

REGISTRAR
PRESIDENCY UNIVERSITY Registrar BANGALORE

Course Code: CHE1008	**Course Title: Energy and sustainability** **Type of Course: Open Elective (Theory only)**		**L- P- C**	2	0	2
Version No.	1.0				
Course Pre-requisites	**NIL**				
Anti-requisites	**NIL**				
Course Description	The course Energy and sustainability is an interdisciplinary course which focus on sustainable energy, provide students with knowledge on alternative, more environmentally friendly forms of energy. This course provides knowledge on different renewable energy technologies, development mechanisms, management and profitability. The course enables the students to understand the need for sustainable energy and develops an interest in students to adopt new technologies for harnessing and utilization of energy.				
Course Out Comes	On successful completion of the course the students shall be able to: a. discuss the importance of sustainable energy sources b. explain the new methodologies for effective utilization of renewable energy sources. c. identify the inputs in harnessing different renewable energy sources .				
Course Content:					
Module 1	Introduction to Sustainable energy sources	Assignment	Data collection		**8 Classes**
Topics: Fundamentals of energy and energy conservation, classification of energy resources, Environmental consequences and limitations of fossil fuels, Importance and limitations. Sustainable Design and development, World energy use, Environmental aspects of energy utilization.					
Module 2	Wind energy and Solar energy	Case Study	Data collection, analysis		**8 Classes**
Topics: Power in the Wind – Types of Wind Power Plants –Components -Working Geothermal energy and tidal energy-mechanism, advantages and disadvantages, Solar energy: Photovoltaic cells-construction and working, Energy policies and regulations.					
Module 3	Electrochemical energy systems	Term paper/Assignment/Case Study	Programming task		**8 Classes**
Topics: Introduction, classification, Classical Batteries- $ZnMnO_2$, Pb-acid, Modern batteries – Li Batteries (Li-MnO2, Li-ion). Fuel cells, practice and energy economic calculations using a virtual battery builder tool.					
Topics:					
Targeted Application & Tools that can be used: [Mention here the application area of the contents of the Module and the name of any specialized professionally used tools (Like software, Hardware, any other form of tool) relevant to the contents of the module.]					

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Electrochemical Cells Pro (version 2.2)- A Virtual Battery Builder

https://web.mst.edu/~gbert/Electro/Electrochem.html

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course

Assignment 1. Data collection of different types of sustainable energy sources that are available in and around Bangalore.
Assignment 2: Observation of wind mill & solar heaters operation and write the report.
Assignment 3: Prepare cells with different electrodes and concentration and record their voltages using https://web.mst.edu/~gbert/Electro/Electrochem.html

Text Book

1. Non-conventional energy sources by B. H. Kahan, Tata Mc-graw Hill Co. Ltd., 2006

References

1. Godfrey Boyle, "Renewable Energy, Power for a Sustainable Future", Oxford University Press, U.K., 1996
2. John W Twidell and Tony D Weir, "Renewable Energy Resources", Taylor and Francis, 2nd Edition 2006

Topics relevant to development of "Foundation skills": Fundamentals of energy systems
Topics relevant to development of "Employability Skills": Energy policies, regulations and energy economic calculations.

Catalogue prepared by	1. Dr. Shashikala A R 2. Dr. Chaitanya Lakshmi G
Recommended by the Board of Studies on	BOS NO: 5th BOS held on 06/08/21
Date of Approval by the Academic Council	

REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE

Course Code: CHE1009	**Course Title:** 3D printing with Polymers **Type of Course:** Open Elective (Theory Only)	**L- P- C**	2	0	2
Version No.	1.0				
Course Pre-requisites	**Nil**				
Anti-requisites	**NIL**				
Course Description	The main objective of the course is to introduce the students to the concepts of applications of chemistry in 3D printing technology and polymer chemistry. It should cultivate an ability to identify chemistry in finely engineered products used in medical, households, electronic, automobile and defence sectors. It aims to strengthen the fundamental concepts of chemistry of materials and then builds an interface with the domestic, industrial and defence applications. It deals with applied and industrially useful topics, such as fundamental of printing technology, types of 3D printing techniques, materials preparation and characterization of materials prepared by 3D printing technology.				
Course Outcomes	On successful completion of the course, the student shall be able to, CO1: describe the fundamentals of 3D printing technologies CO2: recognize the basics types of 3D printing CO3: select the materials for the product developments CO4: apply the techniques into various applications				
Course Content:					
Module 1	Introduction of 3D printing and materials	Assignment	Data Collections		**6 classes**
Topics: Evolution of 3D printing technologies, basic principles, recent developments in 3D printing technologies for domestic and industrial applications, common materials for 3D printing technology, additive vs conventional manufacturing process, challenges, advantages and disadvantages.					
Module 2	Types and Materials for 3D printing and characterization studies	Case study	Programming Tools		**12 classes**
Topics: Types of 3D printing technologies (as per ASTM F42): Binder jetting, Directed energy deposition, Materials extrusion, Materials jetting, Powder bed fusion, Sheet lamination, Vat Photopolymerization, advantages and disadvantages, case studies; Various forms of raw materials: Liquid, Solid and Powder based systems - Metals, Ceramics, Smart materials, special materials, Polymers, biodegradable polymers and polymer composite materials, case studies; Practical demonstration. Property analysis: Mechanical and thermal properties for the 3D printed specimens by the ASTM standard testing.					
Module 3	Applications of 3D technology	Assignment	Data collections		**6 classes**
Topics: Aerospace industry, Defense, Automotive industry, Healthcare and medical industry, Electric and electronic industry Architecture, building, and construction industry, Food industry, Fabric and fashion industry, case studies.					

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Targeted Application & Tools that can be used:

Application Areas are prototypes, tooling, spare parts, personalized products and medical aids in automotive, industrial, energy, medical, defense and aero sectors.

Tools: 3D CAD tools and data preparation tools for 3D printing.

Project work/Assignment:

Project Assignment:

Assignment: 1] Write a comprehensive report on future prospective of 3D printing materials
Assignment 2] Preparation of materials for 3D printing and making prototype of the product using 3D techniques.

Text books:

1. Christopher Barnatt, "3D printing, 3rd Edition", ExplainingTheFuture.com, 2016.

References

1. Lan Gibson, David W. Rosen and Brent Stucker, "Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing", Springer, 2010.
2. N. Shahrubudin, T.C. Lee, R. Ramlan, An Overview on 3D Printing Technology: Technological, Materials, and Applications, Procedia Manufacturing, Volume 35, 2019, Pages 1286-1296, ISSN 2351-9789, https://doi.org/10.1016/j.promfg.2019.06.089.
3. "3D Printing in Chemical Sciences: Applications Across Chemistry", CHAPTER 1 An Introduction to 3D Printing, 2019. Pg: 1-21, "The Royal Society of Chemistry", ISBN "978-1-78801-440-3", DOI: 10.1039/9781788015745-00001.
4. Khanna Editorial, "3D Printing and Design", Khanna Publishing House, Delhi.
5. CK Chua, Kah Fai Leong, "3D Printing and Rapid Prototyping- Principles and Applications", World Scientific, 2017.

