UNIVERSITY OF PATRAS
SCHOOL OF HEALTH SCIENCES
DEPARTMENT OF PHARMACY
POSTGRADUATE PROGRAM: NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE DESCRIPTION AND LEARNING OUTCOMES

INDEX OF COURSES

UNIVERSITY OF PATRAS
SCHOOL OF HEALTH SCIENCES
DEPARTMENT OF PHARMACY
POSTGRADUATE PROGRAM: NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE TITLE: INTRODUCTION **IN PHARMACEUTICAL SCIENCES**
CODE:**HG4_NM0**

NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE OUTLINE

GENERAL

SCHOOL	HEALTH SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF PHARMACY		
PARTICIPATING INSTITUTIONS	-		
TITLE of POSTGRADUATE PROGRAM	NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)		
LEVEL	POSTGRADUATE		
COURSE CODE	**HG4_NM0**	**SEMESTER**	**A'**
COURSE TITLE	**INTRODUCTION IN PHARMACEUTICAL SCIENCES**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Courses	2	3

COURSE TYPE	General Background knowledge (Basic Biology and Basic Chemistry)
PREREQUISITE COURSES	None
LANGUAGE of INSTRUCTION and EXAMINATIONS	ENGLISH
COURSE OFFERED to ERASMUS STUDENTS	THIS IS ALREADY AN EMJMD PROGRAM COURSE
COUSRSE (URL)	https://www.pharmacy.upatras.gr/images/DS/Nano-Med/HG4_NM0.pdf

LEARNING OUTCOMES

Learning Outcomes
Upon successful course completion, students will acquire knowledge, skills and abilities related to level 7 of the European Qualifications Framework for Lifelong Learning. This course is a basic course for harmonization of the selected students according to their undergraduate degree background. Since the Nanomed program is open for students of different backgrounds, such as Pharmacy, Chemistry, Biochemistry, Engineering. Biology, Nontechnology etc. Students select the appropriate course that is required to complement their background and make it easier for them to understand and successfully follow the following courses. Basic Chemistry course are organized by the Université Paris Cité, and Basic Biology/Biopharmaceutics are organized by the University of Patras. In particular, students will:

1. understand the basic concepts of Biology in order to understand interactions between nanoparticles and biological media, as well as interactions between NP's and cells.
2. understand basic concepts of drug absorption, bioavailability and pharmacokinetic, in order for students from other disciplines to be able to follow the next courses
3. acquire basic chemistry background, and in particular basic Organic chemistry (chemical reactions) , basic Physical chemistry (theory of dispersion systems, stability etc) , and Analytical chemistry (methods for drug detection in formulations and biological media).

General Competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Team Work
- Decision-making
- Working in an international environment
- Working in an interdisciplinary environment
- Production of free, creative and inductive thinking
- Adapting to new situations

SYLLABUS

Basic Chemistry Course

1. Introduction- Scope of Course and Learning outcomes
2. Organic chemistry (reactions, structure of organic compounds etc.)
    a. Thiol-ene Micheal addition reaction
    b. Click chemistry
    c. Cycloaddition
3. Physical chemistry (basic concepts, Flux, Kinetics)
    a. liquid forms,
    b. Multi-component solid forms,
    c. Physical chemistry of pharmaceutical compounds,
    d. Single-component solid forms
4. Analytical chemistry (basic methods for drug detection, UV-VIS, Fluorescence, etc. Elisa methods etc.)
    a. Separative methods,
    b. Liquid chromatography
    c. Gas chromatography

Basic Biology/Biopharmaceutics

1. Cells
    a. Types of Cells,
    b. Characteristics, C
    c. Components,

d. Intracellular organelles structure and function

2. Cellular and biological membranes:
   a. Components
   b. Structure and functions
3. Interaction of drugs and Nanos with cells
   a. uptake, binding, endocytosis, transcytosis
   b. Mechanisms, and requirements
4. Biopharmaceutics
   a. ADME of drugs
   b. Basic Biopharmaceutical concepts
   c. Drug classification
5. Introduction to Bioavailability
   a. Per os administration - physiological factor considerations effect;
   b. Effect of formulation type
   c. Other routes of administration - physiological factor considerations /types of formulations
6. Basic Pharmacokinetics
   a. Non compartemental analysis
   b. Biovailability and Bioequivalence

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face to face
USE of INFORMATION and COMMUNICATIONS TECHNOLOGY	• Use of ICT - e-class platform • Communication with students
TEACHING METHODS	***Activity*** — ***Semester Workload*** Lectures — 30 Directed self study — 15 non-directed Self Study — 30 ***Course Total*** **(25 hours of work-load per ECTS credit) — 75**
STUDENT PERFORMANCE EVALUATION	Language of Evaluation: English Written exams • Multiple choice questionnaires, Short answer questions, Open ended questions (100% of final grade)

RECOMMENDED BIBLIOGRAPHY

Suggested Bibliography:

1. Clayden, Jonathan, Nick Greeves, and Stuart Warren. 2012. Organic Chemistry. 2nd ed. London, England: Oxford University Press.
2. Graham L. Patrick, "An Introduction to Medicinal Chemistry", 5th Edition, Oxford University Press, 2013.
3. Atkins, P., Paula, J. d. (2010). Atkins' Physical Chemistry. United Kingdom: OUP Oxford.
4. Kuhn, H., Försterling, H., Waldeck, D. H. (2009). Principles of physical chemistry. United Kingdom: Wiley.
5. Soffiantini, V. A. (2021). Analytical Chemistry: Principles and Practice. Germany: De Gruyter.
6. Robinson, J. W., Skelly Frame, E. M., Frame II, G. M. (2021). Instrumental Analytical Chemistry: An Introduction. United States: CRC Press.
7. Wanjie, A. (2013). The Basics of Cell Biology. United States: Rosen Publishing Group.
8. Pollard, T. D., Earnshaw, W. C., Lippincott-Schwartz, J., Johnson, G. T. (2017). Cell Biology. Netherlands: Elsevier.
9. Kar, A. (2010). Essentials of Biopharmaceutics and Pharmacokinetics - E-Book. India: Elsevier Health Sciences.
10. Biopharmaceutics and Clinical Pharmacokinetics: An Introduction, Fourth Edition,. (2017). United States: CRC Press.

Related Academic Journals:

Journal of Medicinal Chemistry
European Journal of Medicinal Chemistry
Journal of Analytical Chemistry
J. Colloid and Interphase Sciences
Colloids and Surfaces A and B
Pharmaceutical Sciences
European Journal of Pharmaceutical Sciences

UNIVERSITY OF PATRAS
SCHOOL OF HEALTH SCIENCES
DEPARTMENT OF PHARMACY
POSTGRADUATE PROGRAM: NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE TITLE: PREFORMULATION **AND FORMULATION STRATEGY**
CODE:HG4_NM1

NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE OUTLINE

GENERAL

SCHOOL	HEALTH SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF PHARMACY		
PARTICIPATING INSTITUTIONS	-		
TITLE of POSTGRADUATE PROGRAM	NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)		
LEVEL	POSTGRADUATE		
COURSE CODE	**HG4_NM1**	**SEMESTER**	**A'**
COURSE TITLE	**PREFORMULATION AND FORMULATION STRATEGY**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS**
	Courses	2	3
COURSE TYPE	Specialised knowledge (Physical Pharmacy, Pharmaceutical Technology, Pharmaceutics), Skills Development.		
PREREQUISITE COURSES	None		
LANGUAGE of INSTRUCTION and EXAMINATIONS	ENGLISH		
COURSE OFFERED to ERASMUS STUDENTS	THIS IS ALREADY AN EMJMD PROGRAM COURSE		
COUSRSE (URL)	https://www.pharmacy.upatras.gr/images/DS/NanoMed/HG4_NM1.pdf		

LEARNING OUTCOMES

Learning Outcomes
Upon successful course completion, students will acquire knowledge, skills and abilities related to level 7 of the European Qualifications Framework for Lifelong Learning. In particular, students will: • understand the strategy and logic of formulating a drug product • understand the physicochemical properties and other information required in order to formulate a particular drug into a pharmaceutical product s • have been introduced to the techniques and methodology for identifying and calculating the required (for formulation) physicochemical properties of a drug

- have been introduced to the techniques and methodologies underlying the decision about the selection of the optimal type of formulation and optimal route of administration for a specific drug product.

