Innovations by Faculties in teaching and learning

The faculty of our college has adopted various innovative teaching and learning methods during their completion of the curriculum. The basis of most of the techniques adopted by our faculty is use of ICT as it opens up opportunities for learning by enabling the learners to access, extend, transform and share ideas in multi-modal communication forms.

Following is the list of few innovative methods adopted by our faculty in teaching and learning process:

The methods adopted by the faculty are uploaded on college website and social media for wide accessibility.

1. Self learning

The major aim of this method of learning is to make the process more simplified, interactive, accessible, practicable and reflective. In this method of learning, students have been assigned topics incorporated in the curriculum of pharmaceutical chemistry. Subsequently; students were given inputs about the literature available with respect to research principles/procedures and mechanism of the reaction.

In this exercise, students have developed video clip of concerned topic regarding the mechanism of the reaction where the concepts are elaborated and simplified to understand the mechanism of the reaction of the given compound. In fact, this method has been designed by the students with the help of the teacher to make the subject easy and understandable. In this method of learning, students have developed conceptual clarity, analytical ability, and application skills by self learning. The students have uploaded this video clip on YouTube in order to provide open accessibility of this unique method. It is observed that the work carried out by students got very favorable comments and likes in this regard. The same method is also uploaded on college website for information and comments. The effectiveness of this method maps with PO1, PO2, PO3, PO3, PO4, PO5, PO7, PO8, PO9, PO10, PO11.

Link of videos prepared by our faculty:

	List of Videos	
	Link of Video Uploaded on YouTube	
1	https://youtu.be/5tBCg_n_l0k	Synthesis of 2-phenyl indole from phenyl hydrazone.
2	https://youtu.be/6R9QyGbpk78	To synthesise 4-methyl-7-hydroxy coumarin from resorcinol
3	https://youtu.be/7TySr_0o_EA	Synthesis of 5,5diphenylhydantoin
4	https://youtu.be/ai3fAByC	Synthesis Of 2,3-diphenylquinoxaline (Reaction with Mechanism)

	Pyk	
5	https://youtu.be/ByEAQIq385M	Synthesis if benzimidazole
6	https://youtu.be/cjbMmyi4qB4	SYNTHESIS OF BENZOTRIAZOLE
7	https://youtu.be/coGEJVjQrVg	Synthesis of Benzotriazole
8	https://youtu.be/-Cr7yxNU6tM	Synthesis of 5 5 diphenylhydantoin from benzil
9	https://youtu.be/DtNRO52RbYk	To synthesise 4 - methyl- 7 hydroxy coumarin from resorcinol
10	https://youtu.be/DXSscbcDB98	Synthesis of 4methyl -7-hydroxycoumarin from resorcinol
11	https://youtu.be/ex0fNXrnlxc	Synthesis of 4-methyl-7-hydroxycoumarin from resorcinol
12	https://youtu.be/fs8s5rxqog4	Hantzsch Pyridine Synthesis
13	https://youtu.be/kQT8agm6YxM	Synthesis of 2-phenyl indole by using phenylhydrazone.
14	https://youtu.be/M2Sfnva0w1w	Synthesis of 4-methyl-7-hydroxycoumarin
15	https://youtu.be/RDodKOC5DQw	Synthesis of 5,5-Diphenyl hydantoin from benzil
16	https://youtu.be/UN_pKsgsoAM	Synthesis of 2-phenylindole.
17	https://youtu.be/UY2U0Gk0efY	Synthesis of 5,5 Diphenyl Hydentoine from Benzil.
18	https://youtu.be/wAKninuey30	Synthesis of Dihydropyrimidinon from benzaldehyde
19	https://youtu.be/XM_mtNjOdSg	SYNTESIS DIHYDROPRIMIDONE FROM BENZALDEHYDE.
20	https://youtu.be/yf00fytF1Nk	Synthesis of benzimidazole from o- phenylenediamine
21	https://youtu.be/ZvW4VfFGG2o	Synthesis of 2,3 diphenyl quinoxaline
22	https://youtu.be/GJ5IVcDhhrM	To Estimate The Saponification Value of Ester (oil/fat).
23	https://youtu.be/58U0BWNKz5s	Estimation of hydroxyl group
24	https://youtu.be/8c3IqqkPCPM	Estimation of carboxylic acid
25	https://youtu.be/8UwAJYOlY3E	Estimation of percentage of carbonyl compound
26	https://youtu.be/aHFEbTtlEj4	To estimate amount of phenol in given sample of phenol
27	https://youtu.be/C1tG69O0fXc	Estimation of phenol
28	https://youtu.be/fLJ4pP1NkGw	Determination of acid value
29	https://youtu.be/GJ5IVcDhhrM	To Estimate The Saponification Value of Ester (oil/fat).
30	https://youtu.be/gKrJlFVrMfc	Estimation of carbonyl compound
31	https://youtu.be/IO8tymax	Estimation of amino group

