Nanoscience and Microsystems is an interdisciplinary degree program of students mentored by faculty from the Schools of Engineering, Arts and Sciences, and the Health Sciences Center.
Nanoscience and Microsystems is an interdisciplinary degree program of students mentored by faculty from the Schools of Engineering, Arts and Sciences, and Health Sciences Center.

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1. Introduction
This handbook is to be used as a supplement to the UNM Graduate Catalog and Pathfinder (the UNM Student Handbook), and is intended to provide information specifically relevant to the NSMS department.

Graduate Catalog Link http://www.unm.edu/~grad/catalog/catatoc.html
Pathfinder Link http://pathfinder.unm.edu/

The NSMS Program Specialist, Chair, and Associate Chair are available for discussion and clarification regarding any aspect of the program. Each student should receive and understand this catalog before the start of their first year in the graduate program. They are also expected to attend an advisement session at the start of each new semester.

Nanoscience and Microsystems Contact Information:
• Dr. Abhaya Datye, NSMS Chair: datye@unm.edu, 272-0477
• Dr. Deborah Evans, NSMS Associate Chair: evans@unm.edu, 272-0570
• Heather Armstrong, NSMS Program Specialist: heathera@unm.edu, 272-6824

The Office of Graduate Studies (OGS) web site includes all necessary information pertinent to your graduate education. The OGS home page can be found at http://www.unm.edu/~grad/. Links to guidelines for graduate committee composition, exams and general degree requirements are listed at the OGS home page.

OGS forms may be downloaded from, http://www.unm.edu/~grad/forms/forms.html, or found in the Appendix of this handbook, Pg. 64.

Students are responsible for knowing and following all OGS and NSMS policies and procedures. They are also expected to be aware of their academic standing at all times.

2. Admissions and Enrollment

2.1 Admission to the Graduate Program
Applications for admission to the Graduate Program in Nanoscience and Microsystems are reviewed by a departmental Graduate Student Selection Committee. This Committee evaluates whether or not:
1) The individual meets the admissions standards of the Department
2) A suitable sponsor is available in the applicant’s expressed area of interest
3) The applicant appears to have the potential to satisfactorily complete graduate degree work.
If an application is approved by the Graduate Student Selection Committee and a member of the Nanoscience and Microsystems Graduate Faculty agrees to serve as a sponsor for the student, he or she may be accepted into the Department, contingent upon acceptance into the UNM Graduate School. One must be accepted into both programs to qualify for consideration for financial support from the Nanoscience and Microsystems Department.

Applicants are encouraged to contact prospective faculty sponsors as early as possible to discuss their application. Information regarding faculty and their interests can be obtained from the application packet available from the department’s Graduate Program Specialist (UNM Nanoscience and Microsystems Department, MSC01 1120, 1 University of New Mexico, Albuquerque, NM 87131-0001 USA), by calling the Nanoscience and Microsystems Department (505-277-6824), or from the department’s web site (http://nsms.unm.edu/).

2.2 Application Deadline
Applications are evaluated early in the Spring semester for admission for the following Fall semester. The deadline for all required application materials are based on a rolling application date and can be found at the NSMS website each year http://nsms.unm.edu/. Applications received after this date may not be considered. Early application is encouraged for best consideration.

2.3 Application Materials Checklist
Your application must include the following materials and may be sent to:

Nanoscience and Microsystems
MSC01 1120
1 University of New Mexico
Albuquerque, NM 87131-0001

1. Application/Residency Form
2. Official Transcripts (Two official copies from each college/university attended)
3. A Letter of Intent—a detailed letter stating your specific areas of interest, career goals, reasons for pursuing a graduate degree in Nanoscience and Microsystems, and possible faculty sponsors
4. Three (3) Letters of Recommendation
5. GRE Scores sent directly from the testing agency
6. Departmental (NSMS) Database Form (Pg. 96)
7. Other materials that strengthen your application (publications, current CV, etc.)

In their review of applications, the Graduate Student Selection Committee initially screens materials on the basis of the following minimum criteria:
1) Bachelor’s degree from an accredited college or university. The degree must have been granted prior to the date on which you intend to enter the UNM graduate program.

2) An overall grade point average of 3.0 (on a 4 point scale).

3) A minimum total GRE aptitude score of 1100 (Verbal and Quantitative combined); and

4) Basic courses in physics, math and chemistry are essential.

2.4 Deferred Enrollment

Students admitted for the fall semester can ask permission to defer enrollment if they have a good reason for not beginning their studies immediately. Students wishing to defer enrollment must notify the departmental Graduate Program Specialist in writing. This request must also be approved by the Office of Graduate Studies. A deferral is limited to a period within one calendar year. If that limit is exceeded, the student would have to re-apply for admission into the Nanoscience and Microsystems graduate program.

2.5 Non-Degree Status

Students who may have missed the annual admission’s deadline and who wish to begin their graduate studies as soon as possible may take “non-degree status” credit hours prior to seeking formal admission. Up to six hours of such credit may be applied to the student’s degree requirements, assuming the student is eventually formally accepted into the graduate program.

2.6 International Applicants

An additional packet of information prepared by the Office of International Admissions is available from the Nanoscience and Microsystems Department’s Graduate Program Specialist and should be consulted in its entirety. All the application materials should be sent directly to: The Office of International Admissions, MSC06 3720, 1 University of New Mexico, Albuquerque, NM, 87131-0001, USA. Once processed by the International Admissions Office, the application materials will be sent to the Department of Nanoscience and Microsystems.

3. Degree Programs

Graduate students in the Nanoscience and Microsystems Department may undertake one of three degree programs: MS Plan I, MS Plan II, Professional Science Masters (PSM), PhD, or PhD Minor. While it is possible to transfer from one program to another, a program can be planned more effectively if your decision is made at the outset of your studies.

3.1 MS

Two alternatives exist for obtaining a Master’s degree in Nanoscience and Microsystems. The MS Plan I program provides advanced training in a subdiscipline of Nanoscience and Microsystems that emphasizes research preparation. A combination of course work and active research provides a program that develops an ability to conduct scientific research. This plan often leads to a PhD program, either at the University of New Mexico or another institution. A thesis or its equivalent is required.
The MS Plan II stresses advanced course work in Nanoscience and Microsystems and may involve no active research by the student. No thesis is required and students generally take more course work than in the Plan I program. Plan II is most appropriate for individuals desiring exposure to nanoscience and Microsystems course work beyond that obtained in a typical B.S. program. You should not register for this program if your career goal involves substantial research or technical laboratory work, or if you intend to pursue a PhD degree at UNM.

3.2 Professional Science Master (PSM)
The Professional Science Masters at The University of New Mexico emphasizes innovation and entrepreneurial skills necessary to bring discoveries in nanoscience to the marketplace. The motivation behind PSM arises from the technological opportunities presented by the emergence of nanoscience, the vision for this program and can be described in three steps. First, an efficient way to translate nanoscience knowledge to commercial and societal benefits is through the incorporation of nanoscience into a Microsystems technology. Second, while project management and communication skills are necessary to commercialize Microsystems technology, a real advantage can be gained by focusing on innovation and entrepreneurship. Third, the PSM combines the unique nanotechnology “ecosystem” (the national labs and spin off companies) and well-established management of technology (MOT) program in The Anderson School of Management.

3.3 PhD Minor
The PhD minor allows students from other disciplines to receive a transcripted credit by taking the core requirements for the NSMS program. See Appendix for Transcripted Minor Form Pg. 71.

3.4 PhD
The emphasis of the PhD degree is advanced training in the subject matter of Nanoscience and Microsystems, and demonstration of the ability to design and implement significant independent research at an advanced level. The degree program is designed to develop both scholarship and technical expertise as the foundations for continuing scientific activity and contributions.

While many students enter the PhD program after obtaining a Master's degree, it is often preferable to design a program for the PhD that bypasses the MS degree. You should confer with your prospective Major Advisor or a member of the Nanoscience and Microsystems Graduate Faculty before you begin your graduate studies if you are at all uncertain about which program is most appropriate for your goals.