Skill Development

Topics relevant to development of

1. Employability skills
2. Professional ethics
3. Select suitable equipment, instrument and materials

Catalogue prepared by	Dr. Saravanan Chandrasekaran Dr. Anu Sukhdev
Recommended by the Board of Studies on	BOS NO: 5th BOS held on 06/08/21
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REGISTRAR

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Course Code: CHE1010	**Course Title: Bioinformatics** **Type of Course: Open Elective & Theory only**	**L- P- C**	2	0	2
Version No.	1.0				
Course Pre-requisites	**NIL**				
Anti-requisites	**NIL**				
Course Description	Bioinformatics is a fusion of biology, chemistry and computer science. Students will learn to use computational analyses to study the vast information provided by modern molecular biology and medicine. The course offers basic knowledge and training required to mine, process, simulate, and analyze biological information. A thorough understanding of the content of this course will prepare the students to have the skills necessary to apply computing tools to address contemporary problems in biology and medicine.				
Course Out Comes	On successful completion of the course the students shall be able to: 1] Describe the structures of primary biomolecules such as DNA and protein, and representation of these molecular structures. 2] Compute similarity search of DNA and Protein sequences and calculations on measurements of experimental data using appropriate software 3] Outline basic statistical methods				
Course Content:					
Module 1	Introduction	Term paper	Data Collection		**12 Classes**
Introduction to Bioinformatics, Need for informatics tools and exercises, Bioinformatics resources: NCBI, EBI, ExPASy, RCSB. Significance of databases towards informatics projects. Structure of DNA and Protein, Visualization of biomolecules, Biological Sequence Databases, Information Retrieval from Biological Databases					
Module 2	Structural Visualization	Case Study	Simulation		**8 Classes**
Sequence Similarity: Computational tools for comparing genes and proteins using ClustalOmega, Structure Visualization and Graphical representation of molecular structures: DNA, RNA, Proteins, Usages of visualization software available in public domain like VMD, Rasmol, Pymol, SpdbViewer, Chime (anyone)					
Module 3	Drug Designing	Case Study	Programming/Simulation/Data Collection/any other such associated activity		**8 classes**
Deriving bioactive conformations, molecular docking, Ligand - Receptor Interactions: Docking softwares (AUTODOCK/HEX)					
Targeted Application & Tools that can be used: Computer aided tools like NCBI, ClustalOmega, Rasmol					
Project work/Assignment: Mention the Type of Project /Assignment proposed for this course					
• Draw and visualize bio-molecules using computational tools. • Perform similarity search of DNA and Protein sequences • Perform calculations on measurements of experimental data using appropriate software					
Text Book Baxevanis, Andreas D., Gary D. Bader, and David S. Wishart, eds. Bioinformatics. John Wiley & Sons, 2020.					
References					

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<table>
<tr><td colspan="2">Lesk, Arthur. Introduction to bioinformatics. Oxford university press, 2019.

Fenstermacher, David. "Introduction to bioinformatics." Journal of the American Society for Information Science and Technology 56, no. 5 (2005): 440-446.

Choudhuri, Supratim. Bioinformatics for beginners: genes, genomes, molecular evolution, databases and analytical tools. Elsevier, 2014.</td></tr>
<tr><td colspan="2">Skill Development
1. An attitude of enquiry
2. Write reports</td></tr>
<tr><td>Catalogue prepared by</td><td>Dr. Aparna Roy
Dr. Chaitanya Lakshmi. G</td></tr>
<tr><td>Recommended by the Board of Studies on</td><td>BOS NO: 5th BOS held on 06/08/21</td></tr>
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REGISTRAR

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Course Code: CHE1011	**Course Title: Chemical and Petrochemical catalysts** **Type of Course: Open Elective (Theory only)**	**L- P- C**	3	0	3
Version No.	1.0				
Course Pre-requisites	NIL				
Anti-requisites	NIL				
Course Description	The course aims to give an understanding of the relation between modern theories of catalysis and the industrial application for the most important groups of heterogeneous catalysts; metals, metal oxides and zeolites. Assessment of the potential developments and limitations of catalysts will be analyzed through examples from industrial applications or processes under development. This includes the catalyst synthesis, a kinetic description of the different processes involved in a catalytic cycle (adsorption, surface reaction and desorption), mass and heat transfer issues, as well as interpretation of results from experimental and theoretical investigations.				
Course Outcomes	On successful completion of this course the students shall be able to: CO1: discuss the need and usefulness of catalysts CO2: describe reaction kinetics of catalytic reaction CO3: explain the synthesis and characterization of catalyst CO4: explore Zeolites and Molecular Sieves CO5: list the application of Catalyst in modern grass root refinery operations.				
Course Content:					

Module 1	Introduction to catalysis	Assignment	Data Collection	**9 Classes**
Topics: Introduction to catalysis, application to industrial processes – one example each from inorganic, fine organic chemical, petroleum refining, petrochemical and biochemical industries. Types of catalysis: homogeneous catalysis and heterogeneous catalysis. Heterogeneous catalysis: introduction, phase transfer and tri-phase catalysis, liquid – liquid and solid – liquid catalysis, mechanism, engineering problems, mass transfer considerations and reactor types.				
Module 2	Preparation of catalysts	Assignment	Synthetic methods and applications	**8 Classes**
Topics: Preparation of catalysts – supported metal and metal oxide catalyst. major steps involved in catalysts preparation and formation, physical methods of catalyst characterization for determination of surface area by BET method, pore volume and average pore size distribution, effectiveness of the catalyst, selectivity of the catalyst, deactivation of catalyst, mechanism of catalyst poisoning.				
Module 3	Zeolites and their catalytic applications	Case study	Data Analysis	**8 Classes**
Topics: Zeolites – structural chemistry of zeolites, templated molecular sieves, size and shape selectivity, a few industrial applications of zeolites, modification of zeolites.				
Module 4	Homogeneous and Enzyme Catalysts	Assignment	Data collection and statistical analysis	**8 Classes**
Topics: Biocatalysts – enzymes, lipases and microbes as catalysts, mechanism of participation of enzymes in a few typical reactions, Michaelis – Menten kinetics, inhibition of enzyme reaction and kinetics.				

