

COURSE TEMPLATE

1.	Department /Centre proposing the course	CHEMISTRY
2.	Course Title (<i>< 45 characters</i>)	APPLIED CHEMISTRY: CHEMISTRY AT INTERFACES
3.	L-T-P structure	3 - 0 - 0
4.	Credits	3
5.	Course number	CYL121
6.	Status (<i>category for program</i>)	Program Linked Basic Science

7.	Pre-requisites (course no./title)	
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8.	Status vis-à-vis other courses (<i>give course number/title</i>)	
8.1	Overlap with any UG/PG course of the Dept./Centre	NO
8.2	Overlap with any UG/PG course of other Dept./Centre	NO
8.3	Supercedes any existing course	NO

9.	Not allowed for (indicate program names)	
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10.	Frequency of offering	☐ Every sem ☐ 1 st sem ☐ 2 nd sem ☒ Either sem
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11.	Faculty who will teach the course NG Ramesh, Nalin Pant, V Haridas, Nidhi Jain, Ravi P Singh A Ramanan, N D Kurur, S Deep, S Sapra, P Ingole, H Kashyap	
12.	Will the course require any visiting faculty?	NO

13.	Course objective (<i>about 50 words</i>): The main objective of the course is to provide a basic concept on chemical reactions happening at interfaces and their applications to synthesis at industrial scales. The course contents have been designed taking into account requirement of an advanced level undergraduate chemistry course for chemical engineers.	
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14.	Course contents (<i>about 100 words</i>) (<i>Include laboratory/design activities</i>): Unit processses in organic synthesis. Laboratory vs. industrial synthesis. Role of medium in directing synthetic outcomes, organized media. Natural and	
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	synthetic constrained systems (inorganic and organic) for control of reactivity in organic reactions. Phase transfer catalysts, polymer and supported reagents for control of reactions. Green Chemistry. Heterogeneous and homogeneous catalysis, surface chemistry, kinetics of catalyzed reactions. Industrial catalysis.
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15. Lecture Outline (with topics and number of lectures)

Module no.	Topic	No. of hours
1	Unit processes in organic synthesis.	3
2	Laboratory vs Industrial synthesis	3
3	Role of medium in directing synthetic outcomes, organized media	3
4	Natural and synthetic constrained systems (inorganic and organic) for control and reactivity in organic reactions	3
5	Phase transfer catalysis	3
6	31 st Dec ~ 1 st Jan ~ 1 st Feb ~ 1 st Mar ~ 1 st Apr ~ 1 st May ~ 1 st Jun ~ 1 st Jul ~ 1 st Aug ~ 1 st Sep ~ 1 st Oct ~ 1 st Nov ~ 1 st Dec	3
7	Green Chemistry: Principles of green chemistry; greener approaches to organic synthesis; use of environmentally benign solvents in synthesis; applications of non-conventional synthetic methods for industrial applications.	5
8	Surface chemistry	4
9	Kinetics of catalyzed reactions	4
10	Homogeneous and Heterogeneous catalysis: Homogeneous Lewis acid-base catalysts in synthesis with examples of more recent mild catalysts; organometallic catalysts as homogeneous catalysts for applications in organic and polymer synthesis. Examples of organometallic reactions such as olefin metathesis, Suzuki-coupling, Heck coupling, Buchwald coupling etc. Chemistry of zeolites, silica and other heterogeneous acid and base catalysts.	8
11	1 st Jan ~ 1 st Feb ~ 1 st Mar ~ 1 st Apr ~ 1 st May ~ 1 st Jun ~ 1 st Jul ~ 1 st Aug ~ 1 st Sep ~ 1 st Oct ~ 1 st Nov ~ 1 st Dec	3
12		
COURSE TOTAL (14 times 'L')		42

16. Brief description of tutorial activities

NA

17. Brief description of laboratory activities

Module no.	Experiment description	No. of hours
1	NA	NA
2	NA	NA
3	NA	NA
4	NA	NA
5	NA	NA
6	NA	NA
7	NA	NA
8	NA	NA
9	NA	NA
10	NA	NA
COURSE TOTAL (14 times 'P')		14

18. Suggested texts and reference materials

STYLE: Author name and initials, Title, Edition, Publisher, Year.

1. Unit processes in Organic Synthesis P. H. Groggins, Tata McGraw-Hill
2. Industrial Catalysis - A Practical Approach, Jens Hagen, Wiley-VCH
3. Green Chemistry - An introductory Text, Mike Lancaster, RSC Publishing
4. The Basis and applications of Heterogeneous Catalysis, M. Bowker, Oxford Chemistry

Primers (No. 53)

5. Physical chemistry of surfaces, A.W. Adamson and A.P. Gast, 6th Ed., Wiley India

6. Literature from journals

19. Resources required for the course (*itemized & student access requirements, if any*)

19.1	Software	No
19.2	Hardware	No
19.3	Teaching aides (videos, etc.)	Yes
19.4	Laboratory	No
19.5	Equipment	No
19.6	Classroom infrastructure	Yes
19.7	Site visits	No

20. Design content of the course (*Percent of student time with examples, if possible*)

20.1	Design-type problems	NA
20.2	Open-ended problems	NA
20.3	Project-type activity	NA
20.4	Open-ended laboratory work	NA
20.5	Others (please specify)	NA

Date:

(Signature of the Head of the Department)