3.5 Program Changes

3.5.1 Dual Degree Program
Students in dual degree programs must complete both degrees in the same semester. Students must adhere to the general degree requirements. For detailed information, refer to the graduate section of the UNM catalog.
### 3.5.2 Changing Degree Programs

If you were originally admitted into the Master’s program and then decide to pursue a PhD degree, you must notify the Nanoscience and Microsystems program office of your intention. This decision may not be made unilaterally by the student and his/her Committee on Studies. You will be evaluated, along with other applicants, by the departmental Graduate Student Selection Committee during their normal screening period in early spring. Students who wish to make this change must first reapply to the university.

After starting a PhD program, you may decide instead to pursue a MS degree. A change from PhD to an MS degree can be made with the approval of the Committee on Studies. Again, students may need to change their official status with the university.

### 3.6 PhD Elective Courses

Many courses offered at UNM will be accepted for NSMS elective credit with the intent to supplement the nano-based coursework. We have listed numerous elective courses here, some of which were developed as new courses specifically for this degree program, with very specific relevance to the Nanoscience program. This is not an exclusive list. Many other courses will be added as they are developed and identified. Currently, the list of electives includes:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Professor/Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bchm 546L</td>
<td>Intensive Introductory Biochemistry II</td>
<td>Anderson (Existing Course)</td>
</tr>
<tr>
<td>ChNE 499/515</td>
<td>Topics: Nanoscale Quantum Structure Growth</td>
<td>Han (New Topic Course)</td>
</tr>
<tr>
<td>EPS 538</td>
<td>Analytical Electron Microscopy</td>
<td>Brearley (Every year, Fall)</td>
</tr>
<tr>
<td>EPS 558, Biol 558</td>
<td>Geomicrobiology</td>
<td>Crossey, Dahm (Existing Course)</td>
</tr>
<tr>
<td>MGT 594</td>
<td>Innovation in Technology</td>
<td>Salazar (Existing Course)</td>
</tr>
<tr>
<td>Math 466</td>
<td>Mathematical Methods in Science and Engineering</td>
<td>(Existing Course, Fall)</td>
</tr>
<tr>
<td>Math 579</td>
<td>Mathematical Methods for Science &amp; Technology</td>
<td>(Existing Course)</td>
</tr>
<tr>
<td>Math 471</td>
<td>Introduction to Scientific Computing</td>
<td>(Existing Course, Fall)</td>
</tr>
<tr>
<td>Math 504</td>
<td>Introductory Numerical Analysis: Numerical Linear Algebra</td>
<td>(Existing Course, Spring)</td>
</tr>
<tr>
<td>Math 505</td>
<td>Intro. Numerical Analysis: Approximation &amp; Differential Equations</td>
<td>(Existing Course, Fall)</td>
</tr>
<tr>
<td>Math 512</td>
<td>Introduction to Ordinary Differential Equations</td>
<td>(Existing Course, Fall)</td>
</tr>
<tr>
<td>Math 513</td>
<td>Introduction to Partial Differential Equations</td>
<td>(Existing Course, Spring)</td>
</tr>
<tr>
<td>Math 514</td>
<td>Applied Matrix Theory</td>
<td>(Existing Course, Fall)</td>
</tr>
<tr>
<td>Math 557</td>
<td>Selected Topics in Numerical Analysis</td>
<td>(Existing Course)</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
<td>Notes</td>
</tr>
<tr>
<td>-------------</td>
<td>--------------------------------------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>Math 576</td>
<td>Numerical Linear Algebra</td>
<td>(Existing Course)</td>
</tr>
<tr>
<td>Math 577</td>
<td>Numerical Ordinary Differential Equations</td>
<td>(Existing Course)</td>
</tr>
<tr>
<td>Math 578</td>
<td>Selected Topics in Applied Mathematics</td>
<td>(On Demand)</td>
</tr>
<tr>
<td>ME 561</td>
<td>Nanomechanics of Materials</td>
<td>Al-Haik, Shen (Existing Course)</td>
</tr>
<tr>
<td>Phys 430</td>
<td>Introduction to Solid State Physics</td>
<td>(Existing Course)</td>
</tr>
<tr>
<td>Phys 529</td>
<td>Condensed Matter I</td>
<td>(Existing Course)</td>
</tr>
<tr>
<td>Phys 531</td>
<td>Atomic and Molecular Structure</td>
<td>(Existing Course)</td>
</tr>
<tr>
<td>Phys 552</td>
<td>Problems: A Quantum Information Theory</td>
<td>Caves, Deutsch, Geremia, Landahl, Moore (Existing Course)</td>
</tr>
<tr>
<td>Phys 566</td>
<td>Quantum Optics</td>
<td>Caves, Deutsch, Geremia, Landahl, Moore (Existing Course)</td>
</tr>
<tr>
<td>Phys 581</td>
<td>Advanced Topics: Density Functional Theory</td>
<td>Atlas - (Existing Course)</td>
</tr>
<tr>
<td>Stat 527</td>
<td>Advanced Data Analysis I</td>
<td>(Existing Course, Fall)</td>
</tr>
<tr>
<td>Stat 528</td>
<td>Advanced Data Analysis II</td>
<td>(Existing Course, Spring)</td>
</tr>
<tr>
<td>Stat 540</td>
<td>Regression Analysis</td>
<td>(Existing Course, every Fall)</td>
</tr>
<tr>
<td>Stat 545</td>
<td>Analysis of Variance and Experimental Design</td>
<td>(Existing Course, Spring)</td>
</tr>
<tr>
<td>Stat 553</td>
<td>Statistical Interference with Applications</td>
<td>(Existing Course, Spring)</td>
</tr>
<tr>
<td>Stat 561</td>
<td>Probability</td>
<td>(Existing Course, every Fall)</td>
</tr>
<tr>
<td>Stat 565</td>
<td>Stochastic Processes with Applications</td>
<td>(Existing Course, Fall every 2 years)</td>
</tr>
<tr>
<td>Stat 570</td>
<td>Industrial Statistics</td>
<td>(Existing Course, Fall)</td>
</tr>
<tr>
<td>Stat 576</td>
<td>Multivariate Analysis</td>
<td>(Existing Course, Spring every 2 years)</td>
</tr>
<tr>
<td>Stat 581</td>
<td>Introduction to Time Series Analysis</td>
<td>(New Course, Offered first Spring 2007)</td>
</tr>
<tr>
<td>Stat 586</td>
<td>Nonparametric Curve Estimation &amp; Image Reconstruction</td>
<td>(Existing Course, Fall every 2 years)</td>
</tr>
<tr>
<td>EPS 400</td>
<td>Introduction to XDR</td>
<td></td>
</tr>
</tbody>
</table>

*If you are a prospective NSMS student, please be advised we suggest you successfully complete Math 316, Differential Equations, with a B or better. We also strongly suggest students successfully complete Chem 312, Physical Chemistry, with a B or better.*
4. Program Milestones

It is the responsibility of the student to ensure that all forms are completed and submitted on time, with the appropriate signatures. All the forms mentioned in the following schedule are available from the Department’s Graduate Program Specialist, from the Office of Graduate Studies, or at they may be found in the Appendix of this document.

YEAR 1 MILESTONES

PhD Program

Degree Requirements

<table>
<thead>
<tr>
<th>NSMS PhD requirements: 48 Course Credits – 66 Credits Total (Without MS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSMS 510 - Chemistry &amp; Physics at the Nanoscale</td>
</tr>
<tr>
<td>NSMS 512 - Characterization Methods for Nanostructures</td>
</tr>
<tr>
<td>NSMS 518 - Synthesis of Nanostructures</td>
</tr>
<tr>
<td>NSMS 519 - MEMS Transducer Devices and Technology</td>
</tr>
<tr>
<td>NSMS 550 - Social and Ethical Implications of Nanotechnology</td>
</tr>
<tr>
<td>STEM Electives</td>
</tr>
<tr>
<td>Seminar</td>
</tr>
<tr>
<td>Problems</td>
</tr>
<tr>
<td>Dissertation Hours</td>
</tr>
<tr>
<td>TOTAL</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NSMS PhD requirements: 24 Course Credits – 42 Credits Total (With MS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSMS 510 - Chemistry &amp; Physics at the Nanoscale</td>
</tr>
<tr>
<td>NSMS 512 - Characterization Methods for Nanostructures</td>
</tr>
<tr>
<td>NSMS 518 - Synthesis of Nanostructures</td>
</tr>
<tr>
<td>NSMS 519 - MEMS Transducer Devices and Technology</td>
</tr>
<tr>
<td>NSMS 550 - Social and Ethical Implications of Nanotechnology</td>
</tr>
<tr>
<td>STEM Electives</td>
</tr>
<tr>
<td>Seminar</td>
</tr>
<tr>
<td>Problems</td>
</tr>
<tr>
<td>Dissertation Hours</td>
</tr>
<tr>
<td>TOTAL</td>
</tr>
</tbody>
</table>

*MEMS will be worth 4 credits by Spring 2011. Ethics will be worth 1 credit after fall 2011.