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Targeted Application & Tools that can be used:

Application Area is Petroleum Engineering processes like refining, reforming, synthetic petrol etc.

Data collection and statistical analysis using tools like quantum expresso (free internet source)

Project work/Assignment:

Assignment:

Assignment 1: Account for the increase in reaction rate brought about by a catalyst.

Assignment 2: Compare the functions of homogeneous and heterogeneous catalysts.

Assignment 3: List three issues that exist for uncatalyzed industry based chemical reactions.

Text Book

1. Carberry J. J.: Chemical and Catalytic Reaction Engineering, McGraw Hill, New York, 1976.
2. Bruce C. Gates, James R. Katzer, and G. C. A. Schuit: Chemistry of catalytic processes, McGraw Hill, 1979

Reference books

1. Bailey James, Davis Ollis: "Biochemical Engineering", McGraw Hill
2. Wingard L.B.: Enzyme Engineering, Fr. Inter Science, N.Y. 1972.
3. Smith J.M.: "Chemical Engineering Kinetics", 3rd Edition, McGraw Hill
4. Satterfield Charles N.: Heterogeneous Catalysis in Industrial Practices, McGraw- Hill International Editions, 2nd Edition 1993.

Catalogue prepared by	**Dr. Dileep R** **Dr. Sumbul Rahman**
Recommended by the Board of Studies on	BOS NO: 5th BOS held on 06/08/21
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REGISTRAR

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Course Code: CHE1012	**Course Title:** Introduction to Composite materials **Type of Course:** Open Elective (Theory Only)	**L- P- C**	2	0	2
Version No.	1.0				
Course Pre-requisites	NIL				
Anti-requisites	**NIL**				
Course Description	Composites are a relatively new class of materials. In this course, the students learn about the benefits gained when combining different materials into a composite. The main motive is to make the students to understand the different processing methods, issues, properties and applications of different composite materials. The course deals with introduction to composites, classification based on matrices and reinforcements, fabrication processes, mechanical performance and applications of composites in different fields.				
Course Outcomes	**On successful completion of this course the students shall be able to:** CO1: Identify the role of constituents in composite materials CO2: Describe different manufacturing techniques to fabricate composites CO3: Discuss the importance of composites in engineering applications				
Course Content:					
Module 1	**Introduction to composite materials**	Assignment	Data Collections		**07 Classes**
Topics: Engineering materials and its limitations. Definition of composites, History and need of composites, Classification of composites; Requirements for composite materials, General characteristics of reinforcement- classification, terminology used in fiber science, forms of reinforcement, Fiber-Types, advantages and draw backs, Production of fibers-Glass, graphite, Aramid, CMC, MMC and PMC.					
Module 2	**Matrix Composite and Manufacturing techniques**	Case Study	Data Collections and analysis		**10 Classes**
Topics: Polymers as matrix material, Classification, Properties: Thermoplastic and thermosetting resins; Thermoset materials and production methods, metal matrices, Ceramic, Carbon matrices, Advantages and limitations. **Fabrication Process:** Thermoset composites: Hand lay-up process, Bag molding process, Resin transfer molding process, Fabrication of Thermoplastics, metal and ceramic matrix composites. Case studies.					
Module 3	**Particulate, dispersion strengthened, fiber filled composites and applications**	Assignment	Simulation and data collections		**07 Classes**
Topics: Function of matrix, function of fibres, Polymer-fibre interface, factors influencing the performance of composite, coupling agents, Bonding agents, Short fibre composites. Mechanical Property analyses. Simulation based assignment. **Applications:** Aircrafts, missiles, space, automobile, electrical and electronics, marine, recreational, sports equipment and construction.					
Targeted Application & Tools that can be used: **Application Area is Polymer technology, smart materials preparation, aeronautical and space technology.**					

Tools: Composites Design and Manufacturing HUB (cdmHUB) and MatWeb
Project work/Assignment:
Assignment: 1 Write a report on recent technological developments of composite materials and their applications. **Assignment 2:** Preparation of organic and organic-inorganic hybrid materials and evaluation of their water absorption and desorption properties**.**
Text Book: 1. Handbook of Composites, Second Edition, Edited by S.T. Peters, Published by Chapman & Hall in 1998, ISBN 978-1-4615-6389-1 (eBook), DOI 10.1007/978-1-4615-6389-1.
References 1. Composite materials by K.K. Chawla 2. Composite materials by K. Srinivasan 3. Engineering Materials: Polymers, Ceramics and Composites A.K Bhargava Prentice Hall of India. **4.** Introduction to Composites (NPTEL Lectures) by Dr. Nachiketa Tiwari
Skill Development 6. Foundation skills 7. Employability skills 8. Observe and measure physical phenomena

Catalogue prepared by	Dr. Anu Sukhdev Dr. Saravanan Chandrasekaran
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Course Code: CHE1013	**Course Title:** Chemistry for Engineers **Type of Course:** Open Elective (Theory only)	**L- P- C**	3	0	3
Version No.	1.0				
Course Pre-requisites	**NIL**				
Anti-requisites	**NIL**				
Course Description	The course aims to give an understanding of the basic knowledge in Chemistry interfacing with Computers, Electrical, Electronics and Communication fields. The course introduces the concept of Batteries for modern day usage, explores different types of environmentally benign materials for Electronics and lays the groundwork for studies in nanotechnology in computers and communication. This course also gives way to understand the hazardous effects of E-waste and their management				
Course Outcomes	**On successful completion of this course the students shall be able to:** • Explain the role of Computer Science in chemical sciences • Summarize the importance of various electrochemical sources in energy systems. • Discuss the importance of biodegradable materials in electronics • Identify the various applications of nanotechnology in computers and communication • Describe the role of chemistry in E-waste management				
Course Content:					
Module 1	**Energy Conversion and storage**	Assignment	Data Collection	**10 classes**	
Topics: History of batteries; Basics of electrochemical energy systems, Construction, Characteristics, working mechanism and applications of Lithium batteries, Fuel cells, Solar cells, supercapacitors					
Module 2	**Organic Electronics**	Case Study/Assignment	Data collection	**12 classes**	
Topics: Organic, wearable and implantable electronics devices- smart materials. Principles of E-waste management, definition of E-waste, resource available from E-waste, existing techniques to recover the valuable metals from E-waste, environmental and economic aspects of E-waste and their management – life cycle assessment and circular economics.					
Module 3	**Materials for semiconductor Electronics**	Assignment	Programming task	**12 classes**	
Topics: Introduction to nanotechnology and nanomaterials: general synthetic methods, properties and current applications; Silicon and graphene based nanomaterials for semiconductor applications.					
Targeted Application & Tools that can be used: Materials for electronic devices, Understanding the allotropes of carbon using computational tools					
Project work/Assignment:					
Assignment: Write a report on methods of disposing an old and used battery Preparation of a paper based sensor for humidity detection					
Text Books					

