



# UNIVERSITÀ DEGLI STUDI DI PALERMO

<b>DEPARTMENT</b>	Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche		
<b>ACADEMIC YEAR</b>	2018/2019		
<b>MASTER'S DEGREE (MSC)</b>	PHARMACEUTICAL CHEMISTRY AND TECHNOLOGIES		
<b>INTEGRATED COURSE</b>	ADVANCED PHARMACEUTICAL TECHNOLOGY AND PHARMACEUTICAL INDUSTRIAL PLANTS - INTEGRATED COURSE		
<b>CODE</b>	13368		
<b>MODULES</b>	Yes		
<b>NUMBER OF MODULES</b>	2		
<b>SCIENTIFIC SECTOR(S)</b>	CHIM/09		
<b>HEAD PROFESSOR(S)</b>	LICCIARDI MARIANO	Professore Ordinario	Univ. di PALERMO
<b>OTHER PROFESSOR(S)</b>	MAURO NICOLÒ	Professore Associato	Univ. di PALERMO
	LICCIARDI MARIANO	Professore Ordinario	Univ. di PALERMO
<b>CREDITS</b>	12		
<b>PROPAEDEUTICAL SUBJECTS</b>	13181 - PHARMACEUTICAL TECHNOLOGY, SOCIOECONOMICS AND REGULATIONS AND TECHNOLOGY OF PHARMACEUTICAL FORMULATIONS - INTEGRATED COURSE		
<b>MUTUALIZATION</b>			
<b>YEAR</b>	4		
<b>TERM (SEMESTER)</b>	2° semester		
<b>ATTENDANCE</b>	Not mandatory		
<b>EVALUATION</b>	Out of 30		
<b>TEACHER OFFICE HOURS</b>	<b>LICCIARDI MARIANO</b> Monday 11:00 13:00 Via Archirafi, 32 <b>MAURO NICOLÒ</b> Friday 12:00 14:00 Studio: Piano terra, primo cancelletto verde a sinistra subito dopo il portone di legno della scala A di via Archirafi 32.		

DOCENTE: Prof. MARIANO LICCIARDI

<b>PREREQUISITES</b>	Notions of pharmaceutical technology, physical chemistry and medicinal chemistry.
<b>LEARNING OUTCOMES</b>	<p>The goal of the course is to provide the student with the basic knowledge of the manufacturing processes of the pharmaceutical industry. Acquire advanced tools for the development and preparation of both standard and advanced dosage Forms through the industrial processes suitable for their production. The student will acquire a thorough knowledge of:</p> <ol style="list-style-type: none"><li>1) Ability to recognize and apply autonomously the methodologies required to develop a dosage form in the pharmaceutical industry.</li><li>2) organization of pharmaceutical industries</li><li>3) knowledge of modern equipment, industrial plants and all the problems related to their operation.</li></ol> <p>Acquire advanced tools for knowledge of the organization of pharmaceutical establishments. Ability to use the specific rules of the pharmaceutical industry. Ability to apply knowledge and understanding:</p> <p>Ability to recognize and use autonomously the modern equipment and methods used in research and industrial laboratories and all the issues related to the production of dosage forms.</p> <p>Judgment autonomy</p> <p>Being able to evaluate the implications and results of studies to clarify the influence of the Form of Dosage on the activity of an active substance of origin</p> <p>biotechnology. Being able to evaluate the most suitable industrial process at Production of a suitable dosage form.</p> <p>Communicative Skills</p> <p>Ability to expose the results of the studies to an inexperienced audience. Being able to support the importance and highlighting the implications in the field Pharmaceuticals studies on the development of Dosing Forms in Industry pharmaceuticals.</p> <p>Learning Skills</p> <p>Upgrade skills with consultation of scientific publications</p> <p>Owns in the field of Pharmaceutical Technology and the laws in force that Regulate processes in the pharmaceutical industry.</p>
<b>ASSESSMENT METHODS</b>	<p>Oral examination. Oral examination aims 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.</p> <p>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 "poor basic knowledge of main teaching topics and scarce technical language, 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.</p>
<b>TEACHING METHODS</b>	Lectures.