	z9s	
32	https://youtu.be/iqZWvs8vpF8	To estimate the phenol content in the unknown phenolic compound
33	https://youtu.be/jGZ3hRQxqG4	Estimation Of Amino Group
34	https://youtu.be/KDlhy_WEqKg	Estimation Of Amino Group
35	https://youtu.be/n_tOWP3GEFs	Acid Value estimation
36	https://youtu.be/oA7ZI2wjQdw	Estimation of hydroxyl group
37	https://youtu.be/OmWpRz9Vu1Y	Estimation of Primary amine
38	https://youtu.be/sKjj6jML9nk	Estimation of Carbonyl Group
39	https://youtu.be/t7ymvYaJ0hE	Estimation of hydroxyl group
40	https://youtu.be/udQplM8C_ME	Estimation of acid value
41	https://youtu.be/vFbS-JqptkM	Estimation of Saponification Value of an Ester
42	https://youtu.be/wHn0fZ6QmoU	Estimation of Saponification Value of an Ester
43	https://youtu.be/Q7y-OMna00U	Reaction and Mechanism of synthesis of ISOQUINOLINE
44	https://youtu.be/JiIIfe9-UDI	Fischer Indole synthesis
45	https://youtu.be/O71NSGOy5Ac	Gattermann Koch synthesis.
46	https://youtu.be/YnpXXMdasl4	Reaction and mechanism of MADELLUNG SYNTHESIS
47	https://youtu.be/IBQNAiQqFU4	Retrosynthesis Of CIPROFLOXACIN
48	https://youtu.be/nzmp3o-iEvU	Skraup synthesis for synthesis quinolines
49	https://youtu.be/7qtloAZkWbk	synthesis of quinolines
50	https://youtu.be/yfcjkiYhvv4	Retro synthesis of Ibuprofen
51	https://youtu.be/lv18TYWDH8s	GASSMAN INDOLE SYNTHESIS
52	https://youtu.be/ZAv0QFBHbmg	Retrosynthesis of propranolol
53	https://youtu.be/gt-kSgU-2UM	Fiest benary synthesis
54	https://youtu.be/faXtESIlgI4	Reaction and Mechanism of THIOPHENE(Paal knor synthesis)
55	https://youtu.be/dJqfRbjXXtY	Madelung Indole Synthesis
56	https://youtu.be/pHc1dtDdYRM	Retrosynthesis of ciprofloxacin
57	https://youtu.be/SFzxzCzutbY	Gomberg reaction
58	https://youtu.be/fs8s5rxqo	Hantzsch Pyridine Synthesis

