

**Syllabus for Multi-Disciplinary Minor  
(MDM) Degree**

**in**

**Oils Oleochemicals and Surfactants  
Technology**

**Under the National Education Policy-  
NEP 2020**

**(2023-2024)**



**Offered by**

**OILS OLEOCHEMICALS AND SURFACTANTS  
TECHNOLOGY**

**Institute of Chemical Technology**

**(University Under Section-3 of UGC Act, 1956)**

**Elite Status and Center for Excellence**

**Government of Maharashtra**

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### A. Preamble:

Students who wish to learn the principles of oleochemicals and surfactant technology outside of engineering sciences classes might pursue the OILS OLEOCHEMICALS AND SURFACTANTS TECHNOLOGY minor. Students will develop an understanding of the fundamentals of oleochemicals and their application in an industrial setting. This course starts with basics of oleochemicals which further advances into technologies used and then further gives an overview of applications in oleochemicals and allied industry

The minor's technological know-how and skills can be combined with a chemical engineering major or technology of associated branch degree to prepare students for a wide range of prospects in industrial fields and in-demand occupations.

### A. Programme Specific Outcomes (PSOs)

PSO1	Able to understand and apply basic principles and chemistry for an oleochemical
PSO2	Able to interpret emerging trends and developing innovative oleochemical products
PSO3	Apply reasoning informed by the contextual knowledge relevant to oleochemical as well as an allied industry
PSO4	An ability to develop and carry out experiments using research-based knowledge and methodologies such as analysis, data interpretation, and valid conclusion.

### Course Structure

Multidisciplinary Minor: OILS, OLEOCHEMICALS AND SURFACTANT TECHNOLOGY											
Course	Course Code	Semester	Subject	Credits	Hrs./Week			Marks for various Exams			
					L	T	P	CA	MS	ES	Total
MDM 1	OLT1101	III	Chemistry of Oils and Fatty Acids	2	1	1	0	20	30	50	100
MDM 2	OLT1103	IV	Nutrition	2	1	1	0	20	30	50	100
MDM 3	OLT1102	V	Chemistry of Oleochemicals and Surfactant	4	0	0	8	0	50	50	100
MDM 4	OLT1111	VI	Nutraceuticals	2	1	1	0	20	30	50	100
MDM 5	OLT1104	VII	Chemistry of Essential Oils, and Their Application	2	1	1	0	20	30	50	100
MDM 6	OLT1107	VIII	Cosmetics Science	2	0	0	4	00	50	50	100
			Total	14	4	4	12	80	22	300	600

**B. Intake:** Minimum 15 and maximum 35 students

**C. Duration:** 3 years (6 semesters)

**D. Eligibility criteria:** The students enrolled in the B. Chem Engg and B. Tech programmes of ICT shall be eligible for this minor degree. The allotment of minor shall be as per Institute's policy.

**E. Prerequisites:** 12<sup>th</sup> Standard Biology and Chemistry

**F. Pedagogy/Teaching Method:**

Lecture/Discussions: These sessions will discuss the subject matters of the course

Experiential Learning: The sessions will involve hands-on training.

Tutorials: Problem solving / case studies / relevant real-life applications / student presentations / home assignments / individual or group projects

**G. Method of Evaluation/Delivery:**

Subject Code	Semester	Course	Method of Evaluation	Methods of Delivery
OLT1101	III	Chemistry of Oils and Fatty Acids	a) Minimum 2 class tests b) Assignments c) Seminar/ Presentation d) Report submission	a) Lectures/Face to face training b) Tutorials c) Case study d) Presentation (PPT) Group Projects
OLT1103	IV	Nutrition	a) Minimum 2 class tests b) Assignments c) Seminar/ Presentation d) Report submission	e) Lectures/Face to face training f) Tutorials g) Case study h) Presentation (PPT) i) Group Projects
OLT1102	V	Chemistry of Oleochemicals and Surfactant	a) Minimum 2 class tests b) Assignments c) Seminar/ Presentation d) Report submission	a) Lectures/Face to face training b) Tutorials c) Case study d) Presentation (PPT) e) Group Projects
OLT1111	VI	Nutraceuticals	a) Minimum 2 class tests b) Assignments c) Seminar/ Presentation d) Report submission	a) Lectures/Face to face training b) Tutorials c) Case study d) Presentation (PPT) e) Group Projects
OLT1104	VII	Chemistry of Essential Oils, and Their Application	a) Minimum 2 class tests b) Assignments c) Seminar/ Presentation d) Report submission	a) Lectures/Face to face training b) Tutorials c) Case study d) Presentation (PPT) e) Group Projects
OLT1107	VIII	Cosmetics Science	a) Minimum 2 class tests b) Assignments c) Seminar/ Presentation d) Report submission	a) Lectures/Face to face training b) Tutorials c) Case study d) Presentation (PPT) e) Group Projects

