



# UNIVERSITY OF NICOSIA

## ΠΑΝΕΠΙΣΤΗΜΙΟ ΛΕΥΚΩΣΙΑΣ

<b>Course Code</b> PHAR-206	<b>Course Title</b> Pharmaceutical Technology I / Φαρμακευτική Τεχνολογία I	<b>Credits (ECTS)</b> 6
<b>Department</b> Life & Health Sciences	<b>Semester</b> Spring	<b>Prerequisites</b> PHAR-210
<b>Type of Course</b> Required	<b>Field</b> Pharmacy	<b>Language of Instruction</b> Greek/English
<b>Level of Course</b> 1 <sup>st</sup> Cycle	<b>Year of Study</b> 2 <sup>nd</sup> year	<b>Lecturer</b> Elena Mourelatou
<b>Mode of Delivery</b> face-to-face	<b>Work Placement</b> N/A	<b>Co-requisites</b> None

### Objectives of the Course:

Achieving effective treatment of a disease while minimizing adverse effects of a drug requires rational selection, formulation and administration of an appropriate delivery system and form. This course teaches the scientific background and technical aspects vital in dosage form design and preparation.

The aim of this course is to prepare students in the way of developing pharmaceutical formulations with the appropriate properties. The function and value of excipients, their quality specifications, the technological and physicochemical properties and their practical applications are elaborated in this course. Properties such as hardness, disintegration and dissolution of tablets, measurement of particle size of pharmaceutical powders are studied. Discussion will include factors to be considered for the formulation of a solid dosage form as well as the manufacturing process. The Pharmaceutical Technology I module will be focused in the solid pharmaceutical forms

### Learning Outcomes:

After completion of the course students are expected to understand:

- The concept and usefulness of knowledge of particle size, properties and methods of measurement
- The basic processes applied in the production of drugs and general principles of pharmaceutical technology, such as, mixing, separation and drying of particles, but also more modern processes such as fluid bed drying and Wurster.
- The methods of scaling up a batch size from laboratory scale to industrial.
- The function of different excipients in the final drug formulation
- The quality approach for audits of pharmacy and production facilities to confirm suitability of premises and practices before products are released for sale to patients.
- Manufacturing technology of tablets, capsules and inhalers

### Course Contents:

Basic Pharmaceutical Processes and Solid Delivery Systems. Particle properties such as

size and distribution. Particle Size Reduction: Material properties on size reduction, and changes during grinding. Size reduction methods and equipment used for diameter reduction. Mechanical separation of particles. Powder Flow: Adhesion and cohesion, angle of response, bulk and tapped density, improvement of flowability. Plant Design For Solid Dosage Forms: Layout, clean rooms, HVAC, flow of materials and personnel, cGMP requirements, concept of validation and qualification, materials and personnel flow, air quality and air changes. Mixing: Importance of mixing and definition, mechanism of mixing and demixing and interacting factors and evaluation of the degree of mixing. Types and characteristics and operation of mixers. Granulation: Introduction, reasons for granulation and effect on mechanical properties of tablet formation, impact on bioavailability, methods of granulation, granulation mechanism and granulation equipment. Drying: definitions, drying of wet solids, moisture content, methods of drying such as fluid bed drying, tray drying, microwave drying, vacuum drying, other drying equipment, advantages and disadvantages of each method. Solvents used and their impact on stability. Tablets and Compaction: Tableting of solid pharmaceutical preparations (tablets: immediate release, coated, enteric coated, effervescent, lozenges, slow release tablets etc). Quality attributes and expectations, stages of tablet formation, tableting machines, tablet excipients, effect of granulation on the tableting process, speed of machines, disintegration, dissolution, hardness, friability and breakability of tablets. Excipients in general. Coating of Tablets and Multiparticulates: Types of coating such as sugar coating, film coating, film forming materials, tablet in tablet, functional coatings, formulation of coating solution (modern trends), equipment for coating, coating process, evaluation of coated tablets, stability kinetics and quality assurance. Hard Capsules : Advantages and disadvantages of capsule dosage form, materials for production, size of capsules, method of capsule filling, sealing and packaging, pellet filling, hard gelatin capsules shell and its contents, colorants, quality control, stability testing and storage. Soft Gelatine Capsules Advantages and disadvantages (rational for using them), manufacturing process, regulatory challenges and new technology of using hard gelatin capsules to encapsulate oily liquids. Pulmonary Drug Delivery: Preparation administered to the respiratory system by inhalation, liquids-solution by nebulization, solid fine powders by special applicators, modern devices, particle separation, and consistency of dosing.

**Laboratory Exercises:**

**Exercise 1:** Preparation of a mixture for tableting and measurement of bulk and tapped density.

**Exercise 2:** Mixing/blending of pharmaceutical ingredients

**Exercise 3:** Particle size distribution

**Exercise 4:** Measurement of the hardness and thickness of tablets.

**Exercise 5:** Disintegration of Tablets

**Exercise 6:** Friability

**Exercise 7:** Uniformity of mass of tablets

**Learning Activities and Teaching Methods:**

Lectures, class discussion, assignments, laboratory experiments

**Assessment Methods:**

Midterm examination, final examination, laboratory work
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**Teaching Methods**

Lectures, laboratory exercises, written exams, guiding homework
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**Assessment**

Midterm Examination	25%
Laboratory Exercises	25%
Final Examination	50%

**Required Textbooks/Reading:**

Authors	Title	Publisher	Year	ISBN
M. E. Aulton	Pharmaceutics: The Science of Dosage Form Design	Churchill Livingston	2 <sup>nd</sup> Edition	9780443055171

**Recommended Textbooks/Reading:**

Authors	Title	Publisher	Year	ISBN
Γ.Θ. ΠΑΠΑΪΩΑΝΝΟΥ, Κ.Ν. ΔΕΜΕΤΖΟΣ, Μ. ΒΛΑΧΟΥ-ΚΩΝΣΤΑΝΤΙΝΙΔΟΥ	Αρχές φαρμακευτικής φυσικής και νανοτεχνολογίας	Επιστημονικές Εκδόσεις ΠΑΡΙΣΙΑΝΟΥ Α.Ε.		
Σ. Μαλαματάρης	Τεχνολογία Στερεών Φαρμακευτικών Μορφών	Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης	1995	

**Attendance**

Attendance is mandatory and the instructor may fail a student absent without justification especially at the Laboratory Experiments
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