	q4	
59	https://youtu.be/_TFa5RVmBSM	Reimer Teimann Synthesis
60	https://youtu.be/-vNbn0As09k	Preparation of Diazomethane
61	https://youtu.be/Jcxy6hgcQm4	BISCHLER~indole synthesis
62	https://youtu.be/zcAgz_tVM58	Dials Alder Reaction
63	https://youtu.be/_2quAkL7oKg	Mannich reaction
64	https://youtu.be/fwtctDIMSHo	Synthesis of Hantzsch Pyrrole Synthesis.
65	https://youtu.be/ROubYZydF2o	Retrosynthesis of Ibuprofen.
66	https://youtu.be/0TbKIAWdQ-g	Reissert Synthesis of indole
67	https://youtu.be/hw6SlYLoiAM	hantzsch synthesis of pyridine
68	https://youtu.be/VEAaQlyXKvQ	Doebner Miller Synthesis of Quinoline
69	https://youtu.be/bj7MW4qgUrA	Friedlander synthesis of quinoline
70	https://youtu.be/ZAnY_xvZlDw	Retrosynthesis of Propanolol.
71	https://youtu.be/AQp-Jg0_o0E	Skraup synthesis for synthesize quinolines
72	https://youtu.be/q4b_SfHw4Y0	The Bischler-Napieralski synthesis of isoquinoline
73	https://youtu.be/d-g3h8un8T8	Paal knoor synthesis of Pyrole
74	https://youtu.be/rvB8a_P4EQw	Hantzsch Pyrrole Synthesis
75	https://youtu.be/36UTBdXza-U	Retrosynthesis of Ciprofloxacin.
76	https://youtu.be/6uBu-nLi_xs	Synthesis of Phenanthrene
77	https://youtu.be/Th8h8D-MVEo	Paal knorr synthesis of thiophene
78	https://youtu.be/tuvNEvX4Tgg	Skraup synthesis
79	https://youtu.be/n0UOq4GPAaM	BISCHLER INDOLE SYNTHESIS
80	https://youtu.be/mtfNppXtf2Q	Synthesis of pyridine by Hantzsch synthesis
81	https://youtu.be/M2Sfnva0w1w	Synthesis of 4-methyl-7-hydroxycoumarin
82	https://youtu.be/CE_UWitlQKk	Knorr quinoline synthesis
83	https://youtu.be/XPrbTDKGChM	Conrad limpach quinoline synthesis
84	https://youtu.be/ph3OgMPVsVQ	Gassman Synthesis
85	https://youtu.be/KNnf4EV	Retrosynthesis: Benary-Feist synthesis of Furan

	bOMQ	
86	https://youtu.be/vzCJfrSnO3k	Mannich reaction
87	https://youtu.be/4-U7HrVE1IU	Paal Knorr synthesis of furan
88	https://youtu.be/CxqCPPW05Gg	Gatterman Koch Reaction of Pyrrole
89	https://youtu.be/2UScpx_bGII	Reaction and mechanism of thiophene (paal knor synthesis)
90	https://youtu.be/GiHv0oaNXIY	Reissert Indole Synthesis
91	https://youtu.be/3XsCeV97uX8	Madellung synthesis
92	https://youtu.be/S3aWpB8GVUU	BISCHLER INDOLE SYNTHESIS
93	https://youtu.be/KucLPFUeTU4	Diels-Alder reaction
94	https://youtu.be/OYXiyJSoKj0	Paal knor synthesis of pyrrole
95	https://youtu.be/fFyZJwXiMEk	Fischer's indol synthesis
96	https://youtu.be/MAoz5-Ouv9k	Baeyer Indole Synthesis
97	https://youtu.be/zFBKJtvDycw	Hantzsch Pyrrole Synthesis
98	https://youtu.be/3_G9LzVxozQ	Synthesis of 4-methyl-7-hydroxy coumarin.
99	https://youtu.be/9bxWIBV0rmA	Synthesis of m-Nitrophenol from m-Nitroaniline
100	https://youtu.be/cyUSibcLsPs	To synthesize phenothiazine from diphenylamine
101	https://youtu.be/GH3wYi7I5SM	Synthesis of Hippuric Acid | Medicinal Chemistry | Organic Chemistry | Pharmaceutical Chemistry
102	https://youtu.be/iTkdZwb12P4	Synthesis of Isonicotinic Acid
103	https://youtu.be/M1VzzLZUSts	Synthesis of Benzocaine from PABA
104	https://youtu.be/s0BTiqm_iZs	Synthesis of fluroscein from resorcinol.
105	https://youtu.be/4RvhKG5E5x4	Differentiating test between Aldehydes and Ketones
106	https://youtu.be/P67AUPuOv4s	Confirmatory test for amines
107	https://youtu.be/5AbuGpvEt0E	Test of polyhydric alcohol
108	https://youtu.be/zC--8LqI_Uc	Hinsberg test
109	https://youtu.be/jS16u9CFOoQ	Test for identification of phenols.
110	https://youtu.be/OWuo5T7Uvd0	Confirmatory test for carboxylic acid
111	https://youtu.be/gQHAQnYOjXU	Test for carboxylic acids.
11	https://youtu.be/5_vMXwC	Confirmatory test for Phenols

