

Request for Graduate Course Addition

1. Prepare one paper copy with all signatures and supporting material and forward to the Graduate Council Chair.
2. E-mail one identical PDF copy to the Graduate Council Chair. If attachments included, please merge into a single file.
3. **The Graduate Council cannot process this application until it has received both the PDF copy and the signed hard copy.**

College: CITE _____

Dept/Division: Engineering _____

Alpha Designator/Number: ME/545 _____

 Graded CR/NC

Contact Person: Dr. Asad A. Salem _____

Phone: 304-696-3207 _____

NEW COURSE DATA:

New Course Title: Nano-Materials _____

Alpha Designator/Number:

M	E	/	5	4	5				
---	---	---	---	---	---	--	--	--	--

Title Abbreviation:

N	A	N	O	-	M	A	T	E	R	I	A	L	S						
---	---	---	---	---	---	---	---	---	---	---	---	---	---	--	--	--	--	--	--

(Limit of 25 characters and spaces)

Course Catalog Description:
(Limit of 30 words)

Covers fundamentals of nanomaterial and nanotechnology. Unique properties of nanomaterials. Synthesis methods of various nanomaterials. Nano and microfabrication techniques. Applications of nanomaterials in various technologies, environmental science, biotechnology and biomedicine.

Co-requisite(s): _____

First Term to be Offered: Spring 2016 _____

Prerequisite(s): Graduate Status _____

Credit Hours: 3 _____

Course(s) being deleted in place of this addition (*must submit course deletion form*): _____

Signatures: if disapproved at any level, do not sign. Return to previous signer with recommendation attached.

Dept. Chair/Division Head _____	Date _____
Registrar _____	Date _____
College Curriculum Chair _____	Date _____
Graduate Council Chair _____	Date _____

Request for Graduate Course Addition - Page 2

College: CITE

Department/Division: Engineering

Alpha Designator/Number: ME/545

Provide complete information regarding the new course addition for each topic listed below. Before routing this form, a complete syllabus also must be attached addressing the items listed on the first page of this form.

1. FACULTY: Identify by name the faculty in your department/division who may teach this course.

Dr. Iyad Hijazi

2. DUPLICATION: If a question of possible duplication occurs, attach a copy of the correspondence sent to the appropriate department(s) describing the proposal. Enter "**Not Applicable**" if not applicable.

Not Applicable

3. REQUIRED COURSE: If this course will be required by another department(s), identify it/them by name. Enter "**Not Applicable**" if not applicable.

Not Applicable

4. AGREEMENTS: If there are any agreements required to provide clinical experiences, attach the details and the signed agreement. Enter "**Not Applicable**" if not applicable.

Not Applicable

5. ADDITIONAL RESOURCE REQUIREMENTS: If your department requires additional faculty, equipment, or specialized materials to teach this course, attach an estimate of the time and money required to secure these items. (Note: Approval of this form does not imply approval for additional resources.) Enter "**Not Applicable**" if not applicable.

Not Applicable

6. COURSE OBJECTIVES: (May be submitted as a separate document)

Please refer to the attached syllabus

7. COURSE OUTLINE (May be submitted as a separate document)

Please refer to the attached syllabus

8. SAMPLE TEXT(S) WITH AUTHOR(S) AND PUBLICATION DATES (May be submitted as a separate document)

Daniel L. Schodek, Paulo Ferreira, Nanomaterials, Nanotechnologies and Design: An Introduction for Engineers and Architects, 2008, ISBN-10 0750681497

9. EXAMPLE OF INSTRUCTIONAL METHODS (Lecture, lab, internship)

Lecture

Request for Graduate Course Addition - Page 4

10. EXAMPLE EVALUATION METHODS (CHAPTER, MIDTERM, FINAL, PROJECTS, ETC.)

Homework, Project, Exams

11. ADDITIONAL GRADUATE REQUIREMENTS IF LISTED AS AN UNDERGRADUATE/GRADUATE COURSE

None

12. PROVIDE COMPLETE BIBLIOGRAPHY (May be submitted as a separate document)

- Daniel L. Schodek, Paulo Ferreira, Nanomaterials, Nanotechnologies and Design: An Introduction for Engineers and Architects, 2008, ISBN-10 0750681497.
- Stuart Lindsay, Introduction to Nanoscience, Oxford University Press, USA; Pap/Cdr edition, 2009. ISBN-10: 0199544212.
- G. Cao, Nanostructures and nanomaterials: Synthesis, Properties and Applications, Imperial College Press, 2004. ISBN-10: 1860944809.