Year 1 Milestones
• Complete 3 of 4 core courses as well as an ethics course as defined by the curriculum at time of entry into the program.

• NSMS 510 Chemistry and Physics at the Nanoscale (3) Fall  
  (Also offered as PHYC 410*) Students will study chemical and physical concepts necessary to understand nanoscale materials: Quantum properties, charge confinement, and nanoscale thermodynamics, surface and interfacial forces, nanomachines and nanostructures, self-organization, and scaling. Emphasis on problem-solving skills development.

• NSMS 519 MEMS Transducer Devices and Technology (4) Fall  
  (Also offered as CHNE 512) Nanostructure characterization methods. Examine principles underlying techniques and limitations, and how to interpret data from each method: electron beam, scanning probe, x-ray, neutron scattering, optical and near field optical. Lab demonstrations and projects provide experience.

• NSMS 512 Characterization Methods for Nanostructures (3) Spring  
  (Also offered as CHNE 512) Nanostructure characterization methods. Examine principles underlying techniques and limitations, and how to interpret data from each method: electron beam, scanning probe, x-ray, neutron scattering, optical and near field optical. Lab demonstrations and projects provide experience.

• NSMS 518 Synthesis of Nanostructures (3) Spring  
  (Also offered as CHNE, ECE 518) Underlying physical and chemical principles (optics, organic and inorganic chemistry, colloid chemistry, surface and materials science) for nano-structure formation using ‘top-down’ lithography (patterned optical exposure of photosensitive materials) and ‘bottom-up’ self-assembly. Labs will synthesize samples.

• NSMS 550 Social & Ethical Implications of Nanotechnology (1) Fall  
  (Also offered as CHNE, ECE 550) In this course, students will examine issues arising from this emerging technology, including those of privacy, health and safety, the environment, public perception and human enhancement.

• Be in good academic standing with a cumulative GPA of greater than or equal to 3.0 and no grade less than B- (core curriculum and electives)
  • Note: A 3.7 average (A-) GPA in core courses is required to avoid a written qualifying exam.

• Arrange for Major Advisor and set up Committee on Studies. This Committee MUST meet with the student AT LEAST ONCE A YEAR. (approved by the graduate unit chairperson or graduate unit advisor, as evidenced by his/her signature on the student’s Application for Doctoral Candidacy Pg. 84)

• Choose dissertation project/gather preliminary data.

• Pass the qualifying examination by date set by the Qualifying Exam Committee (See “Qualifying Examination” below in Section 0, Pg. 41)

• Select a Committee on Studies (COS) following completion of Qualifying Exam
## Master's Program

### Degree Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSMS 510</td>
<td>Chemistry &amp; Physics at the Nanoscale</td>
<td>3</td>
</tr>
<tr>
<td>NSMS 512</td>
<td>Characterization Methods for Nanostructures</td>
<td>3</td>
</tr>
<tr>
<td>NSMS 518</td>
<td>Synthesis of Nanostructures</td>
<td>3</td>
</tr>
<tr>
<td>NSMS 519</td>
<td>MEMS Transducer Devices and Technology</td>
<td>4</td>
</tr>
<tr>
<td>NSMS 550</td>
<td>Social and Ethical Implications of Nanotechnology</td>
<td>1</td>
</tr>
<tr>
<td>STEM Elective</td>
<td>Social and Ethical Implications of Nanotechnology</td>
<td>3</td>
</tr>
<tr>
<td>Seminar</td>
<td>Social and Ethical Implications of Nanotechnology</td>
<td>4</td>
</tr>
<tr>
<td>Problems</td>
<td>Social and Ethical Implications of Nanotechnology</td>
<td>6</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>30</td>
</tr>
</tbody>
</table>

*MEMS will be worth 4 credits by Spring 2011. Ethics will be worth 1 credit after fall 2011. No more than 6 credits of problems credits will be accepted toward an MS.

### Year 1 Milestones

- Complete all required core courses as defined by the curriculum at time of entry into the program.
- Be in good academic standing with a cumulative GPA of greater than or equal to 3.0 and no grade less than B- (core curriculum and electives).
- Arrange for Major Advisor; set up Committee on Studies (COS). This Committee MUST meet with the student AT LEAST ONCE A YEAR. (approved by the graduate unit chairperson or graduate unit advisor, as evidenced by his/her signature on the student’s Program of Studies Pg. 67)
• For Plan I students only: Submit Research Proposal; start research
• Make formal Program of Studies with the Nanoscience and Microsystems Department and the Office of Graduate Studies, after completing 12 hours of graduate course work (The Program of Studies Form, Pg. 67, should list all course work to be counted toward the degree)

Professional Science Master’s Program

Degree Requirements

**NSMS PSM requirements: 33 Course Credits Total**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>NSMS 510</td>
<td>Chemistry &amp; Physics at the Nanoscale</td>
<td>3</td>
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<tr>
<td>NSMS 512</td>
<td>Characterization Methods for Nanostructures</td>
<td>3</td>
</tr>
<tr>
<td>NSMS 519</td>
<td>MEMS Transducer Devices and Technology</td>
<td>4</td>
</tr>
<tr>
<td>NSMS 550</td>
<td>Social and Ethical Implications of Nanotechnology</td>
<td>1</td>
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<tr>
<td>ME 556</td>
<td>Entrepreneurial Engineering</td>
<td>3</td>
</tr>
<tr>
<td>MGMT 513</td>
<td>Assessment &amp; Forecasting</td>
<td>3</td>
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<tr>
<td>MGMT 514</td>
<td>Technology Entrepreneurship</td>
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<td>MGMT 516</td>
<td>Entrepreneurial Finance</td>
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<tr>
<td>STEM Elective</td>
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<td>NSMS 600</td>
<td>Research Experience</td>
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<td>NSMS 602</td>
<td>SMP MI &amp; T Workshop/Seminar</td>
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<tr>
<td>NSMS 601/MGMT 519</td>
<td>Independent Project (Internship)</td>
<td>3</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>33</td>
</tr>
</tbody>
</table>

*MEMS will be worth 4 credits by Spring 2011. Ethics will be worth 1 credit after fall 2011. MGMT require a special approval to enroll.

**Year 1 Milestones**

• Complete 3 of 4 core courses as well as an ethics course as defined by the curriculum at time of entry into the program.

Core Courses and Ethics Course (15 credit hours)

• **NSMS 510 Chemistry and Physics at the Nanoscale (3) Fall (Also offered as PHYC 410*)** Students will study chemical and physical concepts necessary to understand nanoscale materials: Quantum properties, charge confinement, and nanoscale thermodynamics, surface and interfacial forces, nanomachines and nanostructures, self-organization, and scaling. Emphasis on problem-solving skills development.

• **NSMS 519 MEMS Transducer Devices and Technology (3) Fall (Also offered as CHNE 512)** Nanostructure characterization methods. Examine principles underlying techniques and limitations, and how to interpret data from each method: electron beam, scanning probe, x-ray, neutron scattering, optical and near field optical. Lab demonstrations and projects provide experience.

• **NSMS 512 Characterization Methods for Nanostructures (3) Spring**
(Also offered as CHNE 512) Nanostructure characterization methods. Examine principles underlying techniques and limitations, and how to interpret data from each method: electron beam, scanning probe, x-ray, neutron scattering, optical and near field optical. Lab demonstrations and projects provide experience.

- **NSMS 518 Synthesis of Nanostructures (3) Spring**
  (Also offered as CHNE, ECE 518) Underlying physical and chemical principles (optics, organic and inorganic chemistry, colloid chemistry, surface and materials science) for nano-structure formation using ‘top-down’ lithography (patterned optical exposure of photosensitive materials) and ‘bottom-up’ self-assembly. Labs will synthesize samples.

