George Mason University
Graduate Course Approval/Inventory Form

Please complete this form and attach a copy of the syllabus for new courses. Forward it as an email attachment to the Secretary of the Graduate Council. A printed copy of the form with signatures should be brought to the Graduate Council Meeting. Complete the Coordinator Form on page 2, if changes in this course will affect other units.

Please indicate:  

- [X] NEW
- [ ] MODIFY
- [ ] DELETE

Local Unit: SCS  
Graduate Council Approval Date:

Course Designation: NANO  
Course Number: 520

Full Course Title: Survey of Nanostructures

Abbreviated Course Title (24 characters max.): Nanostructures

Credit hours: 3  
Program of Record: Graduate Certificate in Nanotechnology and Nanoscience

Repeatable for Credit?  
- [X] D=Yes, not within same term Up to ___ hours maximum
- [ ] T=Yes, within the same term Up to ___ hours maximum
- [ ] N=Cannot be repeated for credit

Activity Code (please indicate):  
- [X] Lecture (LEC)  
- [ ] Lab (LAB)  
- [ ] Recitation (RCT)  
- [ ] Studio (STU)  
- [ ] Internship (INT)  
- [ ] Independent Study (IND)  
- [ ] Seminar (SEM)

Catalog Credit Format 3: 3: 0  
Course Level: GF(500-600) [X] GA(700+)

Maximum Enrollment: 30  
For NEW courses, first term to be offered: F05

Prerequisites: NANO 500 and 510, and admission into the Graduate Certificate in Nanotechnology and Nanoscience.

Catalog Description (35 words or less): Discusses nanomechanical oscillators and nanoresonators; nanofibers; conducting polymer nanowires. Nanomechanical beams for reacting ion etching. Electron-beam lithography and photolithography.

APPROVAL SIGNATURES:
Submitted by: ________________________________ email: ________________________________

Department/Program: ________________________________ Date: ________________________________

College Committee: ________________________________ Date: ________________________________

Graduate Council Representative: ________________________________ Date: ________________________________
GEORGE MASON UNIVERSITY
Course Coordination Form

**Approval from other units:**

Please list those units outside of your own who may be affected by this new, modified, or deleted course. Each of these units must approve this change prior to its being submitted to the Graduate Council for approval.

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Graduate Council approval: ______________________________ Date: __________
Graduate Council representative: __________________________ Date: __________
Provost Office representative: _____________________________ Date: __________
Course proposal to the Graduate Council
by
The School of Computational Sciences

1. COURSE DESIGNATION:

NANO 520 Survey of Nanostructures (3: 0: 0)

Prerequisites: NANO 500 and 510, and admission into the Graduate Certificate in Nanotechnology and Nanoscience.


Course Grading: Standard grading options for a graduate course.

2. COURSE JUSTIFICATION:

Course objectives: To provide a survey of nanostructures across the different disciplines, as well as the necessary background to understand the functionality of nanostructures and their potential uses and applications.

Course necessity: This course is needed in order to provide an account of the different nanostructures under development across different disciplines, and their use and/or potential applications.

Relationship to existing programs: The proposed course serves as part of the sequence of classes applicable to the Graduate Certificate in Nanotechnology and Nanoscience. It offers an up-to-date account of the different nanostructures in development across different disciplines.

Relationship to existing courses: No other similar course is currently offered at GMU.

3. APPROVAL HISTORY NA

4. SCHEDULING AND PROPOSED INSTRUCTORS

Time of initial offering: Fall 05

Proposed instructors: Dr. Felix Buot or another member of the Nanotechnology faculty.
5. **SAMPLE STUDENT SYLLABUS:**

**NANO 520 Survey of Nanostructures**

**Textbook:**

Rainer Wasel, “Nanoelectronics and IT. Advance Electronic Material and Novel Devices” (Wiley Science)

Hari Singh Najwa “Nanostructure material and nanotechnology” (Academic Press)

References to recent literature in:

BC Candall, J. Lewis, Nanotechnology: Research and perspectives, MIT Press

“Understanding Nanotechnology,” Scientific American

R. Saito “Physical Properties of C. Nanotubes”

N-T Nguijen, S. Werliey “Fundamentals and Applications of Microfluitics”

John A. Pelesko, D.H. Berntlerie “Modeling MEMS and NEMS”

**Tentative Course Content: NANO 520. Survey of Nanostructures**

- Week 1: Introduction to nanostructures
- Week 2: Nanomaterials, nanofibers, nano sized-organic-inorganic and hybrid materials
- Week 3: Nanomechanical oscillators, nanaresonators
- Week 4: Nanocages, nanobelts, nanohelices, nanorings
- Week 5: Nanofibers nanowires
- Week 6: Conducting polymers,
- Week 7: Nanoengineered ceramics
- Week 8: Carbon nanotubes
- Week 9: Microfluitics
- Week 10: Nanoparticles and aerosoles
- Week 11: Nanocomputers, nanosensors
- Week 12: Nanorobots, NEMS
- Week 13: DNA microarrays
- Week 14: Overview of carrier-transport physics in microelectronics

**Grading:** Assignments: 30%; Quizzes 40%; Final: 30%