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1. Stephen Wilson (auth.) - Chemistry by Computer: An Overview of the Applications of Computers in Chemistry-Springer US (reprinted 2018)	
References 1. Organic Electronics: Materials, Processing, Devices and Applications, Franky So (Editor), CRC Press; 1st edition (24 November 2009) 2. MEMS and Nanotechnology-Based Sensors and Devices for Communications, Medical and Aerospace Applications, A. R. Jha, CRC Press; 1st edition (25 April 2008) 3. Wiley, "Engineering Chemistry", Second edition **4.** Organic Electronics: Foundations to Applications, OUP Oxford (22 July 2020)	
Skill Sets All topics in the course are relevant to 1. Foundational skills 2. Environment and Sustainability	
Catalogue prepared by	Dr. Dileep R Dr. Anu Sukhdev Dr. Nikhath Fathima
Recommended by the Board of Studies on	BOS NO: 5th BOS held on 06/08/21
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Course Code: CHE1014	**Course Title: Surface Coating technology and Corrosion Science** **Type of Course: Open Elective (Theory only)**	**L- P- C**	3	0	3
Version No.	1.0				
Course Pre-requisites	**[List the Pre -requisites of the course]** **NIL**				
Anti-requisites	**[List the Anti -requisites of the course]** **NIL**				
Course Description	Surface coatings play a vital role in protecting the metals from corrosion. The course content is designed to have systematic and comprehensive understanding on various aspects related with surface coatings and their application in corrosion control. The course provides information to students about the trending technologies and its applications. The course aims to strengthen the fundamental concepts of metal finishing and builds an interface with industry applications.				
Course Out Comes	On successful completion of the course the students shall be able to: 1] apply the knowledge of electrochemistry to understand the type of corrosion and preventive methods to be adopted. 2] discuss the importance of surface coatings and corrosion studies. 3] describe the different surface coatings techniques that can be used to protect the metal from corrosion. 4] explain the types of corrosion measurement methods that can be used in the determination of corrosion rate.				
Course Content:					
Module 1	Fundamentals of Electrochemistry	Assignment/Case Study	Data collection		**6 Classes**
Electrode potential-single electrode potential, standard electrode potential, Emf of a cell, Nernst equation. Galvanic series – merits and demerits. Polarization, Decomposition potential and over voltage, effect of polarization, limiting current density, hydrogen over voltage.					
Module 2	Plating technology	Assignment	Data collection and analysis		**12 Classes**
Principles of electroplating. Electroplating, Factors affecting rate of electrodeposition. Surface preparation. Hull cell experiment, covering power and throwing power. Electroplating of metals and alloys (Cu, Ni, Ag,). Electroless plating- Factors affecting electroless plating, differences, elctroless plating of Cu and Ni, painting and powder coating					
Module 3	Specifications and testing of coatings	Assignment	Data collection		**8 Classes**
Introduction, thickness-destructive and non-destructive testing methods, Adhesion-bend test, peel test, corrosion resistance-visual inspection, salt spray test, acetic acid salt spray test, Sulphur dioxide test, hardness test.					
Module 4	Corrosion and control	Case Study	Programming and data analysis		**8 Classes**
Types of corrosion: atmospheric, environmental and microbial. Electrochemical theory. Types of wet corrosion, Passivity, Corrosion control methods, Corrosion problems in practice. Weight loss method for the determination of corrosion					

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Targeted Application & Tools that can be used: [Mention here the application area of the contents of the Module and the name of any specialized professionally used tools (Like software, Hard ware, any other form of tool) relevant to the contents of the module.]

Data Mining or Anova tool to study the corrosion behavior of Fe.

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course

Assignment 1: Data collection and preparation of report on various safety practices followed in coating industries
Assignment 2: Observe the corrosion of different materials you encounter in daily life and list out the details like metal, color of corrosion product etc.

Assignment 3: Perform weight loss experiment for a mild steel coupon to find out corrosion rate in saline environment.
Assignment 4: Detect the corrosion spots in the given specimen by visual inspection.

Text Book

2. Fundamentals of electrochemical deposition and Corrosion by Milan Paunovic and Mordechay, Wiley

References

3. H. Rieger, Electrochemistry, 2nd Edition, Springer 1994
4. Corrosion Engineering by M.G.Fontana, McGraw Hill Publication.
5. An introduction to Electrochemistry, Glastone, East west Ltd.
6. Industrial Electrochemistry, D. Pletcher and F.C. Walsh, Chapman and Hall , II Edition,1984.

Topics relevant to development of "Foundation skills": Fundamentals of electrochemistry.
Topics relevant to development of "Skill Development": Corrosion and control.
Topics relevant to development of "Employability": Electrochemical coating and testing.

Catalogue prepared by	3. Dr. Shashikala A R 4. Dr. Ranganatha S
Recommended by the Board of Studies on	BOS NO: 5th BOS held on 06/08/21
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Course Code: CHE1015	**Course Title: Waste 2 Fuel** **Type of Course: Open Elective (Theory only)**		**L- P- C**	2	0	2
Version No.	1.0				
Course Pre-requisites	**Pre-requisites: NIL**				
Anti-requisites	**Anti-requisites: NIL**				
Course Description	The course provides an introductory understanding to biomass with a scientific examination of feedstocks, conversion technologies, scale up for industrial production, end products, and their applications. It also provides knowledge about government policies and programs with regard to production of low carbon fuel from wastes.				
Course Out Comes	On successful completion of the course the students shall be able to: 1] realize the significance of biofuels and bio energy systems in our day to day life 2] identify potential biomass feedstock including energy crops 3] to relate the existing and emerging biomass to energy technologies				
Course Content:					
Module 1	**BIOFUELS**	Assignment	Data collection		**8 Classes**
Topics: Biomass, First Generation Biofuels: Bioethanol, Second Generation Biofuels: Methane and Hydrogen – Production mechanisms by microbes, Third Generation Biofuels : Biobutanol. Biodesel from algae.					
Module 2	**CLEAN COAL TECHNOLOGY**	Assignment	Case study: Data collection		**8 Classes**
Topics: Principles of Microbial Metal Leaching: Leaching Mechanisms. Factors Influencing Bioleaching. Case Studies of Bioleaching Applications: Commercial-Scale Copper Ore Bioleaching; Bacterial oxidation of Chalcophyire and pyrite; Reactor Bioleaching of Fly Ash; Shake Flask Bioleaching of Electronic Scrap; Bioremediation of Metal-Contaminated Sites.					
Module 3	**SPECIAL TOPICS& POLICIES**	Assignment	Programming		**8 Classes**
Topics: From Microbes to Megawatts – Microbial Fuel Cells - Types of Biological fuel cells – Working Principle – Applications. Policies and Future R&D of Bioenergy: Evaluation of current and future R&D needs; legal framework to support sustainable development and increased use of biofuels; Government policies and programs with regard to biofuels and investment opportunities worldwide.					
Targeted Application & Tools that can be used **Biomass Scenario Model to study the domestic biofuel production and supply.** The Biomass Scenario Model (BSM) is a unique, carefully validated, state-of-the-art, dynamic model of the domestic biofuels supply chain. BSM explicitly focuses on policy issues, their feasibility, and potential side effects. It integrates resource availability, physical/technological/economic constraints, behavior, and policy. The BSM is a product developed by the National Renewable Energy Laboratory.					
Project work/Assignment: Mention the Type of Project /Assignment proposed for this course 1. **Elaborate on Next generation fuel- data collection** 2. **Justify the statement "Microbe to Megawatts".** 3. **Case study on Bioleaching applications.**					
Text Book 1. Samir K. Khanal, "Anaerobic Biotechnology for Bioenergy Production: Principles and Applications", Wiley-Blackwell Publishing, 2008.					
References					