- **NSMS 550 Social & Ethical Implications of Nanotechnology (3) Fall**
  (Also offered as CHNE, ECE 550) In this course, students will examine issues arising from this emerging technology, including those of privacy, health and safety, the environment, public perception and human enhancement.

- Be in good academic standing with a cumulative GPA of greater than or equal to 3.0 and no grade less than B- (core curriculum and electives)

- Arrange for Major Advisor; set up Committee on Studies (COS). This Committee MUST meet with the student AT LEAST ONCE A YEAR. (approved by the graduate unit chairperson or graduate unit advisor, as evidenced by his/her signature on the student’s Program of Studies Pg. 67)

- Make formal Program of Studies with the Nanoscience and Microsystems Department and the Office of Graduate Studies, after completing 12 hours of graduate course work (The Program of Studies Form, Pg. 67, should list all course work to be counted toward the degree).

**YEAR 2 MILESTONES**

**PhD Program**

- Hold first COS meeting no later than the end of Spring semester to review student’s academic progress, discuss Application for Candidacy (Pg. 84) (plans for coursework and research hours to meet student’s educational and research goals), and review outline/plan for student’s dissertation project.

- Note that the first COS meeting need not involve a formal review of a dissertation proposal.

- Hold second meeting of COS no later than 6 months after the first COS meeting. Student progress, Program of Studies and plan for student’s dissertation proposal will be reviewed.
  - At this meeting the student should present a draft of proposed specific aims and initial feasibility data.

- Complete four required elective courses for major concentration.

- Notify the Office of Graduate Studies of date, time and place of Doctoral Comprehensive Exam (using Announcement of Examination Form Pg. 76).

- Take Doctoral Comprehensive exam.
• Make formal Application for Candidacy (Pg. 84) with the Department and the Office of Graduate Studies. The Application for Candidacy Form should list all course work to be counted toward the degree. The form must be filled out in duplicate: one for the Nanoscience and Microsystems Department and one for the Office of Graduate Studies.

Masters Program
• Fulfill remaining course requirements.
• Plan I students: Write thesis.
  • The Certification of Final Form, Report on Thesis (“gray sheets”—one to be filled out by each reader of your thesis) and Title Pages (these are on bond paper and have red-line borders that can be purchased at the bookstore or downloaded from the OGS web site http://www.unm.edu/~ogshmpg/eforms/index.html and printed in color).
  • Take Master’s Exam for Thesis (Announcement of Examination Form Pg. 76).
• Plan II Students: Take Master’s Examination (Announcement of Examination Form Pg. 76).
• Both: Notify the Department and the Office of Graduate Studies of your intent to graduate. Complete the Intent to Graduate Form (Pg. 93), obtained from and returned to the Nanoscience and Microsystems Department’s Graduate Program Specialist’s office.

If you decide, with the approval of your Committee of Studies, to change from Plan I to Plan II, or vice versa, and you have already had your Program of Studies approved by the Dean of Graduate Studies, you need to submit an entire new Program of Studies to your Major Advisor, the Department Chair, the department’s Graduate Program Specialist, and the Dean of the Graduate School for approval.

IMPORTANT DATES
• Notify the Office of Graduate Studies of date, time and place of Master’s Exam (using the Announcement of Examination Form Pg. 76) at least 2 weeks prior to exam.
• Master’s Exam results should be submitted to the Office of Graduate Studies no later than November 15 (Fall), April 15 (Spring), or July 15 (Summer).
• Submit two perfect copies of the approved thesis (Plan I students) to the Office of Graduate Studies no later than November 15 (Fall), April 15 (Spring), or July 15 (Summer). Submit one copy of the thesis to the Nanoscience and Microsystems Department for its collection.

Professional Science Master’s Program
• Fulfill remaining course requirements.

PSM Requirements (15 credit hours)
MGT 514 Technology Entrepreneurship (3) Fall
MGT 556 Entrepreneurial Engineering (3) Fall
NSMS 601/MGT 519 Independent Research internship (3) Fall

[16] 2010-2011
NSMS STEM Elective (3) Spring
MGT 513 Assessment and Forecasting (3) Spring
MGT 516 Entrepreneurial Finance (3) Spring
MGT 602 SPM MI&NT Workshop/Cohort Seminar (1) Spring
MGT 600 Research Experience (3) Summer

• Conduct an industry based Internship.
• Compete in Anderson School of Management Business competition, or conduct a master’s presentation.
• See Masters Year 2.

YEAR 3 MILESTONES

PhD Program
• Schedule Comprehensive Examination (Doctoral Dissertation Proposal) no later than the Spring semester of the Third year.
• Form Dissertation Committee (may include COS members)
  (See UNM Graduate Catalog for requirements on Dissertation Committees) (Appointment of Dissertation Committee Form Pg. 89)
• Complete the Comprehensive Examination no later than the end of Spring semester. The Comprehensive Examination will count as a COS meeting.
  Comprehensive examination will consist of a proposal outlining the research plans and an oral examination of the candidate. Although data supporting the feasibility of the project is recommended, extensive preliminary data should not be required.
  (See Doctoral Comprehensive Exam below, Section 9.5, Pg. 36)
  (See OGS web site for UNM regulations regarding the Comprehensive Examination)
• Complete Application for Candidacy form, (Pg. 84)
• Students may sign up for Dissertation credit hours (699) in the semester they take the Comprehensive Examination
• Meet with Dissertation Committee no later than 6 months after the Comprehensive Examination. Student progress will be reviewed.

Master’s Program
• No modification for continuing students. Students must fulfill requirements pertaining to Year 1 & 2.
Professional Science Master’s Program

- No modification for continuing students. Students must fulfill requirements pertaining to Year 1 & 2.

**YEARS 4 & 5 MILESTONES**

**PhD Program**

- Continue to enroll in dissertation credit (699). A minimum of 18 hours of 699 credit is required for the PhD.
- Meet with Dissertation Committee twice each year or more often if recommended by the Dissertation Committee. Student progress will be reviewed. If adequate progress in dissertation research has been attained, student will receive committee approval to begin writing the dissertation.

**FINAL YEAR MILESTONES**

**PhD Program**

- Meet with Dissertation Committee to obtain approval to write and defend the dissertation.
- Write dissertation.
- Complete Intent to Graduate form, Pg. 93, and submit to the NSMS office for the required signatures.
  - The deadlines for OGS to receive this notification are: October 1 for Fall graduation, March 1 for Spring, and July 1 for Summer.
- Complete “Announcement of Final Examination for Doctorate” form, Pg. 76, and submit to the NSMS office for the required signatures at least three weeks prior to the dissertation defense.
- Public presentation of dissertation research and closed defense of dissertation session.
- Submit Report of Final Examination form, Pg. 76, to the NSMS office for the required signatures.
- Following approval of the oral defense and dissertation document, submit dissertation according to the rules and policies of OGS.
- For approved dissertation formats, see NSMS Handbook and the UNM Graduate Catalog.
- Submit one bound copy of the dissertation to the NSMS office.
- Graduation is dependent upon the completion of all degree requirements for graduation by:
  - November 15 for Fall semester
  - April 15 for Spring semester
  - July 15 for Summer semester
- Notify the department’s Graduate Program Specialist and the Office of Graduate Studies of Intent to Graduate. Complete the Intent to Graduate Form, Pg. 93, obtained from and
returned to the Nanoscience and Microsystems Department’s Graduate Program Specialist’s office.

- Defense of Dissertation. The Announcement/Report of Final Examination Form (Pg. 76), Certification of Final Form for Manuscript (Pg. 90), Report on Dissertation form (Pg. 90) (one to be filled out by each reader of your dissertation) and Title Pages (these are on bond paper and have red-line borders. They can be purchased at the bookstore or downloaded from the OGS web site http://www.unm.edu/~grad/forms/forms.html and printed in red).
- Results of the Dissertation Defense should be submitted no later than November 15 (Fall), April 15 (Spring), or July 15 (Summer).
- Submit two final copies of the approved Dissertation, each with an abstract, to the Office of Graduate Studies no later than November 15 (Fall), April 15 (Spring), or July 15 (Summer). Submit one copy of the dissertation to the Nanoscience and Microsystems Department for its collection.
- In addition to the above mentioned forms that must accompany the dissertation manuscript, A Survey of Earned Doctorate Form must be submitted online @ https://websurvey.norc.org/sed2011/, http://survey.norc.uchicago.edu/doctorate/index.jsp.