<b>Semester</b>	<b>Course Code</b>	<b>Subjects</b>	<b>Faculty</b>
SEM-3	OLT1101	Chemistry of Oils and Fatty Acids	Dr. Pintu K. Kundu
SEM-4	OLT1103	Nutrition	VF- Dr. ASK
SEM-5	OLT1102	Chemistry of Oleochemicals and Surfactant	VF- Dr. SDW
SEM-6	OLT1111	Nutraceuticals	Dr. J. T. Waghmare
SEM-7	OLT1104	Chemistry of Essential Oils, and Their Application	Dr. C.S. Madankar
SEM-8	OLT1107	Cosmetics Science	Dr. C.S. Madankar

<b>MDM</b>	<b>Course Code:</b> <b>OLT 1101</b>	<b>Course Title: MDM1: Chemistry of Oils and Fatty Acids</b>	<b>Credits = 2</b>		
			<b>L</b>	<b>T</b>	<b>P</b>
	<b>Semester: III</b>	<b>Total contact hours:30</b>	<b>1</b>	<b>1</b>	<b>0</b>
<b>List of Prerequisite Courses</b>					
Chemistry (code)					
<b>List of Courses where this course will be prerequisite</b>					
<b>Chemistry of Oleochemicals and Surfactants (code), Chemistry of Essential Oils and their Applications (codes)</b>					
<b>Sr. No.</b>	<b>Course Contents (Topics and subtopics)</b>				<b>Required Hours</b>
1.	<b>General introduction to oils, fats and waxes:</b> Chemical structure, sources and composition. Classification of oils and fats by source type, fatty acid composition and drying properties. Statistics of Indian as well as world production of commercial oil seeds/ oil bearing materials, oils and fats, importance as feedstock for food and chemical industries.				3
2.	<b>Physical characteristics of natural oils and fats:</b> Oiliness and viscosity, density and expansibility, thermal properties, smoke, fire and flash points, solubility and miscibility, refractive index and molecular refraction, adsorption spectra, electrical properties, colour value.				4
3.	<b>Fatty acids:</b> Nomenclature and classification; saturated, monounsaturated, polyunsaturated fatty acid and essential fatty acids. Physical properties of fatty acids and their esters. Polymorphism and crystal structure, solubility, refractivity, optical activity, spectroscopic properties.				3
4.	<b>Important minor/ non-triglyceride constituents of natural oils and fats:</b> Phospholipids, galactolipids, sphingolipids, diacylglycerols, monoacylglycerols, sulfolipids, waxes, sterols, triterpene alcohols, and their esters, tocopherols/ tocotrienols, lipid-soluble vitamins, hydrocarbons, pigments, phenolic compounds etc.				4
5.	<b>Separation and isolation of fatty acids:</b> Distillation, crystallization and counter current distribution. Methods of structure determination.				2
6.	<b>Hydrolysis and esterification:</b> Acid and base-catalyzed and enzymatic hydrolysis of oils/fats, Fat splitting process. Neutralization, saponification, formation of metallic soaps. Acylation, esterification, interesterification, transesterification.				4
7.	<b>Chemical reactions of oils/fats and fatty acids:</b> Estolide synthesis. Hydrogenation, halogenation, epoxidation, hydroxylation, ozonolysis, metathesis. Thermal and oxidative polymerization, Diels-Alder reaction, Stereomutation, double bond migration and cyclization.				10
<b>List of Text Books/ Reference Books</b>					

1.	The Chemistry of Oils and Fats: Sources, Composition, Properties and Uses, Frank D. Gunstone, Blackwell Publishing Ltd, UK (2004).
2.	Fatty Acids in Industry, R. W. Johnson, and E. Fritz, eds., Marcel Dekker, Inc., New York, (1989).
3.	Bailey's Industrial Oil and Fat Products, Sixth Edition Vol. 1: Edible Oil and Fat Products: Chemistry, Properties, and Health Effects, Ed. Fereidoon Shahidi, John Wiley & Sons, Inc., Wiley Interscience Publication (2005).
4.	Oils and Fats Manual, Eds. A. Karleskind and J.-P. Wolff, Vols. I and II, Intercept Ltd., Andover, U.K. (1996).
5.	Fatty Acid and Lipid Chemistry, F. D. Gunstone, Blackie Academic and Professional, London, U.K. (1996).