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<table>
<tr><td colspan="2">2. David M. Mousdale, “Biofuels: Biotechnology, Chemistry, and Sustainable Development “CRC Press, 2008. 3. Gupta, Vijai Kumar; Tuohy, Maria G. (Eds.), “Biofuel Technologies Recent Developments”, Springer, 2013

3.Robert C. Brown, “Biorenewable Resources: Engineering New Products from Agriculture”, WileyBlackwell Publishing, 2003.

4. Pogaku, Ravindra; Sarbatly, RosalamHj. (Eds.), “Advances in Biofuels”,Springer, 2013. 5. Ralph Sims, Michael Taylor, “ From First to Second Generation Biofuel Technologies” IEA Bioenergy</td></tr>
<tr><td colspan="2">Topics relevant to development of “Foundation skills”: Biomass utilization
Topics relevant to development of “Employability Skills”: Microbes to megawatts, future R & D of biofuels.</td></tr>
<tr><td>Catalogue prepared by</td><td>Dr. Chaitanya Lakshmi. G and Dr. Shashikala A.R</td></tr>
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Course Code: CHE1016	Course Title: FORENSIC SCIENCE Type of Course: Open Elective	L- P- C	3	0	3
Version No.	1.0				
Course Pre-requisites	NIL				
Anti-requisites	NIL				
Course Description	This course is an introductory look at the various fields of forensic science and how to the background knowledge, forensic examinations and software tools to solve unusual topics. It also emphasizes on developing an algorithm to solve and restore lost data and reports.				
Course Out Comes	On successful completion of the course the students shall be able to: 1] Identify the significance of forensic science to human society. 2] Locate the divisions in a Forensic Science Laboratory. 3] Use the of Trace Evidence, Ballistics and Document examination by forensic scientists. 4] Learn to generate the algorithm, documentation using softwares.				
Course Content:	This course includes a broad series of lessons and activities that offer a variety of modalities for ultimate student engagement and content retention. Each unit contains a series of lessons that include introduction of content, listing the forensic science laboratories, facilities in labs, instruments involved, tracing evidences and examination. It also includes forensic application in restoring lost data, documents, writing algorithm for the same and solving few case studies using software tools.				
Module 1	**INTRODUCTION**	Assignment	Fundamentals	**03 Classes**	
Topics: Definitions and Pioneers. Historical development of Forensic Science. Principles of Forensic Science.					
Module 2	**FORENSIC SCIENCE LABORATORIES**	Assignment	Data Collection	**06 Classes**	
Topics: Organization of Directorate of Forensic Institutions State Forensic Science Laboratories. Divisions of Forensic Science laboratories and its Functions. Use of important instruments – Microscopes, Spectroscopy, Video Spectral Comparator & Invisible Rays. Role of experts in crime investigation and detection.					
Module 3	**TRACING EVIDENCES**	Case Study	Data Collection	**08 Classes**	
Topics: Trace Evidences a) Hair and fiber. 10 b) Glass Fractures c) Tool marks d) Paint and Soil. Forensic Ballistics. a) Meaning, Classification of firearms and ammunition. b) Identification of firearm and the shooter. c) Explosives: meaning & classification Types					
Module 4	**FORENSIC EXAMINATION**	Case Study	Data Collection	**08 Classes**	
Topics: Examination of Documents and Currency. a) Questioned Documents: Meaning and Types- (i) Forgeries – Meaning & Types b) Identification of hand written documents – Authors c) Differentiation of genuine and counterfeit currency coins & Notes.					
Module 5	**FORENSIC APPLICATIONS**	Assignment	Programming	**10 Classes**	

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Topics:
Probability population and sampler, weight of evidence and the Bayesian likelihood ratio, Transfer evidence application of statistics to particular areas of forensic science, Knowledge base systems, Quality base of system General concepts and tools, Arithmetic and logical operation, Developing an algorithm to solve problem, Modularization, Function and procedures, Arrays, File processing , Reports and control breaks, Processing the date.

Targeted Application & Tools that can be used:

1. Belkasoft live RAM Capturer
2. Magnet RAM Capture
3. Volatility

Project work/Assignment: Mention the Type of Project /Assignment proposed for this course

1.Probability population and sampler using tool (Volatility)
2. Develop an algorithm to solve how to restore lost data, reports.