- They will be able to understand the Basic physicochemical properties of drugs that determine the strategy for formulation development.

General Competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Team Work
- Decision-making
- Working in an international environment
- Working in an interdisciplinary environment
- Production of free, creative and inductive thinking
- Adapting to new situations

SYLLABUS

LECTURES

1. Introduction of "Preformulation" and exercice on ingredients (Essay)
2. Preformulation/ strategical plan for formulation
3. Interfacial and multiphase systems part 1
4. Interfacial and multiphase systems part 2
5. Personal work on ingredients
6. Solubility/dissolution: basis
7. Powders properties
8. Solubility/dissolution: advanced
9. Dispersed systems, particle size analysis
10. Differential scanning calorimetry and thermal analysis/ microcalorimetry
11. personal work on ingredients
12. Rheology
13. Practical work on preformulation (dissolution, LogP, Sterilization, etc)
14. Presentation of pharmaceutical production steps
15. Presentation of work on ingredients

PUBLIC PRESENTATIONS

Individual Assignment & Presentation

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face to face
USE of INFORMATION and COMMUNICATIONS TECHNOLOGY	• Use of ICT - e-class platform • Communication with students
TEACHING METHODS	***Activity*** — ***Semester Workload*** Lectures — 30 Practicals — 5 Preparation/Presentations of Essay on Ingredients — 20 non-directed Study — 20 ***Course Total*** **(25 hours of work-load per ECTS credit) — 75**
STUDENT PERFORMANCE EVALUATION	Language of Evaluation: English Written exams • Multiple choice questionnaires, Short answer questions, Open ended questions (85% of final grade) Report of Practical's • Report (5% of final grade) Public Presentation • Presentation of an Essay of Ingredients (English) (10% of final grade)

RECOMMENDED BIBLIOGRAPHY

Suggested Bibliography:

- Sinko, P. J. (2023). Martin's Physical Pharmacy and Pharmaceutical Sciences. United States: Wolters Kluwer Health.
- Attwood, D., Florence, A. T. (2012). Physical Pharmacy. Germany: Pharmaceutical Press.
- Jain, G., Krishen Khar, R., Ahmad, F. J. (2011). Theory and Practice of Physical Pharmacy - E-Book. India: Elsevier Health Sciences.

J. Colloid and Interphase Sciences
Colloids and Surfaces A and B
International J. Pharmaceutics
Journal of Pharmaceutical Sciences
European Journal of Pharmaceutical Sciences
Eur. J. Pharmaceutics and Biopharmaceutics
Pharmaceutics

UNIVERSITY OF PATRAS
SCHOOL OF HEALTH SCIENCES
DEPARTMENT OF PHARMACY
POSTGRADUATE PROGRAM: NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE TITLE: CLASSICAL AND CONTROLLED RELEASE DOSAGE FORMS
CODE:HG4_NM2

NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE OUTLINE

GENERAL

SCHOOL	HEALTH SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF PHARMACY		
PARTICIPATING INSTITUTIONS	-		
TITLE of POSTGRADUATE PROGRAM	NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)		
LEVEL	POSTGRADUATE		
COURSE CODE	**HG4_NM2**	**SEMESTER**	**A'**
COURSE TITLE	**CLASSICAL AND CONTROLLED RELEASE DOSAGE FORMS**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Courses	7	9

COURSE TYPE	Specialised knowledge (Pharmaceutical Technology, Pharmaceutics, Biopharmaceutics, Industrial Pharmacy, Pharmacokinetics), Skills Development.
PREREQUISITE COURSES	None
LANGUAGE of INSTRUCTION and EXAMINATIONS	ENGLISH
COURSE OFFERED to ERASMUS STUDENTS	THIS IS ALREADY AN EMJMD PROGRAM COURSE
COUSRSE (URL)	https://www.pharmacy.upatras.gr/images/DS/Nano-Med/HG4_NM2.pdf

LEARNING OUTCOMES

Learning Outcomes
Upon successful course completion, students will acquire knowledge, skills and abilities related to level 7 of the European Qualifications Framework for Lifelong Learning. In particular, students will: • understand the differences of drug formulation types according to physical state and administration route • understand the requirement for quality control of dosage forms • have been introduced to the techniques and methodologies for manufacturing of different types of Pharmaceutical Dosage forms

- have understood the basic requirements for ingredients and industrial settings for production of different types of dosage forms according to route of administration
- have familiarized themselves with the concepts of acute releasing and prolonged/sustained release dosage forms
- have understood the kinetics regulating the design of controlled release dosage forms
- have understood the basic requirements for formation of controlled release dosage forms and the methods to design and formulate such dosage forms
- They will be able to design and propose preparation methods for classical and controlled release formulations

General Competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Team Work
- Decision-making
- Working in an international environment
- Working in an interdisciplinary environment
- Production of free, creative and inductive thinking
- Adapting to new situations

SYLLABUS

LECTURES

1. Introduction of "Formulation of classical forms" Dosage forms and oral route/Immediate and modified release definitions
2. Introduction to Case Study Essay
3. Oral liquid forms
4. Solutions, Emulsions, Suspensions
5. Injectable forms and sterilisation
6. Capsules (Types, Ingredients, Preparation/ uses)
7. Spoilage and preservatives of medicines, product stability
8. Powder properties
9. Granulation
10. Tableting
11. Rectal forms,
12. Vaginal Forms
13. Ocular drug delivery
14. Coating/Controls/Packaging of oral solid forms
15. French language courses
16. Personal work on case study
17. Tutorial 1 of case study
18. Personal work on case study
19. Bases of skin biology for active cosmetic and skin delivery of drug
20. Overview of objectivation methods for raw materials and finished cosmetic products. Notions of cosmetic regulation
21. Nasal drug delivery,
22. Tutorial 2 of case study
23. Pulmonary drug delivery

24. Controlled release forms :Introduction, Fast release /Delayed release oral dosage forms
25. Personal work
26. Diffusion test (skin formulations): Franz cell
27. Modified release dosage forms : Extended release dosage forms by other routes
28. Strategic plan of formulation for oral route
29. Tutorial 3 of case study
30. Revisiting biopolymer-based micro- and nanoencapsulation: an analysis of their potential in oral delivery of insulin
31. Dermal and transdermal delivery
32. Biorelevant in vitro performance testing of oraly administered dosage forms
33. Presentation of Case study essays

Case Study Project, is carried out by teams of students that are asked to design and produce a new formulation for a drug to treat a specific disease and/or patient group (paediatric, geriatric etc). Students should document the selection of the route of administration and appropriate dosage form, select the ingredients and provide a detailed formula and method of manufacturing together with required assays for quality control, and also select appropriate packaging and if required applicators for proper drug dosing. Finally, the drug information sheet that will be placed in the packaging should also be prepared.
Tutorials to guide students are carried out.

PUBLIC PRESENTATIONS
Case Study Essay

Assignment & Presentation

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face to face
USE of INFORMATION and COMMUNICATIONS TECHNOLOGY	• Use of ICT - e-class platform • Communication with students
TEACHING METHODS	***Activity*** — ***Semester Workload*** Lectures — 130 Preparation/Presentations of Case Studies — 50 non-directed Study — 45 ***Course Total*** **(25 hours of work-load per ECTS credit) — 225**
STUDENT PERFORMANCE EVALUATION	Language of Evaluation: English Written exams • Multiple choice questionnaires, Short answer questions, Open ended questions (60% of final grade) Public Presentation

	• Presentation of a Case study (English) (40% of final grade)

RECOMMENDED BIBLIOGRAPHY

Suggested Bibliography:

11. Sinko, P. J. (2023). Martin's Physical Pharmacy and Pharmaceutical Sciences. United States: Wolters Kluwer Health.
12. Attwood, D., Florence, A. T. (2012). Physical Pharmacy. Germany: Pharmaceutical Press.
13. Jain, G., Krishen Khar, R., Ahmad, F. J. (2011). Theory and Practice of Physical Pharmacy - E-Book. India: Elsevier Health Sciences.
14. Aulton's Pharmaceutics: The Design and Manufacture of Medicines. (2013). United Kingdom: Churchill Livingstone/Elsevier.
15. Perrie, Y., Rades, T. (2012). Pharmaceutics: Drug Delivery and Targeting. United Kingdom: Pharmaceutical Press.
16. Jones, D. S. (2016). Pharmaceutics: Dosage Form and Design. United Kingdom: Pharmaceutical Press.
17. Agarwal, G. (2018). Pharmaceutics-L: Theory and Practical. India: CBS Publishers & Distributors.
18. Siegel, R. A., Rathbone, M. J. (2011). Fundamentals and Applications of Controlled Release Drug Delivery. Germany: Springer US.
19. Oral Controlled Release Formulation Design and Drug Delivery: Theory to Practice. (2011). Germany: Wiley.