All of the forms mentioned above require a variety of departmental and non-departmental signatures. Please complete all the forms required, obtain all the necessary signatures, except for the Department Chair’s signature, and submit the forms to the Graduate Program Specialist for further processing.

5. Advisors and Graduate Committees

5.1 Major Advisor

The Major Advisor plays a key role in fostering your progress as a developing scientist; he or she is responsible for establishing your plan of study and course work, for seeing that you progress toward degree requirements in a timely fashion, for helping to assemble your Committee on Studies, and, most importantly, for working closely with you in your graduate research. The bonds you form with your major professor during your graduate studies are often firm and lasting, and are founded upon a close, professional working relationship. Accordingly, you should select a Major Advisor with care. Major Advisors must be members of the Nanoscience and Microsystems Graduate Faculty.

Professors differ in their philosophies of graduate training: some spend considerable time with their students, closely directing their studies, often training students who continue his or her own lines of research. Other professors allow their students to explore widely and view their role as a sounding board on which students may try out new research ideas; at the extreme, this can produce a situation in which the student receives little direction and may flounder unless he or she is highly motivated and independent. Most professors, of course, fall somewhere between these extremes. You should consider
such aspects of style and personality along with the idea of expertise or research activity of a faculty member in your selection of a sponsor.

A graduate student in Nanoscience and Microsystems must have a Major Advisor at all times throughout his/her graduate program. Students are also encouraged to have a research advisor in an effort to support and foster their interdisciplinary education. While acceptance by a sponsor is a prerequisite for admission into the Graduate Program of this department, this does not mean that this relationship must be fixed for the duration of your graduate studies. Often students establish contact with a professor prior to completing their application for admission to the Department, but later elect to choose another faculty member to serve as their Major Advisor. You should not hesitate to consider changing your Major Advisor if your scientific interests diverge or your personalities are incompatible. The Major Advisor also has the right to terminate his/her relationship with a student if the relationship becomes strained, if the student’s progress is unsatisfactory, or if the student exhibits inappropriate behavior. If your current arrangement does not seem to be working, you should discuss this change with your Major Advisor before making a decision to change professors. Either or both of you may then wish to involve the prospective new advisor and the Chairperson of the Department in these discussions. Please note, changing your major advisor may impact your funding. Please, consider this when planning any changes.

5.2 Committee on Studies
The Committee on Studies helps the student to plan an integrated program of study that will satisfy the goals of the student and the degree requirements of the Department and UNM. The Committee determines the course work necessary for satisfaction of degree requirements, recommends transfer of credits from other institutions, certifies that the residency requirement has been met, and interacts with the student in the formulation and implementation of the research program. Normally, for PhD students, the Committee on Studies serves as the core of the Dissertation Committee.

You must confer with your Major Advisor within the first semester of your graduate studies about the establishment of your Committee on Studies. For PhD candidates, the Committee must be appointed before 24 graduate credit hours are completed. In addition to the Major Advisor, the Committee on Studies for both MS and PhD degrees must contain at least two additional UNM faculty members, at least one of whom must be a member of the Nanoscience and Microsystems Graduate Faculty. The members of the Committee must be approved by the Major Advisor. The membership of the Dissertation Committee of PhD candidates is larger than that of the Committee on Studies (Section 5.3); it is a good idea to form the larger committee at the outset of your program.

The Committee on Studies of each graduate student who is in residence in the Nanoscience and Microsystems Department must meet with the student at least once during each academic year. The format of this meeting is open, but it should provide an opportunity for the Committee to monitor the student’s progress, discuss course work, review recent research efforts, plan future research, etc. A brief (one paragraph) report of this meeting must be placed in the student’s file in the Department Office by the
student’s Major Advisor within one week of the meeting. This form, and others needed to document the fulfillment of departmental degree requirements, may be obtained from the Graduate Program Specialist.

You should take the initiative in prompting your Major Advisor to call this meeting when it is most appropriate for you, and use it to present your most recent ideas to your Committee or to obtain their guidance on the problems that seem most pressing to you.

You have the right to call for a review of the membership of your Committee at any time. You may call for such a review, or address any other grievance, to your Committee Chairperson (Major Advisor), the Department Chairperson, the Dean of Graduate Studies, or the Faculty Senate Committee on Graduate Programs and Standards.

5.3 PhD Dissertation Committee
The PhD comprehensive examination is administered by the Committee on Studies. The PhD dissertation is reviewed by a Dissertation Committee, which must include at least four members. Three members must hold tenure track positions. Of these three, two must hold tenure track positions at The University of New Mexico. One of these must be from the Nanoscience and Microsystems Department. The fourth individual must be a tenure track member of the UNM Graduate Faculty outside the Nanoscience and Microsystems Department or from another institution other than UNM, and must be qualified to review the dissertation; the remaining members normally are those who composed the Committee on Studies. In addition, the Nanoscience and Microsystems Department suggests that an individual at another college or university should be asked to serve as an outside reader of the dissertation. This individual should be chosen on the basis of his or her competence in the research area of the dissertation, and should be invited to serve in this capacity at least six months prior to the completion of the dissertation. Funds may be available to bring outside readers to the campus at the time of the final exam, if you and your Major Advisor consider it worthwhile. All committee members must be present at dissertation defense or by teleconference if needed. A complete copy of the dissertation must be submitted to each member of your Dissertation Committee at least two weeks before the final examination.

6. General Academic Regulations
You should confer with your Major Advisor or one of the department’s Graduate Advisors before registering for each semester. This provides an opportunity to assess your academic progress, to change courses required on your degree program, if needed, and to maintain contact with your Advisor. UNM follows a pre-registration procedure in which students who are currently enrolled receive registration materials for the next semester from the Office of Admissions and Records prior to the last month of the current semester. If you do not receive these materials, you should contact that office. Returning students who have not pre-registered may register using the UNM I-TEL system. You should make every effort to pre-register or register on time. A late-registration fee is assessed if you fail to register at the scheduled time. You may not register in graduate courses later than the end of the second week of a regular
semester, or the end of the first week of a summer session, without the approval of the instructor(s) and the Dean of Arts & Sciences. If you hold an appointment that grants a tuition waiver, you must register for a full load (12 credit hours) each semester. This may be done by adding hours of Nanoscience and Microsystems 551 (Problems), 599 (Master's Thesis), 651 (Research), or 699 (Dissertation), as appropriate.

6.1 Semester Course Loads
In general, a graduate student enrolling for and completing a minimum of 9 graduate credit hours per semester is considered to be a full-time student at UNM. However, if you are holding a teaching assistantship, the minimum course load is 6 graduate credit hours per semester. Many students holding teaching assistantships complete 12 credit hours or more per semester.

6.2 Registering for Classes
All students register for classes via the Internet or the telephone (246-2020). To use the internet registration system you must access LoboWeb. For more instructions and help using LoboWeb visit the Registrar’s website at registrar.unm.edu. Registration can be completed through MyUNM at my.unm.edu. Prior to registering for classes you will need to obtain your UNM NetID and password.

6.3 Grades
To earn a graduate degree at the University of New Mexico, students must have a minimum cumulative grade point average of 3.0 in graduate-level courses taken in graduate status at the time of degree completion, as well as a grade point average of at least 3.0 for courses listed in their Program of Studies or Application for Candidacy.

Students may not graduate with “I” or Incompletes pending in any graduate course, nor may they graduate while on probation.

Courses taken to meet undergraduate deficiencies/prerequisites cannot be used to meet graduate degree requirements nor are they calculated into the graduate grade point average. It is expected that the student earn at least a B (3.0) in each of these courses. If a grade of less than B (3.0) is earned in any of these, the major department may deem that the prerequisite has not been satisfied.

No more than 6 credit hours of course work in which a C (2.0), C+ (2.33), or CR was earned may be credited toward a graduate degree.