<b>Course Outcomes (students will be .....</b>		
CO 1	Understand and explain the constitution of oils and fats and their importance as feedstock for food and chemical industries.	K2
CO 2	Analyze and illustrate the physical, chemical and stability characteristics of oils and fats/ fatty acids.	K4
CO 3	Understand the technical importance of the minor constituents of natural oils and fats.	K2
CO 4	Implement different modes of derivatizations of oils/ fatty acids.	K3
CO 5	Identify and interpret the tools for chemical analysis of oils and fats.	K3

	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	1
CO2	2	3	3	2
CO3	3	2	2	1
CO4	3	3	2	2
CO5	3	3	2	2

3-Strong Contribution; 2- Moderate Contribution; 1- Low Contribution

<b>MDM</b>	<b>Course Code:</b> <b>OLT 1103</b>	<b>Course Title: MDM2: NUTRITION</b>	<b>Credits = 2</b>		
	<b>Semester: IV</b>		<b>Total contact hours: 30</b>	<b>L</b>	<b>T</b>
			<b>1</b>	<b>1</b>	<b>0</b>
<b>List of Prerequisite Courses</b>					
Biochemistry or Chemistry(code)					
<b>List of Courses where this course will be prerequisite</b>					
Nutraceuticals(code)					
<b>Sr. No.</b>	<b>Topics</b>				<b>No. of lectures</b>
1	Introduction to Nutrition, Importance of study of Nutrition in health and disease, Branches of Nutrition, Nutrigenomics ,Neutraceuticals				2

2	Food as a source of nutrients, Sources and functions of Food, Concept of RDA of nutrients	1
3	Study of major food constituents viz Carbohydrates and Proteins with ref. to Chemical nature, classification, digestion, nutritional role and food sources	4
4	Study of Lipids with special ref. to classification of bio lipids, chemistry, nomenclature of fatty acids, phospholipids, TG, sterols, digestion of fats, utilization and biosynthesis of Cholesterol and of fatty acids in plant and animal kingdom, sources and nutritional role of fats, essential fatty acids, transfats, CLAs, lipoproteins, cholesterol	5
5	Proximate analysis of foods, Fuel value and Physiological fuel value of foods	1
6	Computation of daily calorie requirements with ref to BEE, AT and TEF, ICMR Calorie Requirements for Indians	2
7	Nondigestible carbohydrates, Dietary Fibre, Resistant starch, FOS, Pro and Prebiotics	3
8	Glycemic properties of carbohydrates, fructose as a Health risk factor	1
9	Protein quality evaluation: Chemical score, PER, BV, NPU, PDCAA, Protein requirements at different life stages, Mutual supplementation, Available Lysine	2
10	Antinutritional factors in foods and their significance, Bioavailability of nutrients	2
11	Vitamins: Chemical nature, nutritional function, stability to processing conditions, deficiency symptoms, hypervitaminosis for fat soluble vitamins, RDAs and food sources	4
12	Minerals: nutritional role, RDAs, sources of macro and microelements	3
13	Role of nutrients in metabolic syndrome, CVD, Atherosclerosis, Diabetes, Hypertension, obesity	2
14	ABCDs of nutritional assessment	2

**List of Textbooks/ Reference Books**

1	Lipid Biochemistry: An Introduction, by M. I. Gurr, <b>Publisher:</b> Springer; Softcover reprint of the original 1st ed. 1980 edition
2	Lehninger Principles of Biochemistry, Albert L. Lehninger, David L. Nelson, Michael M. Cox
3	Krause's Food & the Nutrition Care Process. by Janice L Raymond MS RD CD (Author), Kelly Morrow (Author)

**Course Outcomes (students will be .....**

CO 1	understand and explain the constitution of food and oils nutrition, Sources and functions of Food, Concept of RDA(??) of nutrients and its importance	K2
CO 2	Identify major food constituents like Carbohydrates, lipids and Proteins.	K3
CO 3	Proximate analysis of foods, Computation of daily calorie requirements, Nondigestible carbohydrates, Dietary Fibre, Glycemic properties etc.	K4
CO 4	Analyse protein quality, Antinutritional factors, vitamins and minerals etc.	K4
CO 5	Ability to identify role of nutrients and ABCDs of nutritional assessment.	K3