Related Academic Journals:

- Journal of Controlled Release
- J. Colloid and Interphase Sciences
- Colloids and Surfaces A and B
- International J. Pharmaceutics
- Journal of Pharmaceutical Sciences
- European Journal of Pharmaceutical Sciences
- Eur. J. Pharmaceutics and Biopharmaceutics
- Pharmaceutics
- Pharmaceuticals

UNIVERSITY OF PATRAS
SCHOOL OF HEALTH SCIENCES
DEPARTMENT OF PHARMACY
POSTGRADUATE PROGRAM: NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE TITLE: PRACTICAL **APPLICATIONS OF FORMULATIONS**
CODE:**HG4_NM3**

NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE OUTLINE

GENERAL

SCHOOL	HEALTH SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF PHARMACY		
PARTICIPATING INSTITUTIONS	-		
TITLE of POSTGRADUATE PROGRAM	NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)		
LEVEL	POSTGRADUATE		
COURSE CODE	**HG4_NM3**	**SEMESTER**	**A'**
COURSE TITLE	**PRACTICAL APPLICATIONS OF FORMULATIONS**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS**
Practical Courses		6	9
COURSE TYPE	Specialised knowledge (Pharmaceutical Technology, Manufacturing Drug Formulations, Methodologies, Practical Knowledge for experiment planning), Skills Development.		
PREREQUISITE COURSES	None		
LANGUAGE of INSTRUCTION and EXAMINATIONS	ENGLISH		
COURSE OFFERED to ERASMUS STUDENTS	THIS IS ALREADY AN EMJMD PROGRAM COURSE		
COUSRSE (URL)	https://www.pharmacy.upatras.gr/images/DS/Nano-Med/HG4_NM3.pdf		

LEARNING OUTCOMES

Learning Outcomes
Upon successful course completion, students will acquire knowledge, skills and abilities related to level 7 of the European Qualifications Framework for Lifelong Learning. In particular, students will: • understand the strategy for experiment design. • have been introduced to the techniques and methodologies for preparation and physicochemical characterization of dosage forms • have understood the basic approaches to prepare dosage forms. • have understood the basic approaches to evaluate the physicochemical properties of dosage forms

- have understood the basic approaches to evaluate the quality of dosage forms, according to regulatory rules.
- have familiarized themselves with the techniques of preparation, physicochemical property and quality control evaluation of dosage forms

General Competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Team Work
- Decision-making
- Working in an international environment
- Working in an interdisciplinary environment
- Production of free, creative and inductive thinking
- Adapting to new situations

SYLLABUS

LECTURES

Practical courses on the production, analysis and evaluation of Dosage Forms. For each practical course a lecture proceeds to remind the theory behind the practical application.

1. Introduction of Practical's and work load
2. Strategy of formulation of Oral Dosage forms (evaluation methods)
3. Strategy of formulation of suspensions (formulation tests and controls).
4. Strategy of formulation of emulsions (formulation tests and controls).
5. Strategy of formulation of solid Dosage forms (formulation tests and controls)
    a. Tablets
    b. Capsules
    c. Suppositories

    Strategy of formulation of injectable forms

    Formulations tests, controls, dosage of API (ascorbic acid) by HPLC

    Statistical analysis of the results to choose the optimal formulation.

Evaluation report
Oral presentation on practical results

PUBLIC PRESENTATIONS
Oral Presentation of Results of Practical's and Explanation/Critical Assessment of Results

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face to face
USE of INFORMATION and COMMUNICATIONS TECHNOLOGY	• Use of ICT - e-class platform • Communication with students
TEACHING METHODS	***Activity*** — ***Semester Workload*** Lectures / Practical courses — 85 Result analysis — 20 Preparation of Report — 25 Oral Presentation (and preparation) — 10 non-directed Self-Study — 85 ***Course Total*** **(25 hours of work-load per ECTS credit) — 225**
STUDENT PERFORMANCE EVALUATION	Language of Evaluation: English Report of Practical's Results –Explanation of Results • (30% of final grade) Public Presentation • Oral Presentation and evaluation (70% of final grade)

RECOMMENDED BIBLIOGRAPHY

Suggested Bibliography:

- Attwood, D., Florence, A. T. (2012). Physical Pharmacy. Germany: Pharmaceutical Press.
- Jain, G., Krishen Khar, R., Ahmad, F. J. (2011). Theory and Practice of Physical Pharmacy - E-Book. India: Elsevier Health Sciences.
- Aulton's Pharmaceutics: The Design and Manufacture of Medicines. (2013). United Kingdom: Churchill Livingstone/Elsevier.
- Perrie, Y., Rades, T. (2012). Pharmaceutics: Drug Delivery and Targeting. United Kingdom: Pharmaceutical Press.
- Jones, D. S. (2016). Pharmaceutics: Dosage Form and Design. United Kingdom: Pharmaceutical Press.

Related Academic Journals:

- Colloids and Surfaces A and B
- International J. Pharmaceutics
- Journal of Pharmaceutical Sciences
- European Journal of Pharmaceutical Sciences
- Eur. J. Pharmaceutics and Biopharmaceutics
- Pharmaceutics
- Pharmaceuticals

UNIVERSITY OF PATRAS
SCHOOL OF HEALTH SCIENCES
DEPARTMENT OF PHARMACY
POSTGRADUATE PROGRAM: NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE TITLE: INNOVATIVE **DOSAGE FORMS**
CODE:HG4_NM4

DESIGN AND DISCOVERY OF BIOACTIVE COMPOUNDS
COURSE OUTLINE

GENERAL

SCHOOL	HEALTH SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF PHARMACY		
PARTICIPATING INSTITUTIONS	-		
TITLE of POSTGRADUATE PROGRAM	NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)		
LEVEL	POSTGRADUATE		
COURSE CODE	**HG4_NM4**	**SEMESTER**	**A'**
COURSE TITLE	**INNOVATIVE DOSAGE FORMS**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Courses	4	6

COURSE TYPE	Specialised knowledge (Pharmaceutical Technology, Pharmaceults), Skills Development.
PREREQUISITE COURSES	None
LANGUAGE of INSTRUCTION and EXAMINATIONS	ENGLISH
COURSE OFFERED to ERASMUS STUDENTS	THIS IS ALREADY AN EMJMD PROGRAM COURSE
COUSRSE (URL)	https://www.pharmacy.upatras.gr/images/DS/Nano-Med/HG4_NM4.pdf

LEARNING OUTCOMES

Learning Outcomes
Upon successful course completion, students will acquire knowledge, skills and abilities related to level 7 of the European Qualifications Framework for Lifelong Learning. In particular, students will: • understand the requirements, strategy and medical needs for design of innovative dosage forms • understand the differences of different innovative dosage forms, depending on therapeutic need and route of administration • have been introduced to the techniques and methodology underlying the design of innovative dosage forms

- have understood the basic approaches to propose and design innovative dosage forms
- have familiarized themselves with the techniques of optimizing innovative dosage forms

General Competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Team Work
- Decision-making
- Working in an international environment
- Working in an interdisciplinary environment
- Production of free, creative and inductive thinking
- Adapting to new situations

SYLLABUS

LECTURES

Concept and Approach for development of Innovative formulations for enhanced bioavailability depending on route of administration, drug properties, and therapeutic needs.