6.4 Grade Point Average
The Office of Graduate Studies checks the student’s grade point average at the end of every semester and summer session for as long as the student is in graduate status. All students whose academic standing is deficient after receiving grades for 12 attempted semester hours or two semesters, whichever comes first, are placed on probation or suspended, according to the university regulations and those of their graduate unit (see Catalog section on Probation).
The grade point average is calculated using all grades earned in graduate course work while a student is in graduate status. Grades earned at other institutions or in non-degree status are not calculated in a graduate student’s grade point average. The University of New Mexico extension courses (those offered by the Extended University) taken prior to admission to a graduate program are not included in the graduate cumulative grade point average; however, The University of New Mexico graduate extension courses taken while a student is in graduate status are included.

The grade point average is calculated by dividing the total number of grade points earned (see Catalog section on Grades) by the total number of course work hours taken. Grades of CR, WP, NC and PR are excluded from the cumulative grade point average calculation. Grades of WNC, NC, WF and IF may have an adverse impact on a student’s academic standing, financial aid, and assistantship eligibility.

In computing the cumulative grade point average, the OGS will internally calculate a grade of Incomplete as earning two grade points per credit hour the subsequent semester in which the “I” is assigned. No action will be taken unless the student’s grade point average falls below 3.0 as a result of this internal calculation. In such instances, the student will be placed on Type 3 probation (see Catalog section on Probation) until the Incomplete is resolved or other grades are earned which raise the cumulative grade point average. In the event that the student does not resolve the Incomplete or does not follow established procedures to extend the time for completion, the final grade in the course will be recorded as an IF and calculated as an F.

6.5 Change of Grade/Academic Record
The instructor of a course has the responsibility for any grade reported. Once a grade has been reported to the Office of the Registrar, only the instructor who issued the original grade (Instructor of Record) may submit a change by submitting a grade change form to Records and Registration in the Office of the Registrar. The student’s department chairperson and/or college dean and the Dean of Graduate Studies must approve any change of grade submitted more than 30 days after the end of a semester. Any change in grade must be reported within 12 months after the original grade was issued.

6.6 Academic Probation and Consequences
Students who do not maintain good academic standing will be placed on academic probation by the Office of Graduate Studies. There are three types of probation.

6.6.1 Type 1: Grade Point Average
A student whose cumulative grade point average falls below 3.0 for grades earned in graduate-level courses taken while in graduate status will be placed on Type 1 academic probation. The student will be suspended from graduate status if the cumulative grade point average does not reach 3.0 after completion of an additional 12 semester hours of graduate course work or four regular semesters in probationary status, whichever comes first. Students on Type 1 probation are not eligible to hold assistantships, nor are
they allowed to take master's examinations, doctoral comprehensive examinations, defend theses or dissertations, or graduate.

6.6.2 **Type 2: NC/F/WF/IF Grades**
Students who earn any combination of two grades of NC, F, WF, and/or IF in graduate courses taken in graduate status, even if their cumulative grade point average remains above 3.0, are placed on Type 2 academic probation. The student will be suspended from graduate status if a third NC, F, WF or IF grade is earned. Students on Type 2 probation are not eligible to hold assistantships, nor are they allowed to take master's examinations, doctoral comprehensive examinations, defend theses, dissertations, or graduate. When students on Type 2 probation are ready to take final exams or defend theses or dissertations in order to complete graduation requirements, they must petition the Dean of Graduate Studies to end their probationary status so that they may complete their requirements and graduate.

6.6.3 **Type 3: Incomplete Grades**
A student whose cumulative grade point average drops below 3.0 due to the impact of Incomplete grades in graduate-level courses taken in graduate status (see previous section on Grade Point Average) will be placed on Type 3 academic probation. Type 3 probation will end as soon as the student completes all necessary work for the 'I' course(s) and is awarded a grade. However if the student fails to complete the necessary work, or if the final grade is low enough, the student may become subject to Type 1 or Type 2 probation. Students may not take master's examinations, doctoral comprehensive examinations, defend theses or dissertations, or graduate while on Type 3 probation. They may provisionally hold assistantships for one semester.

6.7 **Suspension**

6.7.1 **By the Office of Graduate Studies**
A student who is suspended from graduate status is removed from graduate student status at the University of New Mexico. A student may not apply for readmission to graduate status for one year after being suspended. The student may apply for admission to non-degree or undergraduate status at any time after being suspended from graduate status, but no class taken during the year in which the student is suspended from graduate status can be counted toward requirements for a graduate degree.

6.7.2 **By a Degree Program**
If in the opinion of the graduate unit a student shows little promise of completing the degree program or the student has committed an academic violation (e.g., Plagiarism), the graduate unit will notify the student and the Dean of Graduate Studies in writing that the student is suspended from further work in that unit. Suspended students are not eligible to apply for readmission to any other graduate degree program for a period of one year from the effective date of the suspension.
6.7.3 Readmission after Suspension

If after a period of one year, a suspended student wishes to apply for readmission to a graduate unit, he/she must follow the readmission procedure delineated earlier in this catalog.

If a graduate unit decides to readmit the student, it will specify the conditions required by the student to re-establish his/her good standing. The period of suspension will be included in the time limit to complete the degree.

Students who have been suspended or who withdrew from the University while in probationary status will be placed in probationary status when readmitted to the University. Students suspended for low grade point average (Type 1 probation) will have 12 hours or four regular semesters (whichever comes first) to establish a grade point average of at least 3.0. A student who fails to achieve the minimum grade point average within the allotted time will be permanently suspended from their graduate program. Students who have been suspended for earning three grades of NC and/or F and subsequently readmitted will be permanently suspended from their degree program if a fourth grade of NC and/or F in graduate-level course work is earned.

7. Requirements for Master's Degree

To meet the formal requirements for the Master’s degree, you must:

1) Successfully complete the course work requirements for Plan I or II with a cumulative GPA of at least 3.0
2) Have a Program of Studies approved by the Graduate Dean no later than the semester prior to graduation (Pg. 28)
3) Pass the Master’s Examination and/or Master’s Exam for Thesis (Pg. 29)
4) Submit a research proposal under Plan I (Pg. 26)
5) Present and successfully defend a thesis acceptable to the Department and the Graduate Dean (Plan I only; Pg. 29)

In either Plan I or Plan II, you and your Major Advisor may design a program of studies in which all work is done in the major department, in the major department and the minor department, or in the major department and one or more related departments.

The following provisions must also be observed:

1) Programs meeting the minimum requirements of Plan I or II do not automatically constitute a master’s program. Each program must be approved by the Department and the Dean of Graduate Studies;

2) After the Program of Studies has been filed, minor changes between Plans I and II may be made only with the approval of the Department and the Dean of Graduate Studies. A new Program of Studies form must be filled out and approved if any major changes are made to a Program of Studies;
3) All work offered toward fulfillment of degree requirements must fall within a 7-year period;

4) If you opt for a formal minor as part of your program, 1) you should consult with a member of the minor department in the planning of that program; and 2) the Nanoscience and Microsystems Department shall include a faculty member from the minor department on your Master’s Examination Committee, unless this right is waived by the Chairperson of the minor department.

5) For rules on transfer credits see the UNM Catalog.

7.1 Course Work Requirements

7.1.1 Plan I

Degree Requirements

| NSMS MS Plan I requirements: 24 Course Credits – 30 Credits Total (Thesis option) |
|----------------------------------|--------------------------------|
| NSMS 510 - Chemistry & Physics at the Nanoscale | 3 credits |
| NSMS 512 - Characterization Methods for Nanostructures | 3 credits |
| NSMS 518 - Synthesis of Nanostructures | 3 credits |
| NSMS 519 - MEMS Transducer Devices and Technology | 4 credits * |
| NSMS 550 - Social and Ethical Implications of Nanotechnology | 1 credit * |
| STEM Elective | 3 credits |
| Seminar | 3 credits |
| Problems | 4 credits * |
| Thesis Hours | 6 credits |
| TOTAL | 30 |

1. A minimum of 24 hours of Nanoscience and Microsystems-related course work with a minimum of 12 hours of graduate level Nanoscience and Microsystems courses. The number of hours refers to semester hours in the combined major and minor (or related) fields.