Text Book

1. Criminalistics : An Introduction to Forensic Science by Richard Saperstein, Prentice Hall.

2. Introduction to Forensic Sciences by William G Eckert, CRC Press.

References

1. Computer forensics: evidence collection and management by Robert C. Newman and Boca Raton FL, Taylor and Francis.
2. Forensic Computer Crime Investigation By Jr Thomas A Johnson, Taylor and Francis, CRC Press
3. Introduction to Statistics for Forensic Scientists by David Lucy, Wiley publications.
4. Digital Evidence and Computer Crime, Academic Press

Topics relevant to development of "FOUNDATION SKILLS": listing the forensic science laboratories, facilities in labs, instruments involved, tracing evidences and examination

Topics relevant to " HUMAN VALUES &PROFESSIONAL ETHICS": Principles of Forensic Science

Catalogue prepared by	Dr. Chaitanya Lakshmi. G
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Annexure 3a List of new courses (Annexure CHE 5.3)

List of the new courses included into the curriculum (based on the feedbacks from faculties and other stakeholders) is appended below:

Sl. No.	COURSE CODE	COURSE NAME	L	T	P	C	Year of Introduction
1	CHE1001	Environmental Science	2	0	0	2	2021-22
2	CHE1002	Industrial Chemistry	2	0	2	3	2021-22
3	CHE1003	Sensor Technology	3	0	0	3	2021-22
4	CHE1004	Smart materials for IOT	3	0	0	3	2021-22
5	CHE1005	Computational Chemistry	3	0	0	3	2021-22
6	CHE1006	Introduction to Nanotechnology	3	0	0	3	2021-22
7	CHE1007	Biodegradable electronics	3	0	0	3	2021-22
8	CHE1008	Energy and Sustainability	2	0	0	2	2021-22
9	CHE1009	3D printing and polymers	3	0	0	3	2021-22
10	CHE1010	Bioinformatics	2	0	0	2	2021-22
11	CHE1011	Chemical and Petrochemical catalysts	3	0	0	3	2021-22
12	CHE1012	Introduction to Composite materials	3	0	0	3	2021-22
13	CHE1013	Chemistry for Engineers	3	0	0	3	2021-22
14	CHE1014	Surface Coating technology and Corrosion Science	3	0	0	3	2021-22
15	CHE1015	Waste to fuel	3	0	0	3	2021-22
16	CHE1016	Introduction to forensic science	3	0	0	3	2021-22

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List of the courses revised (based on the feedbacks from faculties and other stakeholders) is appended below:

Annexure 3b List of Revised Courses

Sl. No.	COURSE CODE	COURSE NAME	L	T	P	C	Year of Introduction
	NIL	NIL	NA	NA	NA	NA	NA

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SCHOOL OF ENGINEERING
DEPARTMENT OF CHEMISTRY

Ref. No PU/SOE/CHE/BOS-07/2022-23/MoM Date: 25th July 2022

Minutes of the 7th Meeting of the Board of Studies (Chemistry – BOS – CHE)

The 7th meeting of the Board of Studies (BOS) of the Chemistry is held today 25th July 2022 at 2:00 PM through virtual mode.

Meeting Link:

https://teams.microsoft.com/l/meetup-join/19%3ameeting_MzA4MTVkNDMtMDY4Mi00NjM5LThiOTQtYTQ2ZGM0YzA4YTQ3%40thread.v2/0?context=%7b%22Tid%22%3a%22bf93bb5e-ecf0-4e3d-be0e-79b5cc527a48%22%2c%22Oid%22%3a%220ccca6b3-5ca4-47af-b05e-ca4ae1683266%22%7d

The following members are present:

S. No.	Name	Designation with Affiliation	Status
1	Dr. Abdul Sharief	Professor, Dean, School of Engineering, Presidency University, Bangalore – 64	Chairperson
2	Dr. Shashikala A. R.	Professor and HOD-Chemistry School of Engineering, Presidency University, Bangalore – 64	Member Secretary
3	Dr. Anu Sukhdev	Professor-Chemistry School of Engineering, Presidency University, Bangalore – 64	Member
4	Dr. Dileep R	Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member
5	Dr. Saravanan Chandrasekaran	Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member
6	Dr. S. Sampath	Professor IPC, IISc, Bangalore	External Member
7	Mr. Rajeeva Deekshit	Founder and CEO, Pyro Technologies Bengaluru	External Member (Industry)

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8	Dr. Shilpa Mehta	Professor, Dean-Academics, Presidency University, Bangalore – 64	Special Invitee
9	Dr. Amita Somya	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Special Invitee
10	Dr. Ranganatha S	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Special Invitee
11	Dr. Aparna Roy	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Special Invitee

The following members were absent with permission:

S. No.	Name	Designation with Affiliation	Status
1	Dr. P. Selvam	Professor and Head NCCR, IIT Madras	External Member

The member secretary/ HoD extended a warm welcome to the members, particularly to the external members, and introduced all the members of the committee. The chairman of the 7th BoS meeting, Dr. Abdul Sharief delivered the opening remarks by requesting BoS members to deliberate on each agenda and to provide constructive suggestions for the effective implementation of the proposed courses in the CBCS system.

With the permission of the chairperson, the member secretary presented the following agenda points, and deliberations were recorded.

Agenda SOE-CHE 7.1: To approve the minutes of the 6th BOS held on 18th August 2021.

Resolution SOE-CHE 7.1: The minutes of the 6th meeting of the Board of Studies of Chemistry held on 18th August 2021 were placed before the members and the same was discussed and approved by the members (**Annexure 7.1**)

Agenda SOE-CHE 7.2: Approval of Course Handouts passed by the previous Departmental Academic Committee (DAC).

Resolution SOE-CHE 7.2: The member secretary presented the course handouts passed by the previous DAC, and were duly approved by the BoS Committee (**Annexure 7.2**)

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Agenda SOE-CHE 7.3: Discussion on the feedback obtained on Curriculum from Industry, Students, Alumni, and Faculty.

Resolution SOE-CHE 7.3: The member secretary presented the gist of feedback obtained on the existing curriculum from Industry, students, alumni & faculty members as listed in **Annexures 7.3.1 and 7.3.2** and highlighted the necessity of revamping the curriculum toward Choice based Credit System (CBCS).

Agenda SOE-CHE 7.4: Approval of Course catalogs for the Academic year 2022-23

- **7.4.1 Approval of New course catalogs for the academic year 2022-23**

The member secretary presented all the course catalogs (**Annexure 7.4.1, 7.4.2, and 7.4.3)** which were duly approved after deliberations with the following discussions:

- CHE 1017: Applied Chemistry
    - Applications of conducting polymers to be elaborated
    - Applications of Batteries to be extended to Electric vehicles and power electronics
    - Recovery and reuse of battery components
    - Concept of display systems may be included (liquid crystals)
    - The concept of corrosion in electronic components and devices can be very interesting
    - Monitoring of corrosion especially towards civil structures and heavy mechanical machinery
    - Suggested few reference books on Corrosion, Batteries and Polymers
- CHE 1018: Environmental Science
    - Lab: Different samples from different areas may be collected and analyzed
    - Waste management: source identification to mitigation may be included
    - Analysis of Biological samples may be considered

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- **7.4.2 Ratification of existing course catalogs for the courses offered in the academic year 2021-22**

  The course catalogs for CHE 1001 Environmental Studies (Project-based) and CHE 1019 (Fundamentals of Environmental Studies (Theory only) were ratified by the BoS committee.

