



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche		
ACADEMIC YEAR	2020/2021		
MASTER'S DEGREE (MSC)	PHARMACY		
SUBJECT	COSMETIC PRODUCT TECHNOLOGY		
TYPE OF EDUCATIONAL ACTIVITY	D		
AMBIT	20518-A scelta dello studente		
CODE	19167		
SCIENTIFIC SECTOR(S)	CHIM/09		
HEAD PROFESSOR(S)	DE CARO VIVIANA	Professore Associato	Univ. di PALERMO
OTHER PROFESSOR(S)			
CREDITS	6		
INDIVIDUAL STUDY (Hrs)	102		
COURSE ACTIVITY (Hrs)	48		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	5		
TERM (SEMESTER)	1° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	DE CARO VIVIANA Tuesday 12:00 13:30 Studio docente, via Archirafi, 32 - 2 piano Thursday 12:30 13:30 Studio docente, via Archirafi, 32 - 2 piano		

DOCENTE: Prof.ssa VIVIANA DE CARO

PREREQUISITES	Basic knowledge concerning the anatomy and physiology of the skin. Basic knowledge concerning the organic chemistry and protein chemistry. Knowledge about disperse and colloidal systems: solutions, suspensions, emulsions, colloids. Basic knowledge of semisolids for dermatological use: Ointments, Creams, Paste, Gels.
LEARNING OUTCOMES	<p>Knowledge and ability to understand Acquisition of advanced tools for the development of cosmetic dosage forms. Acquisition of information and expertise in the EU Cosmetics Products Regulation. The knowledge of the functional mechanisms of the skin. Acquisition of knowledge about the functional cosmetics and cosmetic technology. Ability to use technical language and terminology of cosmetic ingredients. Acquisition of expertise in operative procedures that lead to the industrial production, marketing and supply of cosmetics.</p> <p>Ability to apply knowledge and understanding Ability to recognize and apply yourself, the methodologies needed for developing a cosmetic dosage form. Ability to recognize the function of each component of a cosmetic formulation and potential interactions among them. Ability to formulate the main categories of cosmetics (solutions, creams, lotions, cleansers). Application of expertise in operating procedures of a cosmetic preparation in the fields of industrial production, marketing and supply of cosmetics.</p> <p>Autonomy of judgement Ability to evaluate the influence of the composition of the dosage form on activities of functional substances. Acquisition of autonomous judgment with reference to technological properties of the constituents the dosage forms. Ability to evaluate the quality of a cosmetic product according to its composition and method of packaging.</p> <p>Communicative skills To be able to expose with clarity and directness the studied topics. To be able to expose the results of studies to a non-expert audience. To know how to present the peculiarity of a cosmetic product to a non-expert audience.</p> <p>Learning skills To be able to follow, using the knowledge acquired during the course, second level masters, deepening courses and specialized seminars in the field of development and marketing of cosmetics. Ability to synthesize and connect the different topics with basic and related disciplines. Update capabilities by consulting the scientific publications in cosmetic field.</p>
ASSESSMENT METHODS	Oral examination, aimed to assess the skills and disciplinary knowledge possessed by student; the evaluation is expressed in thirtieths. The questions will be specifically designed to test the learning outcomes and to verify: a) the knowledge of topics; b) the ability to process the knowledge, c) the mastery of scientific language and presentation skills. The assessment has a final grade included in the following range: 30-30 with honours (excellent), corresponding to "excellent knowledge of topics, excellent use of language, good analytical skills, the student can implement his\her knowledge to solve the posed problems"; 26-29 (very good), corresponding to "good mastery of topics, very good use of language, the student can implement his\her knowledge in order to solve the posed problems"; 24-25 (good), corresponding to "basic knowledge of the main topics, fair use of language, with moderate capability to independently implement knowledge to solve the posed problems"; 21-23 (satisfactory), corresponding to "the student doesn't possess full mastery of the main teaching topics but s/he possesses knowledge of them, satisfactory use of language, poor ability to independently implement the acquired knowledge"; 18-20 (passing grade), corresponding to "very poor basic knowledge of main teaching topics and scarce technical language, no or very poor ability to independently implement the acquired knowledge"; unsatisfactory when "the student doesn't possess an acceptable knowledge of the contents of the topics dealt during the course".
EDUCATIONAL OBJECTIVES	The goal of the course is the acquisition of knowledge in the field of cosmetic products regarding regulatory, chemical and functional aspects. In particular, the course aims to provide the knowledge of the main cosmetic raw materials, of their functionality, and formulations methods of the most important categories of cosmetics. Objective of the course is also the knowledge of the current legislation for the production, labeling and release on the market of cosmetics.
TEACHING METHODS	Lectures
SUGGESTED BIBLIOGRAPHY	<p>- Handbook of Cosmetic Science and Technology, Third Edition, Edited by: Andre O. Barel, Howard I. Maibach and Marc Paye. Informa healthcare 2011</p> <p>- P. Colombo, P.L. Castellani, A. Gazzaniga, E. Menegatti, E. Vidale Principi di</p>

	<p>Tecnologie Farmaceutiche. Casa Ed. Ambrosiana 2004</p> <p>- Franco Bettiol, Massimiliano Cecchi Manuale delle preparazioni cosmetiche e dermatologiche II ed. Tecniche Nuove 2018</p> <p>- Proserpio, Ambreck, Ceoloni, Il prontuario del cosmetologo, Tecniche Nuove, 2001</p> <p>- AAVV. Manuale del Cosmetologo Tecniche Nuove 2014</p> <p>- G. D'Agostinis Le formule cosmetiche. Skin Care, protezione solare, decorativi, detergenza, estetica professionale, capelli, igiene orale, profumeria. Ed. Tecniche Nuove 2012</p> <p>- Kirk-Othmer Chemical Technology of Cosmetics, Kirk-Othmer Ed. Wiley. 2013</p> <p>- Materiale didattico fornito a lezione</p>
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SYLLABUS