2. A minimum of 6 hours of 500-level course work.

3. A maximum of 6 hours of Problems (NSMS 551) and 3 seminar credits.

4. Only 12 hours (exclusive of thesis hours) may be taken with a single professor.

5. At least 50% of required course work must be completed after admission to the graduate program, unless further limited by the graduate program.

7. A minimum of 6 Thesis hours (NSMS 599).

9. A maximum of 6 hours of course work done in non-degree at UNM may be included in the Master’s degree.

10. Course selection must be made with the approval of the student’s Committee on Studies. Students with interests in ecology and evolution are strongly encouraged to take Nanoscience and Microsystems courses 516 and 517.

Note – “Program of Studies” form (POS) must be filed no later than 1 semester before student intends to graduate. Deadlines for submission are March 1st for a summer graduation, July 1st for a fall graduation, and October 1st for a spring graduation. After POS is filed student can complete his/her thesis defense. Announcement of defense is due to OGS two (2) weeks prior to the defense. Student must be enrolled in classes the term the defense is planned. All degree requirements must be satisfied by the following deadlines, July 15th for summer, November 15 for fall, and April 15th for spring. Once student begins taking thesis credits, the student must remain enrolled in thesis credits every semester until the manuscript is accepted. Thesis can be submitted no later than 90 days after passing the defense or the term graduation deadline, whichever comes first (see degree requirement deadlines).

*MEMS will be worth 4 credits by Spring 2011. Ethics will be worth 1 credit after fall 2011. No more than 6 credits of problems credits will be accepted toward an MS.

### 7.1.2 Plan II

**Degree Requirements**

<table>
<thead>
<tr>
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<tr>
<td><strong>(Project or coursework option)</strong></td>
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<tr>
<td>NSMS 510 - Chemistry &amp; Physics at the Nanoscale</td>
</tr>
<tr>
<td>NSMS 512 - Characterization Methods for Nanostructures</td>
</tr>
<tr>
<td>NSMS 518 - Synthesis of Nanostructures</td>
</tr>
<tr>
<td>NSMS 519 - MEMS Transducer Devices and Technology</td>
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<tr>
<td>NSMS 550 - Social and Ethical Implications of Nanotechnology</td>
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<tr>
<td>STEM Elective</td>
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<tr>
<td>Seminar</td>
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<tr>
<td>Problems</td>
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<tr>
<td>TOTAL</td>
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</tbody>
</table>

1. A minimum of 32 hours of Nanoscience and Microsystems-related course work with a minimum of 18 hours in the major field and 12 hours in the minor, if a minor is declared. The number of hours refers to semester hours in the combined major and minor (or related) fields.

2. A minimum of 12 hours of 500-level courses.

3. A maximum of 12 hours of Problems (NSMS 551) and a maximum of 3 Seminar credits.

4. Only 12 hours may be taken with a single professor.
5. At least 50% of required course work must be completed after admission to the graduate program, unless further limited by the graduate program (16 credit hours UNM).

6. A maximum of 6 hours of course work done in non-degree at UNM may be included in the Master’s degree.

7. Course selection must be made with the approval of the student’s Committee on Studies.

Note – “Program of Studies” form (POS) must be filed no later than 1 semester before student intends to graduate. Deadlines for submission are March 1st for a summer graduation, July 1st for a fall graduation, and October 1st for a spring graduation. After POS is filed student can complete his/her master’s examination. Announcement of exam is due to OGS two (2) weeks prior to the examination. Student must be enrolled in classes the term the defense is planned. All degree requirements must be satisfied by the following deadlines, July 15th for summer, November 15th for fall, and April 15th for spring. Once student begins taking thesis credits, the student must remain enrolled in thesis credits every semester until the manuscript is accepted. Thesis can be submitted no later than 90 days after passing the examination or the term graduation deadline, whichever comes first (see degree requirement deadlines).

*MEMS will be worth 4 credits by Spring 2011. Ethics will be worth 1 credit after fall 2011.

7.2 Program of Studies

A Program of Studies for the Master’s Degree should be filed with the Dean of Graduate Studies after you have completed 12 hours of graduate work and no later than the last day of classes of the semester before you expect to complete degree requirements. (The total number of hours needed for the degree are to be listed on the candidacy form.) Tool skills must be completed and filed along with the Program of Studies.

This form may be obtained either from the Office of Graduate Studies (OGS), the OGS web site http://www.unm.edu/~grad/forms/forms.html or from the Nanoscience and Microsystems Department Office. The Program of Study listed in the application should be planned in consultation with your Major Advisor; both your Advisor and the Department Chairperson must approve the form before it is submitted to the Dean of Graduate Studies. Approval of this form will be given only after 1) all undergraduate pre-requisites have been satisfied; 2) at least 12 hours of graduate credit have been completed with a B average or better.

7.3 Notification of Intent to Graduate

You need to officially inform the Nanoscience and Microsystems Department and the Dean of Graduate Studies of your intention to complete all degree requirements during that semester (Fall, Spring or Summer, respectively) by completing the Intent to Graduate Form (Pg. 93 or obtained from the Graduate Program Specialist’s office) and submitting the form to the Nanoscience and Microsystems Department no later than mid July for Fall semester), 1st week in December for Spring semester, last week in April for Summer semester. Degrees are awarded three times during the year.
7.4 Required Enrollment
Master’s students electing either Plan I or Plan II must be enrolled for at least 1 graduate credit either in thesis (NSMS 599) for Plan I, or in project, problems (not to exceed 12 credit hours), or another graduate course for Plan II for the semester (including the summer session) in which they complete degree requirements.

7.5 Thesis
Each candidate for the Master’s degree under Plan I must submit a thesis that gives evidence of capacity for sound research (Pg. 90). The thesis must be approved by your Committee of at least three faculty members. The Thesis Director will serve as Chairperson of this Committee and assume the major responsibility for guiding the student’s work.

A complete draft of the thesis should be submitted to your Committee well in advance of the anticipated graduation date. A one-page sheet of instructions is available from the UNM Bookstore; the thesis format is available also at the OGS web site http://www.unm.edu/~grad/forms/forms.html.

If you are following Plan I, you must complete a minimum of 6 hours of Thesis (599) credit. Having once registered for Thesis, you must then continue to register for a minimum of 1 hour of NSMS 599 during each regular semester (exclusive of summer, unless you plan on graduating during that semester) until the thesis is approved by the Graduate Dean. This rule applies whether or not you are enrolled for anything else. A thesis from a student who is not enrolled for the current semester is not acceptable.

Two copies of the typed/word-processed thesis, together with two copies of an 150-word abstract, all in perfect form and approved by your Committee, shall be submitted for the approval of the Dean of Graduate Studies by November 15, April 15, or July 15 for Fall, Spring or Summer, respectively. A third copy shall be given to the Nanoscience and Microsystems Department for its collection.

7.6 Master’s Examination
The Master’s Examination and/or Master’s Exam for Thesis must be passed by all candidates for the Master’s degree. The examination, drawn from the major and minor or related fields as appropriate, may be written, oral, or both, at the option of the Committee on Studies; it is conducted by your Committee. The master’s exam may be taken only after the Program of Studies has received approval.

The examination for the Master’s degree will be conducted by a committee of three members approved for graduate instruction, at least two of whom must hold regular, full-time faculty appointments at UNM. The chair of the examination must be a regular faculty member. Non-regular faculty may serve as co-chairs.

Under Plan I, your Major Advisor usually serves as Chairperson of the Committee. The examination may be given only after the Program of Studies has been approved by the Graduate Dean; the student must be in good standing.
At least two weeks prior to the date of the Master’s Examination and/or Master’s Exam for Thesis, the student must notify the Nanoscience and Microsystems Department and the Dean of Graduate Studies of the date, time and place of the examination. The Announcement/Report of Examination Form can be found on Pg. 76 or from the Department’s Graduate Program Specialist and must be submitted to the Department no later than November 1 (Fall), April 1 (Spring), or July 1 (Summer).

You must be notified of the results of the examination no later than two weeks from the date of examination. If your Committee anticipates being unable to meet this deadline, it must give you written notice to this effect prior to this examination; in this event, you must be notified of the results of the examination no later than three weeks from the date of the examination. The results of examinations taken between semesters or during the summer must be given no later than two weeks after the first day of classes of the next regular semester. Results of the examination shall be provided to the Office of Graduate Studies by November 15 (Fall), April 15 (Spring), or July 15 (Summer). If a candidate fails the examination, a six-month interval should elapse before a second examination is given. A candidate may take this examination only twice. Failure to pass the second time will result in the student’s termination from the graduate program.