- **7.4.3 Revision of course catalogs for the existing courses**

- The revisions on the courses CHE 1001: Environmental Studies, CHE 1002: Industrial Chemistry, CHE 1010: Bioinformatics and CHE 1011: Chemical and Petrochemical Catalysts were approved without changes.

For other courses the following suggestions were given

- CHE 1004: Smart Materials for IOT
  - Module 1 and 2: Shape memory polymers may be included
  - Module 1 and 2: inclusion of chalcogenides may be beneficial
  - Suggested to think an alternative to electrochemical characterization
- CHE 1005: Computational Chemistry
  - Suggested to add basics of Bioinformatics
- CHE 1006: Introduction to Nanotechnology
  - Module 2: optical characterization must be included
  - Module 3: Nanophotonics and Nanoplasmonics may be removed
- CHE 1014: Surface Coating Technology and Corrosion Science
  - Methods for passivation may be included
  - Monitoring of corrosion especially towards civil structures and heavy mechanical machinery may be included

Agenda SOE-CHE 7.5: Approval of examiner's list for the Academic year 2022-23

The updated list of examiners **(Annexure 7.5)** was approved as placed.

Agenda SOE-CHE 7.6: Ratification of Value added courses

The updated list of value-added courses **(Annexure 7.6)** was ratified as placed.

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Agenda SOE-CHE 7.7: Any other matter with permission from the Chair

NIL

The BOS Committee has authorized the Member Secretary (in consent with the Chairperson) to incorporate minor corrections/ edits if required. The Chairperson and member secretary expressed special thanks to all the members and requested to extend the same support for future activities.
The meeting was concluded with a vote of thanks by Dr. Dileep.

BOS Committee:

S. No.	Name	Designation with Affiliation	Status
1	Dr. Abdul Sharief	Professor, Dean, School of Engineering, Presidency University, Bangalore – 64	Chairperson
2	Dr. Shashikala A. R.	Professor and HOD-Chemistry School of Engineering, Presidency University, Bangalore – 64	Member Secretary
3	Dr. Anu Sukhdev	Professor-Chemistry School of Engineering, Presidency University, Bangalore – 64	Member
4	Dr. Dileep R	Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member
5	Dr. Saravanan Chandrasekaran	Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member
6	Dr. P. Selvam	Professor and Head NCCR, IIT Madras	External Member
7	Dr. S. Sampath	Professor IPC, IISc, Bangalore	External Member
8	Mr. Rajeeva Deekshit	Founder and CEO, Pyro Technologies Bengaluru	External Member (Industry)
9	Dr. Shilpa Mehta	Professor, Dean-Academics, Presidency University, Bangalore – 64	Special Invitee
10	Dr. Amita Somya	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Special Invitee
11	Dr. Ranganatha S	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Special Invitee

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12	Dr. Aparna Roy	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Special Invitee

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SCHOOL OF ENGINEERING
DEPARTMENT OF CHEMISTRY

Ref. No PU/SOE/CHE/BOS-08/2022-23/MoM Date: 13th Feb 2023

Minutes of the 8th Meeting of the Board of Studies (Chemistry – BOS – CHE)

The 8th meeting of the Board of Studies (BOS) of the Chemistry is held today 13th Feb 2023 at 3:00 PM through Hybrid mode.

The following members are present:

S. No.	Name	Designation with Affiliation	Status
1	Dr. Abdul Sharief	Professor, Dean, School of Engineering, Presidency University, Bangalore – 64	Chairperson
2	Dr. Shashikala A. R.	Professor and HOD-Chemistry School of Engineering, Presidency University, Bangalore – 64	Member Secretary
3	Dr. Dileep R	Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member
4	Dr. Saravanan Chandrasekaran	Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member
5	Dr. P. Selvam	Professor and Head NCCR, IIT Madras	External Member
6	Dr. S. Sampath	Professor IPC, IISc, Bangalore	External Member
7	Mr. Rajeeva Deekshit	Founder and CEO, Pyro Technologies Bengaluru	External Member (industry)
8	Dr. Shilpa Mehta	Professor, Dean-Academics, Presidency University, Bangalore – 64	Special Invitee
9	Dr. Anu Sukhdev	Professor-Chemistry School of Engineering, Presidency University, Bangalore – 64	Special Invitee

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10	Dr. Amita Somya	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Special Invitee
11	Dr. Ranganatha S	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Special Invitee
12	Dr. Aparna Roy	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Special Invitee

The member secretary/ HoD extended a warm welcome to the members, particularly to the external members, and introduced all the members of the committee. The chairman of the 8th BoS meeting, Dr. Abdul Sharief delivered the opening remarks by requesting BoS members to deliberate on each agenda and to provide constructive suggestions for the effective implementation of the proposed courses in the CBCS system.
With the permission of the chairperson, the member secretary presented the following agenda points, and deliberations were recorded.

Agenda SOE-CHE 8.1: To approve the minutes of the 7th BOS held on 25th July 2022.

Resolution SOE-CHE 8.1: The minutes of the 7th meeting of the Board of Studies of Chemistry held on 25th July 2022 were placed before the members and the same was discussed and approved by the members (**Annexure 8.1**)

Agenda SOE-CHE 8.2: Approval of Course Handouts passed by the previous Departmental Academic Committee (DAC).

Resolution SOE-CHE 8.2: The member secretary presented the course handouts passed by the previous DAC, and were duly approved by the BoS Committee (**Annexure 8.2**)

Agenda SOE-CHE 8.3: Approval of new course catalogs and revisions for the Academic year 2022-23

- **8.3.1 Approval of New course catalogs for the academic year 2022-23**

The member secretary presented all the course catalogs (**Annexure 8.3.1 and 8.3.2**) which were duly approved after deliberations with the following discussions:

- CHE1020: Environmental Studies and Sustainable Development
    - Incorporating waste to wealth concepts needs to be done, in the form of case studies

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- Detailed explanation of 3R's
- Environmental Ethics and policies need to be emphasized
- Groundwater pollution should be specially discussed
- Discussion on handling domestic wastage can be incorporated
- Emphasis on Safety, health and hygiene should be included
- Pollution based on specific industries can be discussed through some case studies
- E-waste management and mitigation can be covered (electric vehicles, electronic gadgets, etc)
- Recycling of solid waste (biomedical waste) needs to be discussed

➢ **8.3.2 Revision of course catalogs for the existing courses**

➢ The revisions on the course CHE1012: Introduction to Composite materials was approved without changes.