	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	1

CO2	3	3	2	2
CO3	3	3	3	2
CO4	3	3	3	2
CO5	3	3	2	2

3-Strong Contribution; 2- Moderate Contribution; 1- Low Contribution

<b>MDM</b>	<b>Course Code:</b> <b>OLT 1102</b>	<b>Course Title: MDM3: Chemistry of Oleochemicals and Surfactants</b>	<b>Credits = 4</b>		
	<b>Semester: V</b>	<b>Total contact hours: 60</b>	<b>L</b>	<b>T</b>	<b>P</b>
			<b>3</b>	<b>1</b>	<b>0</b>
<b>List of Prerequisite Courses</b>					
Chemistry of Oils and Fatty Acids(code)					
<b>List of Courses where this course will be prerequisite</b>					
Chemistry of Essential Oils and their Applications(code)					
<b>Sr. No.</b>	<b>Course Contents (Topics and subtopics)</b>				<b>Teaching Hours</b>
1.	Oleochemical and Surfactant raw materials and their derivatives as feedstock for Chemical Industries, Worldwide Statistics of Oleochemical and Surfactant Industries				08
2.	Different techniques of synthesis of Fatty Acid Methyl Esters (FAME), Glycerol and Fatty Alcohols, Fatty Amines, Amides, and Nitriles and their physical and chemical characteristics				08
3.	Introduction to the nature of colloidal solutions, Surface Tension and Energy Definition and classification of surfactants, Hydrophilic and hydrophobic groups and HLB balance, Theory of Surface Actions.				06
4.	Self-assembly and packing features of surfactants (bi and multilayers, direct & reverse micelles, vesicles, Microemulsions). Thermodynamics of Adsorption and Micellization, structure of micelles				06
5.	Different surface activity phenomenon: Emulsification & de-emulsification, foaming & defoaming, Solubilisation, Dispersion, Wetting, Detergency Prediction of emulsion type from packing geometry, general phase behaviour and Solubility–Temperature Relationship for Surfactants, phase inversion, Kraft and Cloud point				06
6.	Synthesis, analysis and applications of Anionic surfactants: Sulphonates (FAMES, AOS, LABS, Paraffin S., Ester & Amide S.), Sulphates (Alcohol & Alcohol ether sulphates, TRO, Sulphated MG, Sulphated Alkanolamides), N-acylated amino acids, Alkyl Phosphates, Sulphosuccinates etc.				10
7.	Synthesis, analysis and applications of Nonionic Surfactants: Fatty Alcohol ethers, Alcohol Polyglycol Ethers, Alkyl phenol ethers, Mono and diglycerides, Lecithin, Polyol esters (TWIN, SPAN, Sucrose polyester), Alkanolamides etc. Polymeric and Gemini Surfactants				08
8.	Synthesis, analysis and applications of Cationic and Amphoteric Surfactants: Alkoxylated amines, Amine oxide, 2-Alkyl imidazoline, N-alkyl- $\beta$ -Alanine, Quaternary Ammonium Compounds, Betains, Sulphobetains etc. Speciality Fluorocarbon and Silicone Surfactants				08
<b>List of Text Books/ Reference Books</b>					
1.	Synthetic Detergents, Davidson, A. S.; Milwidsky, B. 7 <sup>th</sup> Ed. John Wiley and Sons, New York, (1987).				
2.	Handbook of Surfactants, Porter, M. R., Springer Science and Business Media (1993).				

3.	Surfactants in Consumer Products: Theory, Technology and Applications, Ed. J. Falbe, Springer-Verlag, Berlin (1987).
4.	Industrial Applications of Surfactants-II, D. R. Karsa, Royal society of Chemistry (1990).
5	Bailey's Industrial Oil and Fat Products, D. Swern, ed., Vol. I (1979), Vol. 2 (1982), 4 <sup>th</sup> ed., John Wiley & Sons, Inc., New York,.
6	Bailey's Industrial Oil and Fat Products, Sixth Edition Vol. 6: Industrial and Nonedible Products from Oils and Fats, Ed. FereidoonShahidi, Wiley Interscience Publication (2005).
7	Fatty Acids in Industry, R. W. Johnson, and E. Fritz, eds., Marcel Dekker, Inc., New York, (1989).
8	Richard M.; Marilyn E. K.; Pashley. Applied Colloid and Surface Chemistry, <i>John Wiley and Sons Ltd</i> , Chichester, UK (2004).
9	Richard M.; Marilyn E. K.; Pashley. Applied Colloid and Surface Chemistry, <i>John Wiley and Sons Ltd</i> , Chichester, UK (2004).

