

SYLLABUS

Date/ Revision : 30 January 2017/0
Faculty : Life Sciences
Approval : Dean, The Faculty of Life Sciences

SUBJECT : NANO TECHNOLOGY IN FOOD AND PHARMACEUTICALS

1. Identification of Subject:

Name of Subject : Nano Technology in Food and Pharmaceuticals
Code of Subject : FNAN-3500
SKS : 2
Semester : 5
Study Program : Chemical Engineering
Lecturer : Tutun Nugraha, Ph.D



2. Competency

Nanotechnology is an enabling technology that has revolutionized many related disciplines such as food, pharmaceutical, cosmetics and nutraceuticals. Its increase in popularity was shown by increasing consumer demand for healthy food products and need for better drug delivery systems. This course will give general introduction and some applications of nanotechnology to food, nutraceutical and pharmaceuticals sectors.

3. Description of Subject:

This course provides an introduction to the state of the art in nanotechnology with an emphasis on the diverse applications in food and nutrition sciences, medicine, and related fields. It describes the currently available methods, and contains numerous references to the primary literature, making this the perfect initial field guide for the students who wish to further study or utilize nanotechnology in their research or future career. Safety issues regarding these new technologies are also given.

4. Learning Approach

Approach : Expository, inquiry, collaborative
Method : Lecture presentation, Focus group discussion, team work
Student Task : Appraisal, group presentation about biomaterial innovation
Media : Power Point presentation, print out of journals

5. Evaluation

- a) Absence maximum : 25%
b) Discussion and semester appraisal : 40 points
c) Final Examination (Project + Final test) : 60 points

Total : 100 points

6. Contents/ Topics of Lecturing:

Week	Topics	Content	Remark
1	Nutrient absorption in human	<ul style="list-style-type: none"> • Introduction • Nutrients absorption in gastrointestinal tract • Cellular fate of delivery systems and entrapped bioactives 	Chapter 1, 2, 3 1 x 2 x 50 minutes
2, 3	Interfacial Science and Nanotechnology	<ul style="list-style-type: none"> • Interfacial science and the creation of nanoparticles • Synthesis of nano particles in the lab and industries • Controlling properties of micro] to nanosized dispersions using emulsification devices 	Chapter 4 2 x 2 x 50 minutes
4	Nano Delivery System for food and Pharmaceuticals	<ul style="list-style-type: none"> • Delivery systems for food applications: an overview of preparation methods and encapsulation, release, and dispersion properties • Characterization of nanoscale delivery systems • Impact of delivery systems on the chemical stability of bioactive lipids • Encapsulation strategies to stabilize a natural folate, L-5-methyltetrahydrofolic acid, for food fortification practices • The application of nanoencapsulation to enhance the bioavailability and distribution of polyphenols 	Chapter 6, 7, 8, 9, 10 1 x 2 x 50 minutes
5	Nano emulsion	<ul style="list-style-type: none"> • Review Emulsion properties • Properties and applications of multilayer and nanoscale emulsions 	Chapter 11 1 x 2 x 50 minutes
6	Liposome in nano technology	<ul style="list-style-type: none"> • Liposome as efficient system for intracellular delivery of bioactive molecules 	Chapter 12 1 x 2 x 50 minutes

7	Nano technology for lipid	<ul style="list-style-type: none"> Relevance of nano technology for lipid Solid lipid nanoparticles and applications 	Chapter 13 1 x 2 x 50 minutes
8	Midterm Break		
9	Applications for Protein–polysaccharide	<ul style="list-style-type: none"> Protein–polysaccharide complexes for effective delivery of bioactive functional food ingredients 	Chapter 14 1 x 2 x 50 minutes
10	Nano technology for hydrophobic active compounds	<ul style="list-style-type: none"> Self assembly of amylose, protein, and lipid as a nanoparticle carrier of hydrophobic small molecules 	Chapter 15 1 x 2 x 50 minutes
11	Polymers in nano technology	<ul style="list-style-type: none"> Polymeric nanoparticles for food applications Types and characteristics of polymers used 	Chapter 9 1 x 2 x 50 minutes
12	Safety and consumer perceptions	<ul style="list-style-type: none"> Risks and ethics in the context of food nanotechnology and the delivery of bioactive ingredients Consumer perceptions of nanomaterials in functional foods, and pharmaceuticals Safety assessment of nano] and microscale delivery vehicles for bioactive ingredients 	Chapter 19, 20, 21 1 x 2 x 50 minutes
13	Characterization of nano particles 1	<ul style="list-style-type: none"> SEM (Scanning Electron Microscopy) 	(supplement) Chapter 6 1 x 2 x 50 minutes
14	Characterization of nano particles 2	<ul style="list-style-type: none"> TEM (Transmission Electron Microscopy) 	(supplement) Chapter 7 1 x 2 x 50 minutes
15	Characterization of nano particles 3	<ul style="list-style-type: none"> Dynamic Light Scattering 	(Suplement) Chapter 8 1 x 2 x 50 minutes
16, 17	Final Exam		

7. Book Reference:

1. Cristina Sabliov (Editor), Hongda Chen (Editor), Rickey Yada (Editor), “Nanotechnology and Functional Foods: Effective Delivery of Bioactive Ingredients, WileyBlackwell

Supplemental:

2. Graciela Wild Padua, PhD, Qin Wang, PhD, "Nanotechnology Research Methods for Food and Bioproducts", Wiley-Blackwell