➢ CHE1009: 3D printing and polymers

- Suggestion from the expert to discuss the basic concepts of polymer chemistry

Agenda SOE-CHE 8.4: Any other matter with permission from the Chair

NIL

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The BOS Committee has authorized the Member Secretary (in consent with the chairperson) to incorporate minor corrections/ edits if required. The Chairperson and member secretary expressed special thanks to all the members and requested to extend the same support for future activities.
The meeting ended with a vote of thanks by Dr. Shashikala A R.

BOS Committee:

S. No.	Name	Designation with Affiliation	Status
1	Dr. Abdul Sharief	Professor, Dean, School of Engineering, Presidency University, Bangalore – 64	Chairperson
2	Dr. Shashikala A. R.	Professor and HOD-Chemistry School of Engineering, Presidency University, Bangalore – 64	Member Secretary
3	Dr. Dileep R	Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member
4	Dr. Saravanan Chandrasekaran	Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member
5	Dr. P. Selvam	Professor and Head NCCR, IIT Madras	External Member
6	Dr. S. Sampath	Professor IPC, IISc, Bangalore	External Member
7	Mr. Rajeeva Deekshit	Founder and CEO, Pyro Technologies Bengaluru	External Member (industry)
8	Dr. Shilpa Mehta	Professor, Dean-Academics, Presidency University, Bangalore – 64	Special Invitee
9	Dr. Anu Sukhdev	Professor-Chemistry School of Engineering, Presidency University, Bangalore – 64	Special Invitee
10	Dr. Amita Somya	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Special Invitee
11	Dr. Ranganatha S	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Special Invitee
12	Dr. Aparna Roy	Associate Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Special Invitee

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SCHOOL OF ENGINEERING
DEPARTMENT OF CHEMISTRY

Ref. No PU/SOE/CHE/BOS-09/2023-24/MoM Date: 10th July 2023

Minutes of the 9th Meeting of the Board of Studies (Chemistry – BOS – CHE)

The 8th meeting of the Board of Studies (BOS) of the Chemistry is held today **Monday, 10th July 2023** at **3.00 PM** through hybrid mode.

The following members are present:

S. No.	Name	Designation with Affiliation	Status
1	Dr. Abdul Sharief	Professor, Dean, School of Engineering, Presidency University, Bangalore – 64	Chairperson
2	Dr. Shashikala A. R.	Professor and HOD-Chemistry School of Engineering, Presidency University, Bangalore – 64	Member Secretary
3	Dr. Dileep R	Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member
4	Dr. Saravanan Chandrasekaran	Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member
5	Dr. P. Selvam	Professor and Head NCCR, IIT Madras	External Member
6	Dr. S. Sampath	Professor IPC, IISc, Bangalore	External Member
7	Mr. Rajeeva Deekshit	Founder and CEO, Pyro Technologies Bengaluru	External Member (industry)
8	Dr. Shilpa Mehta	Professor, Dean-Academics, Presidency University, Bangalore – 64	Special Invitee

The member secretary/ HoD extended a warm welcome to the members, particularly to the external members, and introduced all the members of the committee. The chairman of the 9th BoS meeting, Dr.

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Abdul Sharief delivered the opening remarks by requesting BoS members to deliberate on each agenda and to provide constructive suggestions for the effective implementation of the proposed courses in the CBCS system.
With the permission of the chairperson, the member secretary presented the following agenda points, and deliberations were recorded.

Agenda SOE-CHE 9.1: Approval of the MOM and ATR of 8th BOS meeting held on 13th February 2022.

Resolution SOE-CHE 9.1: The minutes of the 8th meeting of the Board of Studies of Chemistry held on 13th Feb 2023 were placed before the members and the same was discussed and approved by the members (**Annexure 9.1**)

Agenda SOE-CHE 9.2: Approval of Course Handouts passed by the previous Departmental Academic Committee (DAC) for the winter semester 2022-23.

Resolution SOE-CHE 9.2: The member secretary presented the course handouts passed by the previous DAC, and were duly approved by the BoS Committee (**Annexure 9.2)**

Agenda SOE-CHE 9.3: Approval of New course catalogs and revisions for the AY 2022-23 (even sem)

- **9.3.1 Approval of New course catalogs for the academic year 2022-23**

The member secretary presented all the course catalogs (**Annexure 9.3.1)** which were duly approved after deliberations with the following discussions:

- CHE1021: Environmental Studies and resource management
    - Module 5: Mitigation of environmental pollution is to be incorporated;
    - Module 7: Mention about 4R and 5R during the sessions
    - Include Environmental assessment reports

Links to assessment reports must be included for all the topics in the syllabus

- **9.3.2 Revision of course catalogs for the existing courses**

The member secretary presented all the revisions in the course catalogs (**Annexure 9.3.2)** which were duly approved after deliberations with the following discussions:

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- The revisions on the course CHE1018: Environmental Science
    - Lead and Arsenic estimation in underground water samples can be included in the lab component

Agenda SOE-CHE 9.4: Discussion on the feedback obtained on Curriculum from Industry, Students, Alumni, and Faculty.

Resolution SOE-CHE 9.4: The member secretary presented the gist of feedback obtained on the existing curriculum from Industry, students, alumni & faculty members as listed in **Annexures 9.4.1 and 9.4.2** and highlighted the necessity of revamping the curriculum.

Agenda SOE-CHE 9.5: Approval of examiners list

The BoS Committee approved the examiners list for the academic year 2023-24 (**Annexure 9.5).**

Agenda SOE-CHE 9.6: Approval of MOOC courses list

Not Applicable as the department do not have any MOOC courses.

Agenda SOE-CHE 9.7: Any other matter with permission from the Chair

NIL

The BOS Committee has authorized the Member Secretary (in consent with the chairperson) to incorporate minor corrections/ edits if required. The Chairperson and member secretary expressed special thanks to all the members and requested to extend the same support for future activities.
The meeting ended with a vote of thanks by Dr. Shashikala A R.

BOS Committee:

S. No.	Name	Designation with Affiliation	Status
1	Dr. Abdul Sharief	Professor, Dean, School of Engineering, Presidency University, Bangalore – 64	Chairperson
2	Dr. Shashikala A. R.	Professor and HOD-Chemistry School of Engineering, Presidency University, Bangalore – 64	Member Secretary
3	Dr. Dileep R	Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member

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4	Dr. Saravanan Chandrasekaran	Professor, Chemistry, School of Engineering, Presidency University, Bangalore – 64	Member
5	Dr. P. Selvam	Professor and Head NCCR, IIT Madras	External Member
6	Dr. S. Sampath	Professor IPC, IISc, Bangalore	External Member
7	Mr. Rajeeva Deekshit	Founder and CEO, Pyro Technologies Bengaluru	External Member (industry)
8	Dr. Shilpa Mehta	Professor, Dean-Academics, Presidency University, Bangalore – 64	Special Invitee

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