Course Outcomes (students will be able to....)		
CO1	Understand the technical significance of Oleochemical and Surfactant Industries.	K2
CO2	Conceptualize and develop the different modes of derivatizations of oleochemical and surfactants and its applications.	K6
CO3	Analyse and illustrate the HLB, diverse interfacial phenomenon, molecular aggregations and phase behaviour of surfactants.	K4
CO4	Ability to identify and interpret the role of surfactants as specialty and high-performance chemicals.	K4

	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	1
CO2	3	3	3	3
CO3	3	3	3	2
CO4	3	3	3	3

3-Strong Contribution; 2- Moderate Contribution; 1- Low Contribution

MDM	Course Code: <b>OLT 1111</b>	Course Title: <b>MDM4: Nutraceuticals</b>	Credits = 2		
	Semester: <b>VI</b>		Total contact hours: <b>30</b>	<b>L</b>	<b>T</b>
			<b>2</b>	<b>1</b>	<b>0</b>
<b>List of Prerequisite Courses</b>					
Chemistry of Oils and fatty acids (code), chemistry of oils (code), nutrition (code)					
<b>List of Courses where this course will be prerequisite</b>					
Advanced nutrition (code)					
<b>Sr. No.</b>	<b>Course Contents (Topics and subtopics)</b>				<b>Reqd. hours</b>

1	Introduction to nutraceuticals: definitions, synonymous terms, claims for a compound as nutraceutical, regulatory issues.	5
2	Study of Properties, structure and functions of various Nutraceuticals, such as carotene, lycopene, omega fatty acids, phytosterolsetc, formulation of functional food, stability, analysis.	10
3	Manufacturing aspects of selected nutraceuticals such as lycopene, isoflavonoids.	5
4	Food as remedies, Anti-nutritional Factors present in Foods, Nutritional Genomics Nutraceutical Industry and Market Information, Nutraceuticals and the Future of Medical Science and Consumers'views on nutraceuticals, Labeling and claims for Nutraceuticals products	10
<b>Course Outcomes (students will be .....</b> )		
CO1	Able to understand basics of nutraceuticals and regulatory issues	K2
CO2	Discuss about properties and functions of nutraceuticals	K4
CO3	Summaries on available technologies for manufacturing of nutraceuticals	K3
CO4	Evaluate the nutritional genomics and market information	K5
CO5	Discus on the applications, Consumers' views on nutraceuticals as well as Labeling and claims for Nutraceuticals products of perfumery chemicals	K4

	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	1
CO2	3	3	3	2
CO3	3	3	2	2
CO4	3	3	3	3
CO5	3	3	3	2

3-Strong Contribution; 2- Moderate Contribution; 1- Low Contribution

<b>MDM</b>	<b>Course Code: OLT 1104</b>	<b>Course Title: MDM5:Chemistry of Essential Oils and their Applications</b>	<b>Credits = 2</b>			
	<b>Semester: VII</b>		<b>Total Contact Hours: 30</b>	<b>L</b>	<b>T</b>	<b>P</b>
				<b>1</b>	<b>1</b>	<b>0</b>
<b>List of Prerequisite Courses</b>						
Chemistry of Oils and fatty acids (OLT 1101), Chemistry of Oleochemicals and Surfactants(code)						
<b>List of Courses where this course will be Prerequisite</b>						
Cosmetics Science (OLT 1107)						
<b>Sr. No.</b>	<b>Course Contents (Topics and subtopics)</b>				<b>Required Hours</b>	
1	Advanced methods of analysis of oils: Chromatography of oils, fats and derivatives. Packed column gas chromatography. Thin layer				8	