2	xeP4	
113	https://youtu.be/R1x0AW4gxlk	confirmatory test for ketone
114	https://youtu.be/ZiWzv8WwL18	Recrystallization of Aspirin
115	https://youtu.be/P77J_ruX4sc	Carboxylic acid test
116	https://youtu.be/qARKnpjuQRM	Confirmatory test for amides

2. Student-centric learning

This is a new age learning method to make students independent and autonomous to develop in sight of the subject. In this method, a student have been assigned topic included in the curriculum for presentation in the class. In this regard the teacher gave detail inputs about the literature available, and also gave detailed information about the preparation and presentation of the subject in the class by using modern methods of presentation i.e. power point presentation(PPTs), video clip, animation, chart, graph etc. to make the presentation more effective, meaningful, interactive and understandable to the students. Besides, the other students of the class were informed to ask doubts and queries regarding the presentation. In this way, the faculty facilitates the students to prepare and present the lecture in the class like a teacher. In other words, in this method, the student becomes a teacher and the teacher act as a facilitator. This exercise has been video recorded and uploaded on college website to motivate and inspire other learners.

In fact, this method of learning has got overwhelming response from students since the process enables students to evaluate, analyze, apply and understand the concept clearly. The students do integrate, consolidate and simplify the concept to enhance their learning competencies. This method has also enhanced communication, confidence and interactive learning. The students become tech-savvy and familiar to use ICT solution in learning. Hence this method of learning was found to be highly appropriate, effective, meaningful and learner-centric making students autonomous and independent. The effectiveness of this method maps PO1, PO2, PO3, PO5, PO8, PO9, & PO11.

Link of videos prepared by our faculty:

https://www.youtube.com/watch?v=l-mKZXq8FK0

https://www.youtube.com/watch?v=H-yAR7Iz-XU

https://www.youtube.com/watch?v=CzTGYelYFFk

https://www.youtube.com/watch?v=r6O4eedj8Eo

3. Learning by doing

This is a unique method of learning to enhance the hands on experience and practical skills of the learner. This method is exclusively used in practical for field work and collection of herbal drugs. In this exercise student have been given detail inputs about the collection, selection and method of preservation of medicinal plants from the field. Students are also shown the technique of preservation of herbarium specimen of a medicinal plant which is a ready reckoner for the authentification of crude drug. The students visits the field, observe the specimen, collect the voucher specimen of crude drug and then record on the spot character of the crude drug which is required for authentification. The collected crude drug specimen is pressed, dried and then glued on a standard sheet of 11.5cm × 16.5cm paper sheet called as herbarium which is a standard technique of presentation of crude drug carried out by student.

The students are also trained to study micromorphological character of crude drug for correct identification. Student has been shown, a technique of section cutting of root stem, leaves or floral bud required for the study of crude drug. The sections are taken and stained for the internal differentiation of various tissues and also for the observation of internal anatomical character. The sections are dehydrated and mounted on a slide with cover glass and preserved for ready reference to the users. The students are also asked to carry out field work for the study of different environment related problem like water pollution, solid waste management, hospital waste management, air pollution, urban green cover etc. the student visit different spot in the field and collect relevant information about various issues. The information collected by the students is consolidated and interpreted on the basis of field observation. In this exercise students could get an opportunity to study various environmental problems and issues of sustainable life.

In view of above facts, students develop hands-on experience, lateral thinking, multidimensional thinking, cognitive skills, and critical thinking with the help of learning by doing. In facts student are attracted to new challenges and get knowledge and skills to deal with real life solutions. The effectiveness of this learning method maps with PO1, PO2, PO3, PO6, PO9, PO10.