1. Introduction of "Formulation of innovative forms" (course)
2. Introduction of publication exercise
3. Personal work on publications
4. Biomolecules and Biomedicines
5. Formulation of proteins
6. Cyclodextrins: applications and NPs
7. Physicochemistry of lipids
8. Improvement of bioavailability of drugs by lipidic formulations (1)
9. Innovative forms for pulmonary route
10. Improvement of bioavailability of drugs by lipidic formulations (2)
11. Personal work on publications
12. Liposomes Introduction
13. Conception of innovative ocular dosage forms
14. Personal work on publications
15. Polymeric nanoparticles : preparation- Nanoparticles for cancer therapy
16. Choosing the optimal oral dosage form
17. Microencapsulation and drying
18. in situ forming gels (theory and applications in drug delivery)

PUBLIC PRESENTATIONS
Oral Presentation of Essay on Publication

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face to face
USE of INFORMATION and COMMUNICATIONS TECHNOLOGY	• Use of ICT - e-class platform • Communication with students
TEACHING METHODS	***Activity*** — ***Semester Workload*** Lectures — 85 Preparation & Presentation of Essay — 25 non-directed Study — 40 ***Course Total*** **(25 hours of work-load per ECTS credit) — 150**
STUDENT PERFORMANCE EVALUATION	Language of Evaluation: English Written exams • Multiple choice questionnaires, Short answer questions, Open ended questions (80% of final grade) Public Presentation • Presentation of Essay English) (20% of final grade)

RECOMMENDED BIBLIOGRAPHY

Suggested Bibliography:

- Attwood, D., Florence, A. T. (2012). Physical Pharmacy. Germany: Pharmaceutical Press.
- Aulton's Pharmaceutics: The Design and Manufacture of Medicines. (2013). United Kingdom: Churchill Livingstone/Elsevier.
- Perrie, Y., Rades, T. (2012). Pharmaceutics: Drug Delivery and Targeting. United Kingdom: Pharmaceutical Press.
- Jones, D. S. (2016). Pharmaceutics: Dosage Form and Design. United Kingdom: Pharmaceutical Press.
- Siegel, R. A., Rathbone, M. J. (2011). Fundamentals and Applications of Controlled Release Drug Delivery. Germany: Springer US.
- Oral Controlled Release Formulation Design and Drug Delivery: Theory to Practice. (2011). Germany: Wiley.
- Innovative Dosage Forms: Design and Development at Early Stage. (2019). Germany: Wiley.
- Novel Drug Delivery Technologies: Innovative Strategies for Drug Re-positioning. (2020). Germany: Springer Nature Singapore.
- Gassmann, O., Reepmeyer, G., von Zedtwitz, M. (2013). Leading Pharmaceutical Innovation: Trends and Drivers for Growth in the Pharmaceutical Industry. Germany: Springer Berlin Heidelberg.
- Dermal Drug Delivery: From Innovation to Production. (2020). United States: CRC Press.

Related Academic Journals:

- J. Colloid and Interphase Sciences
- Colloids and Surfaces A and B
- International J. Pharmaceutics
- Journal of Pharmaceutical Sciences
- European Journal of Pharmaceutical Sciences
- Eur. J. Pharmaceutics and Biopharmaceutics
- Pharmaceutics
- Int. J. Nanomedicines
- Nanoscale,
- ASC Nano
- Nature Nanotechnology

UNIVERSITY OF PATRAS
SCHOOL OF HEALTH SCIENCES
DEPARTMENT OF PHARMACY
POSTGRADUATE PROGRAM: NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE TITLE: INNOVATIONS in Pharmaceutical Technology
CODE: HG4_NM5

NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)
COURSE OUTLINE

GENERAL

SCHOOL	HEALTH SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF PHARMACY		
PARTICIPATING INSTITUTIONS	-		
TITLE of POSTGRADUATE PROGRAM	NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)		
LEVEL	POSTGRADUATE		
COURSE CODE	**HG4_NM5**	**SEMESTER**	**B'**
COURSE TITLE	**Innovations in Pharmaceutical Technology**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Courses and Seminars	2	3

COURSE TYPE	Specialised knowledge on Pharmaceutical Technology and Industrial Pharmacy (Pharmaceutical Technology, Industrial Pharmacy,), Skills Development.
PREREQUISITE COURSES	None
LANGUAGE of INSTRUCTION and EXAMINATIONS	ENGLISH
COURSE OFFERED to ERASMUS STUDENTS	THIS IS ALREADY AN EMJMD PROGRAM COURSE
COUSRSE (URL)	https://www.pharmacy.upatras.gr/images/DS/Nano-Med/HG4_NM5.pdf

LEARNING OUTCOMES

Learning Outcomes
Upon successful course completion, students will acquire knowledge, skills and abilities related to level 7 of the European Qualifications Framework for Lifelong Learning. In particular, students will: • understand advanced and novel methods applied in current days for formulation design • understand advanced and novel methods applied in current days for formulation design • have been introduced to innovative techniques and methodologies applied for development of Pharmaceutical products

General Competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Team Work
- Decision-making
- Working in an international environment
- Working in an interdisciplinary environment
- Production of free, creative and inductive thinking
- Adapting to new situations

SYLLABUS

LECTURES

Special topics in Pharmaceutical Technology:

1. Introduction of "Advanced Pharmaceutical technology"
2. Experiment planning by Design of Experiments
3. Conference on 3D printing
4. 3D printing technologies for individualized drug therapy
5. Quality guidelines- Quality by Design
6. Innovations in Design and Production of transdermal delivery Devices/Patches
7. Industrial production of Injectable
8. microfluidic mixing for scaled up production of nanomedicines. Types of plat-forms, chips and Examples. Scaling up
9. Preparation of nanoparticles by microfluidics
10. Production of nanoparticles by supercritical fluids
11. Challenges to produce LNP vaccines
12. Stability of Formulations and Novel Methodologies for Assesment
13. Novel approaches for Lipid based formulations for oral delivery
14. Nanocrystals: Development and manufacturing
15. green synthesis for APIs and Ingredients and NPs
16. continuous manufacturing approaches
17. "green" analysis with less organic solvent
18. Advanced Characterization methods for Pharmaceuticals (Raman, micro-CT etc
19. Innovative devices for Pulmonary delivery
20. Other specialized topics by experts from Industry

An essay on topics of innovative methods to produce specific formulation types will be given to students.

PUBLIC PRESENTATIONS

Assignment & Presentation

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face to face
USE of INFORMATION and COMMUNICATIONS TECHNOLOGY	• Use of ICT - e-class platform • Communication with students
TEACHING METHODS	***Activity*** ***Semester Workload*** Lectures 30 Preparation / Presentations of Essay 15 non-directed Study 30 ***Course Total*** **(25 hours of work-load per ECTS credit) 75**
STUDENT PERFORMANCE EVALUATION	Language of Evaluation: English Written exams • Multiple choice questionnaires, Short answer questions, Open ended questions (80% of final grade) Public Presentation • Presentation of a Essay (20% of final grade)

RECOMMENDED BIBLIOGRAPHY

Suggested Bibliography:

- Innovation and Marketing in the Pharmaceutical Industry: Emerging Practices, Research, and Policies. (2013). Netherlands: Springer New York.
- Gassmann, O., Reepmeyer, G., von Zedtwitz, M. (2013). Leading Pharmaceutical Innovation: Trends and Drivers for Growth in the Pharmaceutical Industry. Germany: Springer Berlin Heidelberg.
- Value Creation in the Pharmaceutical Industry: The Critical Path to Innovation. (2016). Germany: Wiley.
- Atun, R. A., Sheridan, D. J. (2007). Innovation In The Biopharmaceutical Industry. Singapore: World Scientific Publishing Company.
- Continuous Manufacturing of Pharmaceuticals. (2017). Germany: Wiley.
- Engelhardt, H. T. (2014). Innovation and the Pharmaceutical Industry: Critical Reflections on the Virtues of Profit. United States: Ebsco Publishing.
- National Academies of Sciences, Engineering, and Medicine; Division on Earth and Life Studies; Board on Chemical Sciences and Technology; Committee to Identify Innovative Technologies to Advance Pharmaceutical Manufacturing. Innovations in Pharmaceutical Manufacturing on the Horizon: Technical Challenges, Regulatory Issues, and Recommendations. Washington (DC): National Academies Press (US); 2021 Feb 24. 3, Innovations in Manufacturing Drug Products. Available from: https://www.ncbi.nlm.nih.gov/books/NBK570316/

Related Academic Journals:

Journal of Intelligent Manufacturing
Journal of Pharmaceutical Manufacturing

UNIVERSITY OF PATRAS
SCHOOL OF HEALTH SCIENCES
DEPARTMENT OF PHARMACY
POSTGRADUATE PROGRAM: **NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)**

