

## COURSE OUTLINE

### 1. GENERAL

<b>SCHOOL</b>	SCHOOL OF HEALTH AND CARE SCIENCES		
<b>ACADEMIC UNIT</b>	BIOMEDICAL SCIENCES -AESTHETICS AND COSMETIC SCIENCE		
<b>LEVEL OF STUDIES</b>	UNDERGRADUATE		
<b>COURSE CODE</b>	7041	<b>SEMESTER</b>	7
<b>COURSE TITLE</b>	DELIVERY SYSTEMS OF ACTIVE SUBSTANCES		
<b>INDEPENDENT TEACHING ACTIVITIES</b> <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>	<b>WEEKLY TEACHING HOURS</b>	<b>CREDITS</b>	
Lectures	3		
Laboratory Exercises	-		
		5	
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
<b>COURSE TYPE</b> <i>general background, special background, specialised general knowledge, skills development</i>	SC		
<b>PREREQUISITE COURSES:</b>	.NO		
<b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>	.Greek		
<b>IS THE COURSE OFFERED TO ERASMUS STUDENTS</b>	NO		
<b>COURSE WEBSITE (URL)</b>	<a href="https://bisc.uniwa.gr/course/systimata-metaforas-drastikon-oyision/">https://bisc.uniwa.gr/course/systimata-metaforas-drastikon-oyision/</a>  <a href="https://eclass.uniwa.gr/courses/AISTH135/">https://eclass.uniwa.gr/courses/AISTH135/</a>		

### 2. LEARNING OUTCOMES

#### Learning outcomes

*The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.*

*Consult Appendix A*

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The aim of the course is for students to understand the applications of the delivery systems used for increase of bio-availability of the active ingredients used in topical dermal preparations.

The goal of the course is for students to acquire the knowledge of the molecular design and development of advanced delivery systems of bioactive substances used in skin preparations.

#### Learning outcomes

- After the end of the course students will be able to:

- To design and develop delivery systems for the increase of dermal permeability of bioactive substances
- To investigate a) mechanisms of release of the substances of these systems b) the physicochemical stability of the systems and the stability of bioactive substances in these systems
- Know the basic principles of nanotechnology of the skin care products
- Compare the advantages and disadvantages of the delivery systems used for the increase of bioavailability of active ingredients
- Evaluate the environmental impact of the nanotechnology used in skin care products

### **General Competences**

*Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?*

*Search for, analysis and synthesis of data and information, with the use of the necessary technology  
Adapting to new situations  
Decision-making  
Working independently  
Team work  
Working in an international environment  
Working in an interdisciplinary environment  
Production of new research ideas*

*Project planning and management  
Respect for difference and multiculturalism  
Respect for the natural environment  
Showing social, professional and ethical responsibility and sensitivity to gender issues  
Criticism and self-criticism  
Production of free, creative and inductive thinking  
.....  
Others...  
.....*

***Working independently, Working in an international environment***

**Working in an interdisciplinary environment, Respect for the natural environment, Showing social, professional and ethical responsibility, Production of new research ideas, Production of free, creative and inductive thinking**

### **3. SYLLABUS**

1. Delivery systems of bioactive substances. Nanotechnology. Nanometrology. Physicochemical properties of nan-delivery systems, techniques for the characterization of electron microscopy, size dispersity index, aggregation. Nanocolloids. Applications in biomedical sciences.
2. Deliver complexes. Colloids and non-colloids
3. Nanoemulsions. Liposomes-methods of preparations-methods of stability testing. Release of the incorporated ingredient. Advantages-Disadvantages of liposomes in skin care products
4. Liquid crystals. Dendrimers. Liquid crystals as emulsifiers.
5. Fullerenes. Application of fullerenes in Cosmetic Science.
6. Solid lipid nanoparticles (SLN)
7. Polymeric nanoparticles, Nanocapsules and lipid nanocarriers (NLC). Biodegradable polymers. Encapsulation of essential oils. Mechanism of release of the encapsulated ingredients
8. Metal nanoparticles and nanoparticles of chemical compounds of metals. Nano-sunscreens-photoprotection
9. Gels. Nanofibrils, nanochitin
10. Cosmetic-textiles for the release of active substances

11. Nanotechnology in Dermatology
12. Disadvantages of the application of nano-systems
13. Introduction to regulatory affairs regarding the nanotechnology and the research in this field. Impact of nano-materials on aqueous environment.

#### 4. TEACHING and LEARNING METHODS - EVALUATION

<b>DELIVERY</b> <i>Face-to-face, Distance learning, etc.</i>	Face-to face	
<b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b> <i>Use of ICT in teaching, laboratory education, communication with students</i>	Use of ICT in teaching, Support of the learning process through e-class Exercises through e-class.	
<b>TEACHING METHODS</b> <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i>  <i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i>	<b>Activity</b>	<b>Semester workload</b>
	Lecture	70
	Independent study	5-
	<b>Course total</b>	<b>120</b>
<b>STUDENT PERFORMANCE EVALUATION</b> <i>Description of the evaluation procedure</i>  <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i>  <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	<p>Language Greek</p> <p>Final exam: multiple choice, open-ended questions, characterization of sentences as True or False, problem solving 100 %</p> <p>Or</p> <p>Final exam multiple choice, open-ended questions, characterization of sentences as True or False, problem solving 60% and public presentation 40%</p> <p>All criteria are given to the students</p>	

#### 5. ATTACHED BIBLIOGRAPHY

- Suggested bibliography:

1. Morgan S.E., Havelka K.O. and Lochhead R.Y. Cosmetic Nanotechnology: Polymers and Colloids in Personal Care 1<sup>st</sup> edition ISBN-13: 978-0841239968 ACS Symposium series, 2007.
2. Garti N. and Amar-Yuli I. Nanotechnologies for Solubilization and Delivery in Foods, Cosmetics and Pharmaceuticals ISBN-13: 000-1605950165, 2011.
3. Brayner R. (Editor), Fiévet F. and Coradin T. Nanomaterials: A Danger or a Promise?: A Chemical and Biological Perspective ISBN-13: 978-1447159162, 2013.
4. Δεμέτζος K.N. Φαρμακευτική Νανοτεχνολογία : Βασικές Αρχές και πρακτικές εφαρμογές ISBN 978-960-394-988-6, ΕΠΙΣΤΗΜΟΝΙΚΕΣ ΕΚΔΟΣΕΙΣ ΠΑΡΙΣΙΑΝΟΥ ΑΕ, 2014.
5. Βαρβαρέσου Α. και Ιακώβου Κ. Συστήματα μεταφοράς δραστικών ουσιών, Αθήνα 2019.

- Related academic journals: Colloids and Surfaces A: Physicochemical and Bioengineering Aspects, Advanced Drug Delivery Reviews, Materials