Link of videos prepared by our faculty:

https://www.youtube.com/watch?v=GkRg-EZjQRk

https://www.youtube.com/watch?v=4ePk7rI-rSw

4. Creative Learning

This method of learning has been used in pharmacognosy laboratory practical's to study macro and micro morphological characters of crude drugs for authentication. In this exercise, students have been given detail inputs about the significance of micro morphological characters such as trichomes, stomata's, tracheae's, vessels, leaf architecture and type of calcium oxalate crystals which are highly constant, consistent and characteristic of a crude drug. Students have been asked to craft the acrylic models of above mentioned parts of the plants to develop creativity, imagination, multidimensional thinking, ingenuity and conceptual understanding. This method also boosts insight of the subject. The effectiveness of this method maps with PO1, PO2, PO4 and PO11.

Link of videos prepared by our faculty:

http://www.mcop.org.in/Images/4%20MODELS%20OF%20ANATOMICAL%20SRTUCTURES.pdf

5. Experiential Learning

Experiential learning is a Aristotelian logic of learning expounded by David Kolb. In fact, this method is exclusively employed in practicals. In this exercise, a group of 3-4 students have been identified and assigned experiment incorporated in the curriculum. The students are given detail inputs about the theory, logic and significance of the experiment. Subsequently student experiment, reflect and conceptualize during the experimentation. One participant of the group elaborates the protocol, requirements. The second participant explains about the working and handling of the equipment, while the third participant elaborates about the reflective ideas and, the fourth participant highlights the conclusion of experiment. All the steps in the experiment are carefully video recorded and used as reference for other students for motivation.

This method has holistic perspectives which include experience, perception, cognition, collaboration, coordination and cooperation. In fact, this learning method basically encompasses concrete learning, reflective observation, abstract conceptualization and active experimentation. The learners are attracted to new challenge and solve the problem intuitively. This learning process also involves conceiving new ideas, evaluation, analysis, interpretation, generalization and factual conclusion. Learners do apply intuitive skills to achieve and attain desired learning objectives. By and large, learners develop multidimensional thinking, lateral thinking, critical thinking, analytical ability, and application skills. The effectiveness of this learning method maps with PO1, PO2, PO3, PO5, PO9, PO10, PO11.

Link of videos prepared by our faculty:

Sr. No.	**In short Description of model/chart**	**Link of video**
1.	Moisture content determination by Loss on drying	https://www.youtube.com/watch?v=tZOR0j7WdN8
2.	Stomatal Number & stomatal index determination of crude drug sample.	https://www.youtube.com/watch?v=4LsyaBwlqf0
3.	Extraction and	https://www.youtube.com/watch?v=LHCrRHJPKGM

	chromatographic analysis of Piperine from black pepper.	
4.	Swelling Index Determination of crude drug.	https://www.youtube.com/watch?v=aN8JtdBXqHk
5.	Extraction of Strychnine & TLC characterization.	https://www.youtube.com/watch?v=MZqKSwScJ8c
6.	Crude fibers by Dutch method	https://www.youtube.com/watch?v=0Fx5_iTwmSA&feature=youtu.be
7.	Total ash value of given crude drug.	https://www.youtube.com/watch?v=tx82TXmWN_Y&t=13s
8.	Extraction and chromatographic analysis of Piperine from Black pepper	https://www.youtube.com/watch?v=oyQPOYPZ5UM&t=1s
9.	Total phenolic content of crude drug sample.	https://www.youtube.com/watch?v=cmbNe6rs7sQ&t=20s

6. Project based learning

It is a unique method of student centric pedagogy where students integrate their finding by knowing and doing. In fact, this activity involves either assignment of small project or field work. Project based learning is a collaborative activity which involves planning, designing, analyzing, drawing conclusion, and lastly sharing the ideas within a team. The team comprises of slow and advanced learner. In this method projects are assigned to a group of 2-3 students including slow learners and advanced learners in order to inspire and motivate slow learner for the improvement of overall performance. This method is applied for environmental studies where students have been assigned project of major environmental issues which have profound impact on sustainable life. The students have explored the major issues like water pollution, solid waste management, hospital waste management and water harvesting in which students have complied and consolidated exhaustive information by the way and field observation, data collection related to the current scenario. In this activity student acquires deeper knowledge exploration, field collection, data collection, and meticulous observation in order to acquire knowledge of real world challenges and problem. This activity boosts leadership, interpersonal skills, inclusiveness and inquiry based learning of student. In fact this method was found extremely important to bring slow learners at par with advanced learners. The effectiveness of this learning method maps with PO1, PO2, PO3, PO5, PO9, PO10, PO11.