COURSE TITLE: **BASIC NANOMEDICINES**
CODE:**HG4_NM6**

NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE OUTLINE

GENERAL

SCHOOL	HEALTH SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF PHARMACY		
PARTICIPATING INSTITUTIONS	-		
TITLE of POSTGRADUATE PROGRAM	NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)		
LEVEL	POSTGRADUATE		
COURSE CODE	**HG4_NM6**	**SEMESTER**	**B'**
COURSE TITLE	**BASIC NANOMEDICINES**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Courses and Practical's	4	6

COURSE TYPE	Specialized general knowledge (Nanotechnologies for drug delivery and Targeting, Applications of Nanotechnologies for Drug Delivery), Skills Development.
PREREQUISITE COURSES	None
LANGUAGE of INSTRUCTION and EXAMINATIONS	ENGLISH
COURSE OFFERED to ERASMUS STUDENTS	THIS IS ALREADY AN EMJMD PROGRAM COURSE
COUSRSE (URL)	https://www.pharmacy.upatras.gr/images/DS/Nano-Med/HG4_NM6.pdf

LEARNING OUTCOMES

Learning Outcomes
Upon successful course completion, students will acquire knowledge, skills and abilities related to level 7 of the European Qualifications Framework for Lifelong Learning. In particular, students will: • understand the strategy and logic of applying Nanotechnology for formation of Nanoparticulate drug delivery systems/carriers • understand the specific requirements in terms of biocompatibility of Nanomedicines • have been introduced to the techniques and methodology for development of different types of Nano-medicines

- have understood the differences between nanomedicine types and the requirements depending on the specific therapeutic or theragnostic or diagnostic application.
- Have been familiarized with the concept and strategies of drug Targeting (passive/active) by using nanomedicines
- Have been familiarized with methods to prepare nanomedicines, characterize them and evaluate their performance by in vitro methods

General Competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Team Work
- Decision-making
- Working in an international environment
- Working in an interdisciplinary environment
- Production of free, creative and inductive thinking
- Adapting to new situations

SYLLABUS

LECTURES

1. Introduction to "Basic nanomedicine" –Types and properties of Nanocarriers
2. Introduction to nanomedicine/ Implication of Nanosize on biocompatibility/cytotoxicity
3. Characterisation of nanocarriers – Requirements for applications in Therapeutics
4. Nanomedicine for Anti-infectious therapy. The case of Liposomes
5. Zeta sizer: Malvern formation/demonstration
6. Phytodrug delivery systems
7. Hybrid Nanomedicines for special applications Attachement /Intergration of Nanomedicines on surfaces, Medical devices, Biomaterials
8. Nanoparticles and Formulation of proteins –What are the advantages?
9. Liposomes (preparation and drug loading methods)
10. Polymeriv NP (Preparation and drug loading methods)
11. Liposome applications for Drug Delivery
12. Nanocrystals for Drug Delivery – Applications for oral delivery
13. In vitro methods to evaluate nanomedicine activity (cell culture models, monolayers, FACS, Confocal microscopy etc.)
14. Morphological assessment methods of nanomedicines
15. Nanomedicines and Vaginal route –Liposomes, Other types
16. Nanomedicines and Pulmonary route- Liposomes, Other Types
17. Nanomedicines and Ocular delivery – Lipsoomes, Other Types
18. Administration of nanoparticles to the skin
19. Nanomedicines and Localized delivery
20. Current Naonamedicine Products – Bottlenecks in the field – Room for Innovations
21. Liposomes for Nucleic acid Delivery
22. Developpment and optimisation of non viral carriers for gene therapy
23. Polymers for nanocarriers design
24. Production of nanoparticles by supercritical fluids
25. Protein corona: opportunities and challenges for nanomedicine design
26. Nanomedecine in inflammatory diseases
27. Nanomedicines for Pain management
28. Nanomedicines for Cancer

29. Regulatory requirements for the registration of medicinal products: procedures and CTD for marketing authorization

Practical courses on Liposomes, nanoparticles, nanoemulsion preparation, characterization and in vitro evaluation (integrity, drug release kinetics, size distribution, zeta potential).

Practical Courses:

- Liposomes preparation and characterization (size and zeta potential) 1
- Liposomes preparation and characterization (size and zeta potential) 2

- Nanoemulsion preparation and characterization (group 1)
- Nanoemulsion preparation and characterization (group 2)

- Microemulsion/Nanoemulsion preparation and characterization group 1
- Microemulsion/Nanoemulsion preparation and characterization group 2

- Stability test nanosizer group 1
- Stability test nanosizer group 2

PUBLIC PRESENTATIONS
Oral presentation on practicals

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face to face
USE of INFORMATION and COMMUNICATIONS TECHNOLOGY	• Use of ICT - e-class platform • Communication with students
TEACHING METHODS	***Activity*** — ***Semester Workload*** Lectures — 65 Presentations of Practical — 20 Practical Courses — 20 Self Study — 45 ***Course Total*** **(25 hours of work-load per ECTS credit) — 150**
	Language of Evaluation: English Written exams • Multiple choice questionnaires, Short answer questions, Open ended questions (70% of final grade) Public Presentation • Presentation of a Case study (English) (30% of final grade)

RECOMMENDED BIBLIOGRAPHY

Suggested Bibliography:

- Nanomedicine for the Treatment of Disease: From Concept to Application. (2019). United States: Apple Academic Press.
- Advances and Challenges in Nanomedicine. (2019). (n.p.): Frontiers Media SA.
- Nanomedicine for Bioactives: Healthcare Applications. (2020). Singapore: Springer Nature Singapore.
- Igarashi, E. (2018). Nanomedicines and Nanoproducts: Applications, Disposition, and Toxicology in the Human Body. United States: CRC Press.
- Gregoriadis, G. (2018). Liposome Technology: Volume III: Targeted Drug Delivery and Biological Interaction. United Kingdom: CRC Press.
- Liposomes: Methods and Protocols. (2023). Germany: SPRINGER-VERLAG NEW YORK.
- Liposomes in Drug Delivery: What, Where, How and When to Deliver. (2024). United Kingdom: Elsevier Science.
- Grumezescu, A. M. (2019). Nanomaterials for Drug Delivery and Therapy. Netherlands: Elsevier Science.

Related Academic Journals:

Nature Nanotechnology
J, Controlled Release
ACS Nano
Inter. J. Pharmaceutics
J. Pharm. Sciences
J. Liposome Research
Nanomedicine
Int. J. Nanomedicines
Pharmaceutics

UNIVERSITY OF PATRAS
SCHOOL OF HEALTH SCIENCES
DEPARTMENT OF PHARMACY
POSTGRADUATE PROGRAM: **NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)**

COURSE TITLE: **BIOMOLECULES**
CODE:**HG4_NM7**

NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE OUTLINE

GENERAL

SCHOOL	HEALTH SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF PHARMACY		
PARTICIPATING INSTITUTIONS	-		
TITLE of POSTGRADUATE PROGRAM	NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)		
LEVEL	POSTGRADUATE		
COURSE CODE	**HG4_NM7**	**SEMESTER**	**B'**
COURSE TITLE	**BIOMOLECULES**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Courses	4	6

COURSE TYPE	Specialized general knowledge (Biotechnology, Pharmaceutical bio-technology, Immunology, Biological Drugs) , Skills Development.
PREREQUISITE COURSES	None
LANGUAGE of INSTRUCTION and EXAMINATIONS	ENGLISH
COURSE OFFERED to ERASMUS STUDENTS	THIS IS ALREADY AN EMJMD PROGRAM COURSE
COUSRSE (URL)	https://www.pharmacy.upatras.gr/images/DS/Nano-Med/HG4_NM7.pdf

LEARNING OUTCOMES

Learning Outcomes
Upon successful course completion, students will acquire knowledge, skills and abilities related to level 7 of the European Qualifications Framework for Lifelong Learning. In particular, students will: 4. understand the structure and properties of biological and biotech drugs (peptides, proteins, nucleid acids) 5. understand the structure and properties of antibodies, their production methods and how they are used in Pharmaceutics 6. have been introduced to basic concepts of immunology and vaccines.