Request for Graduate Course Addition - Page 5

Please insert in the text box below your course summary information for the Graduate Council agenda. Please enter the information exactly in this way (including headings):

Department:

Course Number and Title:

Catalog Description:

Prerequisites:

First Term Offered:

Credit Hours:

Department: Engineering

Course Number and Title: ME 545 Nano-Material

Catalog Description: Covers fundamentals of nanomaterial and nanotechnology. Unique properties of nanomaterials. Synthesis methods of various nanomaterials. Nano and microfabrication techniques. Applications of nanomaterials in various technologies, environmental science, biotechnology and biomedicine

Prerequisites: Graduate status

First Term Offered: Spring 2016

Credit Hours: 3

ME 545 – Nano-Materials

College of Information Technology & Engineering
Weisberg Division of Engineering and Computer Science

Course Title/Number	Nano-Materials -ME 545
Semester/Year	
Days/Time	
Location	
Instructor	
Office	
Phone	
E-Mail	
Office/Hours	
University Policies	By enrolling in this course, you agree to the University Policies listed below. Please read the full text of each policy by going to www.marshall.edu/academic-affairs and clicking on “Marshall University Policies.” Or, you can access the policies directly by going to http://www.marshall.edu/academic-affairs/?page_id=802 Academic Dishonesty/ Excused Absence Policy for Undergraduates/ Computing Services Acceptable Use/ Inclement Weather/ Dead Week/ Students with Disabilities/ Academic Forgiveness/ Academic Probation and Suspension/ Academic Rights and Responsibilities of Students/ Affirmative Action/ Sexual Harassment

Catalog Course Description

Covers fundamentals of nanomaterial and nanotechnology. Unique properties of nanomaterials. Synthesis methods of various nanomaterials. Nano and microfabrication techniques. Applications of nanomaterials in various technologies, environmental science, biotechnology and biomedicine.

Required Text: Additional Reading and Other Materials

Daniel L. Schodek, Paulo Ferreira, Nanomaterials, Nanotechnologies and Design: An Introduction for Engineers and Architects, 2008, ISBN-10 0750681497.

References:

- Stuart Lindsay, Introduction to Nanoscience, Oxford University Press, USA; Pap/Cdr edition, 2009. ISBN-10: 0199544212.
- G. Cao, Nanostructures and nanomaterials: Synthesis, Properties and Applications, Imperial College Press, 2004. ISBN-10: 1860944809.

Course Objectives:

- To discuss unique mechanical, chemical, electrical, optical and magnetic properties of nanomaterials as a result of reduction in dimensionality.
- To highlight the principles of different techniques used for the synthesis of nanomaterials and nanofabrication.
- To give applications of nanomaterials in catalysis, electronics, optoelectronics, composite technology, environmental science, biotechnology and biomedicine.

Grade Policy:

Attendance and Participation	5%
Homework	20%
Quizzes	10%
Project	20%
Exams	45%

Attendance Policy:

Students are expected to attend all class sessions. Attendance will be taken and will influence the overall grade in the course (see below). The MU policy on absences will be followed; students should read and understand this policy.

Learning Outcomes:

Course Student Learning Outcomes	How students will practice each outcome in this Course	How student achievement of each outcome will be assessed in this Course	ABET Outcome (letter) & Level (number)
Describe the basics of simulation techniques in nanoscale systems.	<ul style="list-style-type: none">• Lectures• In-class examples• Homework assignments	<ul style="list-style-type: none">• Homework Assignments• Exam• Quiz• Project	a2,c2,e2
Discuss unique mechanical, chemical, electrical, optical and magnetic properties of nanomaterials as a result of reduction in dimensionality.	<ul style="list-style-type: none">• Lectures• In-class examples• Homework assignments	<ul style="list-style-type: none">• Homework Assignments• Exam• Quiz• Project	a2,c2,e2

Describe applications of nanomaterials in catalysis, electronics, optoelectronics, composite technology, environmental science, biotechnology and biomedicine.	<ul style="list-style-type: none"> • Lectures • In-class examples • Homework assignments 	<ul style="list-style-type: none"> • Homework Assignments • Exam • Quiz • Project 	a2,c2,e2
Describe various methods used in characterization of nanomaterials.	<ul style="list-style-type: none"> • Lectures • In-class examples • Homework assignments 	<ul style="list-style-type: none"> • Homework Assignments • Exam • Quiz • Project 	a2,c2,e2
Explain various methods used in synthesis of nanomaterials.	<ul style="list-style-type: none"> • Lectures • In-class examples • Homework assignments 	<ul style="list-style-type: none"> • Homework Assignments • Exam • Quiz • Project 	a2,c2,e2
Identify nanomaterial Forms and functions.	<ul style="list-style-type: none"> • Lectures • In-class examples • Homework assignments 	<ul style="list-style-type: none"> • Homework Assignments • Exam • Quiz • Project 	a2,c2,e2

Course Schedule:

No of Weeks	Topic	Chapter
1	Introduction to Nanomaterials and Nanotechnologies	1
2	Modelling in Nanotechnology: Basics of simulation techniques in nanoscale systems: molecular dynamics, density functional theory and Monte Carlo methods. Understanding the basics of constructing energy models for nanostructures	=
3	Material classes, structures and properties	4
4-5	Nanomaterial classes and fundamentals	6
6-7	Nanomaterial properties	7
8-9	Nanomaterial syntheses and characterization	8
10-11	Nanomaterial Forms and functions	10
12-13	Nanomaterials and Nanotechnologies	11 and 12

Prepared by Dr. Iyad Hijazi