Link of contents prepared by our faculty:

http://www.mcop.org.in/Images/project_based_learning_Dr_SKA.pdf

7. Molecular Modeling of Desired Drugs

This is a unique method of learning which boosts creativity, inquisitiveness, spatial visualization, perceptual speed, inductive learning, and visual perception. Molecular structure of different drug is highly intricate and available only in 2D form which is a major hurdle in understanding the 3D structure of drug specially in understanding stereo chemistry. In this method, an attempt has been made to design and developed 3D models of drug in order to understand the structural arrangement in space, bond, bond distance, angle, orientation, configuration, confirmation and proper dimension which is highly difficult to explain and elaborate with the help of 2D model. in this exercise student are given detail input regarding the designing of molecular model by using Darling Flexible Molecular Model Kit which has an interesting arrangement of push and pull coupling system. The students of Final Year B Pharm. have been assigned a drug to design and develop its 3D molecular model by using molecular model kit. This work was assigned as a part of theory curriculum. Students have designed and developed 3D molecular model of a given drug and described the mechanism of formation, orientation, configuration, and dimension of the molecule. Students have developed a deep insight while crafting the 3D model which is difficult to understand the scenario with the help of 2D model and plain text. This method has generated interest in student by getting better context, a greater sense of perfection, visualization, conceptual understanding, and more engaging activity. This allows student to better connect with learning material. This technique has sharpened critical thinking, problem, solving, conceptual understanding, application skill which is a basis for the development of analytical reasoning and decision making.

This method also enable student to develop self directed learning skills. Students do develop feeling of accomplishment for getting in depth knowledge and skills. In this method student are more focused engaging self motivated for getting insight knowledge of the subject . the effectiveness of this method maps with PO1, PO2, PO3, PO4, PO7, PO9, PO11.

Link of videos prepared by our faculty:

https://youtu.be/pg9GpHQVcvM

https://www.youtube.com/watch?v=pg9GpHQVcvM

8. Blended Learning

Blended learning is an amalgamation of face to face learning, and use of multimedia to make the learning meaningful and understandable. In this exercise, a conventional face to face discussion method has been blended with video clips, animation and graphs as and when it is necessary to simplify the complex concept or mechanism for better clarity.

In industrial pharmacy certain concepts are more vivid with the help of video clips where student get utmost clarity and in depth understanding. The use of multimedia in combination with face to face method is more impactful where student are made aware of modern concept of industrial requirement. This method also develops, critical thinking, lateral, thinking, conceptual understanding required for employability skills. The effectiveness of this method maps with PO1, PO3, PO4, PO6, PO9, PO11.

Link of videos prepared by our faculty:

https://www.youtube.com/watch?v=i1l-nRy9ohY

9. Use of Novel teaching tool by developing 3 D Models

This is a unique teaching method used to study highly intricate concepts which is difficult to understand by the students. In the microbiology curriculum, the structure of virus is very difficult to understand and also the mechanism of multiplication of virus in human cell. In this context, students were given inputs of detailed literature on viruses to find out the information regarding detailed structure and mechanism of multiplication. However, students could not get explicit idea about the structure of the virus. In order to make this problem more simplified and understandable the inputs from students have been carefully studied and a 3 Dimensional model of virus has been conceptualized and subsequently developed by using 3 D printing technology. This is an interdisciplinary work incorporating 3 Dimensional concepts to develop model of the virus. The 3 dimensional model of virus was very easy to understand and fascinated students to develop 3 D models in order to understand mechanism of replication of HIV virus which is a topic of current interest. The effectiveness of this method maps with PO1, PO2, PO3, PO4, PO7, PO11.