7. have understood the basic approaches to consider for preparation of a vaccine
8. have understood the basic approaches to consider for formulation of biological drugs

General Competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Team Work
- Decision-making
- Working in an international environment
- Working in an interdisciplinary environment
- Production of free, creative and inductive thinking
- Adapting to new situations

SYLLABUS

LECTURES

1. Intro Biomolecules
2. General aspects of the immune system
3. Chemistry of biological molecules
4. Innate immunity
5. Chemistry of biological molecules
6. T-cell antigen recognition
7. Analytical methods for biological products
8. B-cell antigen recognition
9. Anticancerous immunity
10. Formulation for gene therapy
11. Peptide and peptidomimetics
12. Developpment and optimisation of non viral carriers for gene therapy
13. Reconbinant proteins
14. Administration of siRNA by non-viral carriers
15. Monoclonal Antibodies
16. Therapeutic applications of siRNA and ODN
17. Conjugated Antibodies
18. Vaccines and Semisynthetic glyco-vaccines
19. Conjugated Antibodies
20. Development and validation of vaccine product against tuberculosis
21. Analytical methods for biological products
22. Formulation and characterization to optimize biotherapeutics and vaccine stability
23. Formulation and characterization to optimize biotherapeutics and vaccine stability

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face to face

USE of INFORMATION and COMMUNICATIONS TECHNOLOGY	• Use of ICT - e-class platform • Communication with students
TEACHING METHODS	***Activity*** ***Semester Workload*** Lectures 85 Presentations 15 non-directed Study 50 ***Course Total*** **(25 hours of work-load per ECTS credit) 150**
STUDENT PERFORMANCE EVALUATION	Language of Evaluation: English Oral Examination (70% of final grade) Written exams • Multiple choice questionnaires, Short answer questions, Open ended questions (20% of final grade) Public Presentation • Presentation of a Case study (English) (10% of final grade)

RECOMMENDED BIBLIOGRAPHY

Suggested Bibliography:

- Pharmaceutical Biotechnology: Drug Discovery and Clinical Applications. (2012). Γερμανία: Wiley.
- **Pharmaceutical Biotechnology: Fundamentals and Applications. (2013). Γερμανία: Springer New York.**
- **Immunopotentiators in Modern Vaccines. (2016). Ολλανδία: Elsevier Science.**
- **Encyclopedia of Medical Immunology: Vaccines. (n.d.). Ηνωμένες Πολιτείες: Springer US.**
- **Nanomedicine and Nanobiotechnology. (2012). Γερμανία: Springer Berlin Heidelberg.Βασίλειο: Cambridge University Press.**
- **Formulation and Process Development Strategies for Manufacturing Biopharmaceuticals. (2010). Γερμανία: Wiley.**

Related Academic Journals:

Nature Nanotechnology
Immunology
J. Immunol. Methods
J, Controlled Release
ACS Nano
Inter. J. Pharmaceutics
J. Pharm. Sciences
J. Liposome Research
Nanomedicine

UNIVERSITY OF PATRAS
SCHOOL OF HEALTH SCIENCES
DEPARTMENT OF PHARMACY
POSTGRADUATE PROGRAM: **NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)**

COURSE TITLE: **3-MONTH INTERNSHIP**
CODE:**HG4_NM8**

NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE OUTLINE

GENERAL

SCHOOL	HEALTH SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF PHARMACY		
PARTICIPATING INSTITUTIONS	-		
TITLE of POSTGRADUATE PROGRAM	NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)		
LEVEL	POSTGRADUATE		
COURSE CODE	**HG4_NM8**	**SEMESTER**	**B'**
COURSE TITLE	**3-MONTH INTERNSHIP**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Practical, Lab work, One-by-one teaching	10	12

COURSE TYPE	Specialised general knowledge (Laboratory Techniques in Pharmaceutical Technology, practical issues, Laboratory Skills), Skills Development.
PREREQUISITE COURSES	None
LANGUAGE of INSTRUCTION and EXAMINATIONS	ENGLISH
COURSE OFFERED to ERASMUS STUDENTS	THIS IS ALREADY AN EMJMD PROGRAM COURSE
COUSRSE (URL)	https://www.pharmacy.upatras.gr/images/DS/Nano-Med/HG4_NM8.pdf

LEARNING OUTCOMES

Learning Outcomes

Upon successful course completion, students will acquire knowledge, skills and abilities related to level 7 of the European Qualifications Framework for Lifelong Learning.

In particular, students will:

- understand the strategy and logic of implementation of a research project
- Understand how to systematically review the scientific literature for a specific scientific question.
- Understand how to critically assess publications.
- Learn how to use basic equipment for preparation of pharmaceutical forms, processing of samples, analysis and physicochemical evaluation of samples
- Learn how to write a scientific report
- Learn how to prepare a scientific poster of their work
- Learn how to present orally a scientific project

General Competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Team Work
- Decision-making
- Working in an international environment
- Working in an interdisciplinary environment
- Production of free, creative and inductive thinking
- Adapting to new situations

SYLLABUS

LECTURES

Description of course: This course in a guided laboratory project that aims to develop and teach to the student's practical laboratory skills that they need for their thesis, especially when the thesis will include execution of wet-lab experiments.
The course is carried out in the laboratories of four partner Universities and or Associated partners.
Students are initially introduced into the scope of the project and scientific questions that need to be answered.
Then they carry out a systematic literature search on the project and find the most relevant reports.
They complete a number of practical experiments and learn the use of basic laboratory equipment (pipettes, chromatography columns, UV and Fluorescence spectrophotometers, zeta-sizer, emulsifiers, mixing devices, filtration/extrusion devises etc.).
They also learn how to analyse data, prepare graphs, prepare a poster to present their results, as well how to write a report and search into bibliographic databases.

PUBLIC PRESENTATIONS
Report presentation

Oral presentation of Poster (during the Yearly Summer School)

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face to face
USE of INFORMATION and COMMUNICATIONS TECHNOLOGY	• Use of ICT - e-class platform • Communication with students
TEACHING METHODS	***Activity*** — ***Semester Workload*** Literature searching and analisis — 30 Experimental guided work –analysis of results — 200 writing report and poster preparation — 50 Presentations — 20 ***Course Total*** **(25 hours of work-load per ECTS credit)** — **300**
STUDENT PERFORMANCE EVALUATION	Language of Evaluation: English Student evaluation is based on the degree of student participation to the project and ability to learn and execute specific laboratory techniques, ability to analyze data; • 45 percent of final mark Quality of report and poster • 35 percent of final mark Oral examination on poster presentation during the Summer School is also evaluated. • 35 percent of final mark

RECOMMENDED BIBLIOGRAPHY

Suggested Bibliography:

- PHARMACEUTICAL LAB MANUAL. (2019). (n.p.): KY Publications.
- In Vitro Methods in Pharmaceutical Research. (1997). Ηνωμένο Βασίλειο: Elsevier Science.
- Methods for Stability Testing of Pharmaceuticals. (2019). Ηνωμένες Πολιτείες: Springer New York.
- Chidambaram, S. B., Essa, M. M., Qoronfleh, M. W. (2022). Introduction to Toxicological Screening Methods and Good Laboratory Practice. Σιγκαπούρη: Springer Nature Singapore.
- RNA Nanotechnology and Therapeutics: Methods and Protocols. (2016). Ηνωμένες Πολιτείες: Springer New York.
- Cancer Nanotechnology: Methods and Protocols. (2017). Ηνωμένες Πολιτείες: Springer New York.
- Liposomes: Methods and Protocols. (2018). Ηνωμένες Πολιτείες: Springer New York.
- Liposomes: Methods and Protocols. (2023). Germany: SPRINGER-VERLAG NEW YORK.

