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: 530

Full Course Title: Nanofabrication

Abbreviated Course Title (24 characters max.): Nanofabrication

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

Repeatable for Credit?  ___ D=Yes, not within same term  Up to ___ hours maximum
___ T=Yes, within the same term  Up to ___ hours maximum
__ X 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: Summer 05

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

Catalog Description (35 words or less): Covers pulsed laser deposition; molecular beam epitaxy; controlled vapor deposition; reactive sputtering; doping and implant isolation.

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 530 Nanofabrication (3: 0: 0)

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

   **Catalog description:** Covers pulsed laser deposition; molecular beam epitaxy; controlled vapor deposition; reactive sputtering; doping and implant isolation. Also includes discussion of plasma etching; ohmic and Schottky electrical contacts. Micro- and nanoelectromechanical systems. Covers motion of a nanofilament in electrical and magnetic fields.

   **Course Grading:** Standard grading options for a graduate course.

2. **COURSE JUSTIFICATION:**

   **Course objectives:** To provide nanofabrication knowledge. Exposes the students to the techniques available for the fabrication of nanostructures and devices. Provides the necessary scientific background to understand the technology behind nanofabrication.

   **Course necessity:** This course is needed in order to provide students with focused material on the science of the techniques available to produce advanced nanostructures.

   **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 specialized knowledge and training in nanofabrication.

   **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:** Summer 05

   **Proposed instructors:** Member of the Nanotechnology faculty.
5. **SAMPLE STUDENT SYLLABUS:**

   **NANO 530 Nanofabrication**

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

   References to:

   **Tentative Course Content:** NANO 530. Nanofabrication

   - Week 1: Introduction from micro to nano fabrication
   - Week 2: Molecular Beam Epitaxy (MBE, ALE)
   - Week 3: Chemical Vapor Deposition techniques (CVD, MOCVD, HCVD)
   - Week 4: Pulsed Laser Deposition
   - Week 5: Sputtering
   - Week 6: Ion Implantation, doping
   - Week 7: Chemical etching
   - Week 8: Plasma etching /lab
   - Week 9: Photolithography and related chemistry/lab
   - Week 10: e-beam lithography, scanning probe lithography
   - Week 11: nano-imprint,
   - Week 12: self assembly
   - Week 13: interfaces/lab
   - Week 14: contacts

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