COURSE TEMPLATE

1.	**Department/Centre proposing the course**	CHEMISTRY
2.	**Course Title** *(< 45 characters)*	CHEMICAL SYNTHESIS OF FUNCTIONAL MATERIALS
3.	**L-T-P structure**	3-0-0
4.	**Credits**	3
5.	**Course number**	
6.	**Status** (*category* for *program*)	

7.	**Pre-requisites** (course no./title)	CYL100

8.	**Status vis-à-vis other courses** *(give course number/title)*	
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)	

10.	**Frequency of offering**	☐Every sem ☐1st sem ☒2nd sem ☐Either sem

11.	**Faculty who will teach the course** Sameer Sapra, A Ramanan, Pravenn Kumar Ingole	
12.	**Will the course require any visiting faculty?**	NO

13.	**Course objective** *(about 50 words)***:** The objective is intended to introduce the fundamentals of nanomaterials and nanostructures and highlight the chemical approaches towards producing such materials. Emphasis will be placed more on "chemical techniques" to manipulate the structural characteristics as well as incorporate functionality.
14.	**Course contents** *(about 100 words) (Include laboratory/design activities)***:** Chemical approaches to the synthesis of functional materials - the design of materials targeting important properties by 'bottom-up' processes that manipulate primary chemical bonds. Fundamental chemistry principles involved in materials design through synthesis – process methodologies such as self-assembly, sol-gel reactions, synthesis of nanomaterials,etc.

15. Lecture Outline *(with topics and number of lectures)*

Module no.	Topic	No. of hours
1	Definition of synthesis: Historical examples of key synthetic discoveries	2
2	Introduction to qunatum structures	4
3	Thermodynamics and kinetics in synthesis	2
4	Scale up of synthetic processes	4
5	Supramolecular self-assembly	4
6	Self assembly of monolayers, 2-D and 3-D materials	6
7	Sol-gel chemistry	5
8	Synthesis of naomaterials: Quantum dots, nano wires, graphenes, carbon nanotubes	4
9	Functionalised nanostructures	3
10	Chemical beam epitaxy	4
11	Characterization of nano materials (this will be included as and when necessary)	4
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		
2		
3		
4		
5		
6		
7		
8		
9		
10		
COURSE TOTAL *(14 times 'P')*		00

18. Suggested texts and reference materials

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

1. Nano chemistry: A chemical approach to Nanomaterials,
G.A. Ozin, A.C. Arsenault and L. Cademartiri,
RSC Publishing, 2nd Edition (2009)

2. A textbook of nanoscience & nanotechnology,
T. Pradeep
McGraw Hill Education India (2011)

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

19.1	Software	
19.2	Hardware	
19.3	Teaching aides (videos, etc.)	
19.4	Laboratory	
19.5	Equipment	
19.6	Classroom infrastructure	
19.7	Site visits	

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

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

Date: (Signature of the Head of the Department)