Related Academic Journals:

Nature Nanotechnology
J, Controlled Release
ACS Nano
Inter. J. Pharmaceutics
J. Pharm. Sciences
J. Liposome Research
Nanomedicine
Int. J. Nanomedicines
Pharmaceutics

UNIVERSITY OF PATRAS
SCHOOL OF HEALTH SCIENCES
DEPARTMENT OF PHARMACY
POSTGRADUATE PROGRAM: **NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)**

COURSE TITLE: **SUMMER SCHOOL AND WORKSHOP**
CODE:**HG4_NM9**

NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE OUTLINE

GENERAL

SCHOOL	HEALTH SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF PHARMACY		
PARTICIPATING INSTITUTIONS	-		
TITLE of POSTGRADUATE PROGRAM	NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)		
LEVEL	POSTGRADUATE		
COURSE CODE	**HG4_NM9**	**SEMESTER**	**B'**
COURSE TITLE	**NANOMED SUMMER SCHOOL AND WORKSHOP**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Courses, Seminars, essay's	2	3

COURSE TYPE	Specialized knowledge (Nanomedicines, Pharmaceutics), Skills Development.
PREREQUISITE COURSES	None
LANGUAGE of INSTRUCTION and EXAMINATIONS	ENGLISH
COURSE OFFERED to ERASMUS STUDENTS	THIS IS ALREADY AN EMJMD PROGRAM COURSE
COUSRSE (URL)	https://www.pharmacy.upatras.gr/images/DS/Nano-Med/HG4_NM9.pdf

LEARNING OUTCOMES

Learning Outcomes
Upon successful course completion, students will acquire knowledge, skills and abilities related to level 7 of the European Qualifications Framework for Lifelong Learning. In particular, students will: • understand basic concepts on Nanomedicines on a specific subject (or subjects) related with the theme of the summer school • have been introduced to the techniques and methodology underlying the development of specific nanomedice types (during the workshop)

- have the experience of presenting/defending their work (3-month internship or 6 month Diploma Thesis) to an audience (similar to conference).
- Have been introduced to soft skills (writing cv, writing reports, research project proposals etc) –(during the summer school).

General Competences
• Working independently • Team Work • Working in an international environment • Working in an interdisciplinary environment • Production of free, creative and inductive thinking • Adapting to new situations

SYLLABUS

The summer School is organized each year by one of the partner Universities;

One Invited Professor gives lectures for 8 days on selected topics related to Nanomedicines;

During the summer school students are asked to complete an essay or case study, which they present on the final day, and are also evaluated by written .

Student evaluation is based on a written test, and oral presentation of specific topic case study or essay. evaluations

PUBLIC PRESENTATIONS
1st year students present their Posters (from 3 month Internship results)

2nd year students defend their Diploma Thesis, orally during the workshop, in from or their examination committee and the workshop audience

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face to face	
USE of INFORMATION and COMMUNICATIONS TECHNOLOGY	• Use of ICT - e-class platform • Communication with students	
TEACHING METHODS	***Activity***	***Semester Workload***
	Lectures from Invited Professor	30
	Scientific presentations during Workshop	20
	Presentations of Poster /Thesis	2
	Case Studies' Preparation & non-directed Study	23
	Course Total **(25 hours of work-load per ECTS credit)**	**75**

STUDENT PERFORMANCE EVALUATION	Language of Evaluation: Greek / English Written exams • Multiple choice questionnaires, Short answer questions, Open ended questions (60% of final grade) Public Presentation • Presentation of a Case study (Greek or English) (40% of final grade)

RECOMMENDED BIBLIOGRAPHY

Suggested Bibliography:

- Nanomedicine for the Treatment of Disease: From Concept to Application. (2019). United States: Apple Academic Press.
- Advances and Challenges in Nanomedicine. (2019). (n.p.): Frontiers Media SA.
- Nanomedicine for Bioactives: Healthcare Applications. (2020). Singapore: Springer Nature Singapore.
- Igarashi, E. (2018). Nanomedicines and Nanoproducts: Applications, Disposition, and Toxicology in the Human Body. United States: CRC Press.
- Gregoriadis, G. (2018). Liposome Technology: Volume III: Targeted Drug Delivery and Biological Interaction. United Kingdom: CRC Press.
- Liposomes: Methods and Protocols. (2023). Germany: SPRINGER-VERLAG NEW YORK.
- Liposomes in Drug Delivery: What, Where, How and When to Deliver. (2024). United Kingdom: Elsevier Science.
- Grumezescu, A. M. (2019). Nanomaterials for Drug Delivery and Therapy. Netherlands: Elsevier Science.

Related Academic Journals:

Nature Nanotechnology
J, Controlled Release
ACS Nano
Inter. J. Pharmaceutics
J. Pharm. Sciences
J. Liposome Research
Nanomedicine
Int. J. Nanomedicines
Pharmaceutics

UNIVERSITY OF PATRAS

SCHOOL OF HEALTH SCIENCES

DEPARTMENT OF PHARMACY

POSTGRADUATE PROGRAM: NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE TITLE: 3RD SEMESTER I (ANGERS COURSES)

CODE:HG4_NM10

NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE OUTLINE

GENERAL

SCHOOL	HEALTH SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF PHARMACY		
PARTICIPATING INSTITUTIONS	-		
TITLE of POSTGRADUATE PROGRAM	NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)		
LEVEL	POSTGRADUATE		
COURSE CODE	**HG4_NM10**	**SEMESTER**	**C'**
COURSE TITLE	**3RD SEMESTER I (ANGERS COURSES)**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Courses (6 cources)	20	30

COURSE TYPE	Cycle of Specialized knowledge courses for Specialization semester (selections 1) (CMC Regulatory and QbD Approach, Innovation and Application, Drug Product Design, Characterization strategy, Non Clinical Strategy, Innovation Project and Personal development Seminars), Skills Development.
PREREQUISITE COURSES	None
LANGUAGE of INSTRUCTION and EXAMINATIONS	ENGLISH
COURSE OFFERED to ERASMUS STUDENTS	THIS IS ALREADY AN EMJMD PROGRAM COURSE
COUSRSE (URL)	https://www.pharmacy.upatras.gr/images/DS/Nano-Med/HG4_NM10.pdf

LEARNING OUTCOMES

Learning Outcomes

Upon successful course completion, students will acquire knowledge, skills and abilities related to level 7 of the European Qualifications Framework for Lifelong Learning.

In particular, students will:

- understand the strategies available for different application of nanomedicines for drug delivery
- have been familiarized to the applications of nanomedicines for therapeutic and/or diagnostic applications .
- Have understood the basic approaches for design and development of nanomedicines depending on the specific application.
- Have familiarized themselves with the techniques of optimizing nanomedicines depending on therapeutic or diagnostic requirements, route of administration etc.
- Learn how a nanomedicine can go from the lab to the clinic and finally to the market, what to consider and how to organize each step.
- learn about personal development methods that will help them in their future carriers

General Competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Team Work
- Decision-making
- Working in an international environment
- Working in an interdisciplinary environment
- Production of free, creative and inductive thinking
- Adapting to new situations

SYLLABUS

LECTURES

This semester consists of 6 courses (that are carried of @ Universite d' Angers), the following:

CMC Regulatory and QbD Approach:

Applied studies in Chemistry

Manufacturing and Control (CMC) Regulatory,

Quality by Design (QbD),

Design of Experiments (DoE),

Statistics

Special Seminars

Innovation and Application:

Applied study of Innovation engineering

Intellectual property,

Applications in complex Drug Products.

Personal Development Seminars

Occupational Integration.

Drug product Design:

Raw material properties,

Formulation and Process development.

Characterization strategy:

Analytical consideration

method development,

Physicochemical consideration,

Microbiological consideration.

Non clinical strategy:

Non clinical methodology,

Kinetics and Efficacy,

Safety and Toxicology.

Innovation project:

Project management,

PUBLIC PRESENTATIONS

Selected case studies in modern Nanomedicine subjects

Individual Assignment & Presentation

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face to face
USE of INFORMATION and COMMUNICATIONS TECHNOLOGY	• Use of ICT - e-class platform • Communication with students
TEACHING METHODS	***Activity*** — ***Semester Workload*** Lectures — 280 Practical's — 50 Presentations of Case Studies — 100 Seminars — 60 Case Studies' Preparation & non-directed Study — 260 ***Course Total*** **(25 hours of work-load per ECTS credit)** — **750**

STUDENT PERFORMANCE EVALUATION	Language of Evaluation: English Written exams • Multiple choice questionnaires, Short answer questions, Open ended questions (60% of final grade) Public Presentation • Presentation of a Case study (English) (25% of final grade) • Presentation of Practicals courses results • (15% of final grade)

RECOMMENDED BIBLIOGRAPHY

Suggested Bibliography:

- Nanomedicine for the Treatment of Disease: From Concept to Application. (2019). United States: Apple Academic Press.
- Advances and Challenges in Nanomedicine. (2019). (n.p.): Frontiers Media SA.
- Nanomedicine for Bioactives: Healthcare Applications. (2020). Singapore: Springer Nature Singapore.
- Igarashi, E. (2018). Nanomedicines and Nanoproducts: Applications, Disposition, and Toxicology in the Human Body. United States: CRC Press.
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- Liposomes: Methods and Protocols. (2023). Germany: SPRINGER-VERLAG NEW YORK.
- Liposomes in Drug Delivery: What, Where, How and When to Deliver. (2024). United Kingdom: Elsevier Science.
- Grumezescu, A. M. (2019). Nanomaterials for Drug Delivery and Therapy. Netherlands: Elsevier Science.