**MODULE  
PHARMACEUTICAL INDUSTRIAL PLANTS**

*Prof. MARIANO LICCIARDI*

**SUGGESTED BIBLIOGRAPHY**

- L. Fabris, A. Rigamonti, La Fabbricazione Industriale dei Medicinali, Esculapio Ed.
- L. Lachman, H.A. Lieberman, The Theory and Practice of Industrial Pharmacy, Lea&Febiger, Philadelphia Third Ed.
- G.C. Ceschel, L. Fabris, Impianti per l'Industria Farmaceutica, SEE, Bologna.
- Aulton, Tecnologie Farmaceutiche, progettazione e allestimento dei medicinali, C.Ed. Edra.
- F.U. XII Ed. It.

<b>AMBIT</b>	50323-Discipline Chimiche, Farmaceutiche e Tecnologiche
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<b>INDIVIDUAL STUDY (Hrs)</b>	102
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<b>COURSE ACTIVITY (Hrs)</b>	48
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**EDUCATIONAL OBJECTIVES OF THE MODULE**

The learning objective of the module is to provide to the students basic knowledge of the production processes of the pharmaceutical industry.

The student will acquire a thorough knowledge of:

- 1) organization of pharmaceutical industry
- 2) knowledge of modern equipment, industrial plants and all the problems related to their operation.
- 3) Information on some advanced technologies of industrial production.

**SYLLABUS**

<b>Hrs</b>	<b>Frontal teaching</b>
2	Organization of the pharmaceutical industry. Industrial production of drugs and related problems. Technical direction. Researches and development. GLP, GMP.
2	process validation. control documentation.
2	risk profile of the production processes in the pharmaceutical industry.
2	Structure and organization of a production plant of pharmaceutical forms. the working area: classification, humidity conditions, spare parts and air filtration.
2	air conditioning. conditioning systems: components and schemes. Centralized and autonomous systems of air distribution systems. Operating conditions. Dehumidifiers.
2	clean room. Air sterilizing filtration, absolute filters (HEPA filters). Diagram of a sterile block. And classification schemes (federal standard) in laminar air flow environments. Clean Room Class 100.
3	centralized technical services. Production of steam. Steam used as a heating medium in the production process and as a sterilizing agent. Installations.
3	Production of steam. Steam used as a heating medium in the production process and as a sterilizing agent. Installations.
2	Various gases. compressed air. Equipment for the production of compressed air.
4	Production of the cold: Cold-storage installations
3	Production of vacuum: Vacuum Pumps
3	Industrial Water production: Water treatments. Softening. Osmosis and reverse osmosis. Distillers
18	SINGLE operations: Drying. Lyophilization. Mixing. Milling. Filtration. Granulation Compression. Sterilization. Industrial fermentations.

**MODULE**  
**ADVANCED PHARMACEUTICAL TECHNOLOGY**

*Prof. NICOLÒ MAURO*

**SUGGESTED BIBLIOGRAPHY**

-A.T. Florence, D. Attwood, Physicochemical Principles of Pharmacy, Chapman and Hall, New York.  
-Principi di Tecnologie Farmaceutiche, Colombo P. et al, Casa Editrice Ambrosiana  
F.U. XII Ed. It.

<b>AMBIT</b>	50323-Discipline Chimiche, Farmaceutiche e Tecnologiche
<b>INDIVIDUAL STUDY (Hrs)</b>	102
<b>COURSE ACTIVITY (Hrs)</b>	48

**EDUCATIONAL OBJECTIVES OF THE MODULE**

The learning objective of the module I (Advanced PHARMACEUTICAL TECHNOLOGY ) is to provide to students the knowledge on the preparation and control of technologically advanced pharmaceutical forms.

**SYLLABUS**

<b>Hrs</b>	<b>Frontal teaching</b>
6	Preparations for inhalation: Preparations for inhalation. Storage mechanisms. Aerodynamic diameter. Inhalers
5	Pharmaceutical Pressurized preparations : Propellants and Formulation.
6	Bioadhesive materials and systems: Analysis and measurement of bioadhesive phenomenon. Bioadhesive materials and their application in the pharmaceutical field.
5	Parenteral nutrition.
5	Materials for the primary packaging of medicines.
21	Advanced colloidal systems for the veicolation and targeting of drugs: polymeric micelles, nanoparticles, poliplexes.