Hrs	Frontal teaching
2	Aims of the course and presentation of the contents. Exposition of assessment method of learning outcomes. Definition of cosmetic product and cosmetic functions under current legislation. Law 713/86, Regulation (EC) No 1223/2009 on cosmetic products. Labeling. The expiration date and the PAO.
3	Preservation of cosmetics. Shelf life and cosmetic packaging. Technological evaluation of formulations applied to the skin. Release assays of actives from formulations: release assays with and without membrane. Franz cell, Moll cell. Penetration assays through the skin. Assessment of toxicity: Skin irritation, patch test.
5	Skin constituent elements. Structure and function of the epidermis: cholesterol, ceramides, lipids; Water Holding Capacity, Natural Moisturizing Factor. Structure and function of the dermis: proteoglycans, hyaluronic acid, collagen, elastin. Skin absorption. Potential routes of active ingredients penetration. Formulation's factors that influence the cutaneous absorption.
6	Main vehicles and ingredients in cosmetics: classification of raw materials. Hydrophilic excipients: - Wetting agents, equilibrium hygroscopicity and dynamic hygroscopicity, - Sugars and derivatives, starches, - natural and modified polymers: cellulosic derivatives. Synthetic polymers: vinyl, carboxyvinyl, acrylic, methacrylic polymers. Anhydrous hydrophilic excipients: Lanolin and derivatives. Lipophilic excipients: hydrocarbons, waxes, esters, silicones. Inorganic rheology modifiers: Bentonite, anionic and cationic clays, hydrotalcites.
3	Intrinsic and extrinsic skin aging. Appearance of wrinkles. Cosmetic means to reduce the skin aging. Role of ceramides in the epidermis functions. Natural and synthetic ceramides for skin moisturization. Factors that increase free-radical damage. Antioxidants: scavenger and chain breaker; substances "anti-aging". Botox-like substances: adenosine and magnesium salts, acetyl hexapeptide-3. Skin lightening active ingredients: alpha-hydroxy acids, diacetyl boldine.
2	Powders for cosmetic use. Definition and methods for preparation; dimensional analysis, mixing. Aspersions powders and face powders: excipients, formulation and manufacture of face powders and eyeshadows.
4	Elements of rheology. Newton's law, non-Newtonian fluids, thixotropy. Mechanical behavior of materials to tensile strength, Hooke's law, Viscoelasticity. Ultimate tensile strength. Rheological measurements of viscoelasticity. Static and dynamic tests: Creep and Stress relaxation, Stress-Strain Curves; oscillatory measurements.
2	Cosmetic suspensions. Formulation of nail polish: primary film-forming, secondary film-forming, solvents. Toothpastes: abrasives, detergents. Formulation of deodorants and antiperspirants: classification of deodorant and antiperspirant agents. Formulation of lipstick.
5	Interfacial phenomena, Contact angle. Wettability. static and dynamic contact angle, advancing and receding angle, contact angle hysteresis. Spreading coefficient. Mechanism of detergency. The detergents for cosmetic use: characteristics and biodegradability. Definition and classification of surfactants. Anionic surfactants: alkylsulfonates, alkyl sulfates, Alkyl aryl sulphonates, alkyl ether sulphates; auxiliary anionic surfactants (mild): sulfosuccinates, sarcosinates, acyl peptides, carboxy alkyl ethers, alkyl phosphates. Chemical structures and functions. Amphoteric surfactants: Alkyl betaine, sulfo-betaine. Non-ionic surfactants: ethoxylated products, glucose ethers, sucrose esters. Cationic surfactants. Conditioning agents and consistency factors in hair conditioners. Quats, Ester quats, ethoquats, polyquats: chemical structures, and functions.
3	Emulsions: notes on the theory of disperse systems; Criteria for determining stability of disperse systems. Main emulsifiers for cosmetic use. Multiple emulsions. Gel polymeric emulsions. Mechanism of electrosteric stabilization. Silicone emulsions, spherical texturizers.
2	Non-conventional cosmetic systems: Liposomes. Niosomes, Solid Lipid Nanoparticles (SLN and NLC)
3	Chemistry of hair products. Hair structure and composition. Temporary and permanent deformation, irreversible demolition of keratin by chemical methods. Use of thioglycolic acid and its salts. Mercaptans. oxidizing solutions. Hydrogen peroxide for cosmetic use. Oxidation hair colorants. Derivatives of para-phenylenediamine. Modifiers of color and/or stabilizers. Chemistry of the vegetable and metallic dyes.
5	Effects of sun radiation on the skin. Melanogenesis. UV radiation: Beer-Lambert law. Chromophores. Skin types and SPF and Boots index. Methods for SPF evaluation of sunscreen product. Chemical and physical sunscreens: mechanism of action. Selective filters of the UV-A: structure and absorption spectrum. Selective filters of the UV-B: structure and absorption spectrum. Self-tanners.
1	Decorative cosmetics: dyes, pigments and lacquers, classification according to the Colour Index. Organic and inorganic pearls, pearls interference.
2	Phytocosmetics: Main types of plant extracts. Vegetable raw materials. The perfumes: essential oils and synthetic fragrant molecules. Extraction methods of essential oils. Elements of a perfume.