Related Academic Journals:

Nature Nanotechnology
J, Controlled Release
ACS Nano
Inter. J. Pharmaceutics
J. Pharm. Sciences
J. Liposome Research
Nanomedicine
Int. J. Nanomedicines
Pharmaceutics

UNIVERSITY OF PATRAS

SCHOOL OF HEALTH SCIENCES

DEPARTMENT OF PHARMACY

POSTGRADUATE PROGRAM: NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE TITLE: 3RD SEMESTER II (PAVIA COURSES)

CODE:HG4_NM11

NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE OUTLINE

GENERAL

SCHOOL	HEALTH SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF PHARMACY		
PARTICIPATING INSTITUTIONS	-		
TITLE of POSTGRADUATE PROGRAM	NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)		
LEVEL	POSTGRADUATE		
COURSE CODE	**HG4_NM11**	**SEMESTER**	**C'**
COURSE TITLE	**3RD SEMESTER II (PAVIA COURSES)**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Courses (6 courses)	20	30

COURSE TYPE	Cycle of Specialized knowledge courses for Specialization semester [selection 2) (Nanotechnology and biologic/biotech. Drugs, Regulatory and analytical aspects, Industrialization, Drug targeting and vaccination, Specific applications of Nanomedicines, Personal Development Seminars), Skills Development.
PREREQUISITE COURSES	None
LANGUAGE of INSTRUCTION and EXAMINATIONS	ENGLISH
COURSE OFFERED to ERASMUS STUDENTS	THIS IS ALREADY AN EMJMD PROGRAM COURSE
COUSRSE (URL)	https://www.pharmacy.upatras.gr/images/DS/Nano-Med/HG4_NM11.pdf

LEARNING OUTCOMES

Learning Outcomes

Upon successful course completion, students will acquire knowledge, skills and abilities related to level 7 of the European Qualifications Framework for Lifelong Learning.

In particular, students will:

- understand the strategies available for different application of nanomedicines for drug delivery
- have been familiarized to the applications of nanomedicines for therapeutic and/or diagnostic applications .
- Have understood the basic approaches for design and development of nanomedicines depending on the specific application.
- Have familiarized themselves with the techniques of optimizing nanomedicines depending on therapeutic or diagnostic requirements, route of administration etc.
- Learn how a nanomedicine can go from the lab to the clinic and finally to the market, what to consider and how to organize each step.
- learn about personal development methods that will help them in their future carriers

General Competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Team Work
- Decision-making
- Working in an international environment
- Working in an interdisciplinary environment
- Production of free, creative and inductive thinking
- Adapting to new situations

SYLLABUS

LECTURES

This semester consists of 6 courses (that are carried of @ Universita Degli Study di Pavia), the following:

Nanotechnology and biologic/biotech drugs:

Formulation aspects of nanodrug delivery systems for different administration routes,

ATMPs

Regulatory and analytical aspects:

Regulatory aspects of biotech drugs and nanodrug delivery systems

Statistics and Chemometrics,

Analytical methods for biotech drugs.

Industrialization:

GMP,

Manufacturing techniques for nanodrug delivery systems.

Drug targeting and vaccination:

Drug targeting,

stimula responsive polymers,

vaccination,

Advanced methodologies in pharmacology and biotechnology.

Specific applications of nanomedicines:

Inorganic nanomedicines,

Diagnostics,

Medical Devices based on nanopharmaceuticals,

ocular,

cutaneous and transdermal applications of nanomedicines.

Personal Development Seminars:

Literacy,

CV development,

Italian language course,

Introduction of traineeship projects by students.

PUBLIC PRESENTATIONS
Selected case studies in modern Nanomedicine subjects
Individual Assignment & Presentation

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face to face	
USE of INFORMATION and COMMUNICATIONS TECHNOLOGY	• Use of ICT - e-class platform • Communication with students	
TEACHING METHODS	***Activity***	***Semester Workload***
	Lectures	280

	Practical Courses	50
	Presentations of Case Studies	100
	Seminars	60
	Case Studies' Preparation & non-directed Study	260
	Course Total **(25 hours of work-load per ECTS credit)**	**750**
STUDENT PERFORMANCE EVALUATION	Language of Evaluation: English Written exams • Multiple choice questionnaires, Short answer questions, Open ended questions (60% of final grade) Public Presentation • Presentation of a Case study (English) (25% of final grade) • Presentation of Practicals courses results • (15% of final grade)	

RECOMMENDED BIBLIOGRAPHY

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Related Academic Journals:

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UNIVERSITY OF PATRAS
SCHOOL OF HEALTH SCIENCES
DEPARTMENT OF PHARMACY
POSTGRADUATE PROGRAM: NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE TITLE:6-MONTH DIPLOMA THESIS
CODE:HG4_NM12

NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)

COURSE OUTLINE

GENERAL

SCHOOL	HEALTH SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF PHARMACY		
PARTICIPATING INSTITUTIONS	-		
TITLE of POSTGRADUATE PROGRAM	NANOMEDICINES FOR DRUG DELIVERY- NANOMED (EMJMD)		
LEVEL	POSTGRADUATE		
COURSE CODE	**HG4_NM12**	**SEMESTER**	**D'**
COURSE TITLE	**6-MONTH DIPLOMA THESIS**		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
6 MONTH INTERNSHIP	20	30

COURSE TYPE	Specialized knowledge, Skills Development.
PREREQUISITE COURSES	PREVIOUS COURSES
LANGUAGE of INSTRUCTION and EXAMINATIONS	ENGLISH
COURSE OFFERED to ERASMUS STUDENTS	THIS IS ALREADY AN EMJMD PROGRAM COURSE
COUSRSE (URL)	https://www.pharmacy.upatras.gr/images/DS/Nano-Med/HG4_NM12.pdf

LEARNING OUTCOMES

Learning Outcomes
Upon successful course completion, students will acquire knowledge, skills and abilities related to level 7 of the European Qualifications Framework for Lifelong Learning. In particular, students will: • understand the strategy and logic of literature searching before and during research project execution • have been introduced to the techniques and methodology aaplied in their specific topic • have understood the basic approaches for carrying out a complete research project • have familiarized themselves with the methods followed to adapt specific techniques in order to answer specific questions they have during their lab work

- They will be able to understand the approaches they have to follow in order to conduct a complete study on a specific topic.

General Competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Team Work
- Decision-making
- Working in an international environment
- Working in an interdisciplinary environment
- Production of free, creative and inductive thinking
- Adapting to new situations

SYLLABUS

Literature Search

Setup of Methodologies, Techniques, Procedures, Protocols

Test Methods and Protocols for verification

Carry out Experimental work

Analyze Experimental Results

Write Report

Defend thesis during the yearly Workshop

PUBLIC PRESENTATIONS
Selected case studies in modern drug discovery.
Individual Assignment & Presentation

TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face to face	
USE of INFORMATION and COMMUNICATIONS TECHNOLOGY	• Use of ICT - e-class platform • Communication with students	
TEACHING METHODS	***Activity***	***Semester Workload***
	Self Study –Literature Search	100
	Experiment execution	500
	Analysis of Results	50
	Writing Report	100
	Oral presentation	
	Course Total **(25 hours of work-load per ECTS credit)**	**750**

STUDENT PERFORMANCE EVALUATION	Language of Evaluation: English Supervisor's Mark (50 % of total) Written Report mark from committee (30% of final grade) Public Presentation • Defense of Diploma Thesis to committee (English) (20% of final grade)

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Suggested Bibliography:

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- Liposomes in Drug Delivery: What, Where, How and When to Deliver. (2024). United Kingdom: Elsevier Science.
- Grumezescu, A. M. (2019). Nanomaterials for Drug Delivery and Therapy. Netherlands: Elsevier Science.

And others depending on the topic of the Thesis

Related Academic Journals:

Nature Nanotechnology
J, Controlled Release
ACS Nano
Inter. J. Pharmaceutics
J. Pharm. Sciences
J. Liposome Research
Nanomedicine
Int. J. Nanomedicines
Pharmaceutics
And others depending on the topic of the Thesis