	Chromatography, Ultra Violet spectroscopy, Infra Red Spectroscopy	
2	Gas Liquid Chromatography. High performance liquid chromatography, Mass spectrometry of triglycerides and related compounds. Nuclear Magnetic Resonance Spectroscopy.	5
3	Essential oils: extraction from different sources, separation and purification. Enflurage, Maceration, solvent extraction, supercritical extraction, water distillation, water steam distillation and steam distillation. Analysis of essential oils for RI, optical rotation, density, solubility, boiling point, melting point.	7
4	Characteristics and composition of Indian essential oils like sandal wood oil, pine oil, cedar wood oil, palmrosa oil, patchouli, mint, clove, cardamom, cinnamon leaf oils, coriendor oil, ajwan, cumene, vetivert, eucalyptus, rosha oil, citrus oils, orange oils, rose, jasmine juichameli oils etc. Role of essential oil in aroma therapy. Stability studies of essential oil. Evaluation and testing of essential oils by sensory hedonic and substantively and GC tests.	10
<b>List of Text Books/ Reference Books</b>		
1	Essential oils (Vol. I to VI) by Guenther E.	
2	Perfume and flavour materials of natural origin by Arctander S.	
3	Perfume, Cosmetics and Soap by Poucher W., Chapman and Hall Ltd., (1959)	
4	Perfumes, Soaps detergents and Cosmetics by S. C. Bhatia, CBC Publishers and Distributors (2001)	
12	Perfumes, Soaps detergents and Cosmetics by S. C. Bhatia, CBC Publishers and Distributors (2001)	

<b>Course Outcomes (students will be .....</b>		
CO1	Able to understand the basic process of glyceride synthesis, optically active glycerides and allied products.	K2
CO2	Selects the process for the manufacture of monoglyceride, diglycerides, and isomers.	K4
CO3	Select or identify advance method of analysis of oils and lipids like GC, MS, HPLC, NMR	K4
CO4	Discuss novel process of extraction of essential oils from various natural sources and different types of Essential Oils.	K3

	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	2
CO2	3	3	2	3
CO3	3	3	2	3
CO4	3	3	3	3
Course	3	3	3	3

3-Strong Contribution; 2- Moderate Contribution; 1- Low Contribution

<b>MDM</b>	<b>Course Code:</b> <b>OLT 1107</b>	<b>Course Title: MDM6: Cosmetics Science</b>	<b>Credits =</b> <b>3</b>
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		L	T	P
<b>Semester: VIII</b>		<b>Total Contact Hours: 45</b>		
		<b>2</b>	<b>1</b>	<b>0</b>
<b>List of Prerequisite Courses</b>				
Chemistry of Oleochemicals and surfactants (OLT 1102)				
<b>List of Courses where this course will be Prerequisite</b>				
Technology of Oleochemicals (OLT 1112), Processing of Soaps and Detergents and Surfactants and Triboapplications Laboratory (OLP 1211)				
<b>Sr. No.</b>	<b>Course Contents (Topics and subtopics)</b>	<b>Required Hours</b>		
1	Common ingredients used in cosmetics, surfactants, additives, antioxidants, preservatives. Equipments, plants and machinery used for manufacture.	7		
2	Formulations of different cosmetic creams such as hair care products: Hair dressing cream, hair tonics, shampoos, antidandruff, depilatories, hair weaving preparations and straightners.	8		
3	Formulations of skin creams, hand cream, moisturizers, nail polish, lipsticks. Stability tests and product specifications Nail polish, lipsticks, face powders, baby toiletries	7		
4	Dentifrices, Sun protection and sunscreen products, Antiperspirants, Deodorants, Shaving products, after shave products, Aerosol cosmetics.	8		
5	Evaluation and Efficacy of cosmetics products. Stability tests and product specifications	7		
6	Concept of product design, labeling, claiming and claim support understanding of current needs, translation of current needs to products	8		
<b>List of Text Books/ Reference Books</b>				
1	Modern Cosmetics by Thomssen, Universal Publishing Corporation (1951)			
2	Formulations and functions of cosmetics by Jellinek, Wiley Interscience 970)			
3	Chemistry and manufacture of cosmetics by Denavarre, Grosse farm			
4	Handbook of Cosmetic Science and Technology, Third Edition, André O. Barel Marc Paye, Howard I. Maibach			
5	Cosmetics, Science and Technology, Edward Sagarin 1957			
6	Poucher's Perfumes, Cosmetics and Soaps, Hilda Butler 2000 Cosmetics and Soaps 10th Edition			
<b>Course Outcomes (students will be .....</b>				
CO1	Understand the basic formulation of cosmetics	K2		
CO2	Selects the various ingredients and manufacturing processes for various cosmetics.	K4		
CO3	Develop formulations of different cosmetics products	K3		
CO4	Summarize stability analysis of cosmetic formulations.	K3		

	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	1
CO2	3	3	3	2
CO3	3	3	2	2
CO4	3	3	2	2
Course	3	3	3	2

3-Strong Contribution; 2- Moderate Contribution; 1- Low Contribution