### 7.7 Master’s Snapshot

The following requirements must be met before a student's name can be submitted for graduation.

- The student must follow the UNM Catalog in place at the time of his/her admission, plus any additional departmental requirements.
- Master's students under Plan I must be continuously enrolled for 599 hours. Master's students under Plan II must have been enrolled within three semesters (including summer) of graduation.
- The student should check his/her academic record (LoboWeb) at the end of each term to ensure that his/her status, degree program, grades and GPA are correct and in compliance with University policies.
- The student must meet the general degree requirements published in the UNM Catalog.
- The student must submit a Program of Studies (POS) listing all the courses that apply to the degree. The POS form (Pg. 67) can be filed at any time after admission but must be filed no later than the term before the student intends to graduate. The specific deadlines are as follows: March 1 for Summer graduation, July 1 for Fall graduation and October 1 for Spring graduation.
- The student must notify the degree program of his/her intent to graduate the term prior to the term of graduation. The student should confirm additional deadlines with his/her program.
- The student is required to pass a master’s examination and/or thesis defense. The master’s examination may be taken only after the Program of Studies has received approval by the Graduate Dean and
only if the student is in good academic standing. The Announcement/Report of Examination form (Pg. 76) must be submitted to OGS a minimum of two weeks before the scheduled date of the examination. The student must be enrolled in the term the master’s examination is taken.

• The student must satisfy degree requirements (passed master’s exam and/or thesis submission) by the deadlines of July 15 for summer graduation, November 15 for Fall graduation, or April 15 for Spring graduation.

• The student who chooses Plan I/Thesis option must complete a minimum of 6 hours of 599/thesis. Once a student begins enrollment in 599 s/he must enroll in 599 every term (summer term is excluded, except if the student is graduating in the summer) until the manuscript is accepted by OGS.

• The student must meet all thesis requirements. Please refer to the Graduation Checklist form (Pg. 65). The thesis must be submitted no later than 90 days after passing the thesis defense, or the term graduation deadline, whichever comes first. Manuscript formatting guidelines are available through this link.

• The student who misses the term graduation deadline, but completes degree requirements by the last day of that term may choose to follow the Courtesy Policy.

*NOTE: Deadlines that fall on a weekend or holiday are automatically moved to the end of the next business day.

8. PSM

Degree Requirements

<table>
<thead>
<tr>
<th>NSMS PSM requirements: 33 Course Credits Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>(PSM Project or coursework option)</em></td>
</tr>
<tr>
<td>NSMS 510 - Chemistry &amp; Physics at the Nanoscale</td>
</tr>
<tr>
<td>NSMS 512 - Characterization Methods for Nanostructures</td>
</tr>
<tr>
<td>NSMS 519 - MEMS Transducer Devices and Technology</td>
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<tr>
<td>NSMS 550 - Social and Ethical Implications of Nanotechnology</td>
</tr>
<tr>
<td>ME 556 – Entrepreneurial Engineering</td>
</tr>
<tr>
<td>MGMT 513 – Assessment &amp; Forecasting *</td>
</tr>
<tr>
<td>MGMT 514 – Technology Entrepreneurship *</td>
</tr>
<tr>
<td>MGMT 516 – Entrepreneurial Finance *</td>
</tr>
<tr>
<td>STEM Elective</td>
</tr>
<tr>
<td>NSMS 600 – Research Experience</td>
</tr>
<tr>
<td>NSMS 602 – SMP MI &amp; T Workshop/Seminar</td>
</tr>
<tr>
<td>NSMS 601/MGMT 519 – Independent Project (Internship)</td>
</tr>
<tr>
<td>TOTAL</td>
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</tbody>
</table>
Note – “Program of Studies” form (POS) must be filed no later than 1 semester before student intends to graduate. Deadlines for submission are March 1st for a summer graduation, July 1st for a fall graduation, and October 1st for a spring graduation. After POS is filed student can complete his/her master’s examination. Announcement of exam is due to OGS two (2) weeks prior to the examination. Student must be enrolled in classes the term the defense is planned. All degree requirements must be satisfied by the following deadlines, July 15th for summer, November 15 for fall, and April 15th for spring. Once student begins taking thesis credits, the student must remain enrolled in thesis credits every semester until the manuscript is accepted. Thesis can be submitted no later than 90 days after passing the examination or the term graduation deadline, whichever comes first (see degree requirement deadlines).

*MEMS will be worth 4 credits by Spring 2011. Ethics will be worth 1 credit after fall 2011. MGMT require a special approval to enroll.

Other than class load remaining requirements are the same as Master’s Plan II. See Sections 28.7.2 through 7.7 for more details.

9. Requirements for Doctorate

It is the responsibility of the student to ensure that all forms are completed and submitted on schedule, with the appropriate signatures. All the forms mentioned in the following schedule are available from the Department’s Graduate Program Specialist.

To meet the formal requirements for the PhD degree, you must:

1. Successfully complete the course work requirements
2. Pass the PhD comprehensive examination (Section 9.5, Pg. 36)
3. Apply for and be admitted to doctoral candidacy (Section 9.4, Pg. 35)
4. Submit a research proposal
5. Pass PhD Comprehensive examination (Section 9.5, Pg. 36)
6. Present and successfully defend a dissertation acceptable to the Department and the Graduate Dean (Section 9.7, Pg. 36)

The requirements described below should be viewed only as a minimal formal context in which you are expected to grow in the professional stature represented by the doctoral degree.

9.1 Curriculum Requirements
1. A minimum of 48 hours of graduate credit course work (exclusive of dissertation hours). Must have 18 hours of 699 over and above the 48 hours.

2. Four, (part of the 48 hours needed) UNM Nanoscience and Microsystems Department courses of 400 or 500 level (excluding 402/502, 500, 551, 599, 651 or 699) with at least two of the four courses at the 500 level. The four courses must include a minimum of four different graduate faculty members. Students should consult w/major advisor or committee on studies for appropriate courses. These courses must be completed in the first 4 semesters.

3. At least 24 hours of graduate credit course work must be completed at The University of New Mexico of which, at least 18 hours of graduate credit course work must be completed after admission to the doctoral program at The University of New Mexico. (Part of the 48 hours) The six remaining graduate credits to meet the 24 credit hours must be course work completed at UNM. The remaining 24 credit hours to meet the 48 credit hour degree requirements can be applied (includes non-degree or master’s course work at UNM or transfer credits)

4. A minimum of 18 hours of graduate credit course work must be earned in The University of New Mexico courses 500 or above. (Part of the 48 hours)

5. No more than 50% of the required course credits at The University of New Mexico may be taken with a single faculty member. (Course work that has been completed for the master’s degree is included in this limit)

6. A minimum of 18 hours of dissertation credits (NSMS 699) over and above the 48 credit hours for the degree requirement.

7. Must be enrolled the semester in which you complete degree requirements, including the summer session. If student has met the 18 credit hours of dissertation, the doctoral student must enroll with a minimum of 3 credit dissertation hours each semester.

8. Course selection must be made with the approval of the student’s Committee on Studies.

**NSMS PhD w/out obtaining MS**

**Degree requirements**

<table>
<thead>
<tr>
<th>NSMS PhD requirements: 48 Course Credits – 66 Credits Total (Without MS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSMS 510 - Chemistry &amp; Physics at the Nanoscale</td>
</tr>
<tr>
<td>NSMS 512 - Characterization Methods for Nanostructures</td>
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<tr>
<td>NSMS 518 - Synthesis of Nanostructures</td>
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</tbody>
</table>
### NSMS PhD with previously obtained MS

<table>
<thead>
<tr>
<th>NSMS PhD requirements: 24 Course Credits – 42 Credits Total (With MS)</th>
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<tbody>
<tr>
<td><strong>NSMS 510 - Chemistry &amp; Physics at the Nanoscale</strong></td>
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<tr>
<td><strong>NSMS 512 - Characterization Methods for Nanostructures</strong></td>
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<td><strong>STEM Electives</strong></td>
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<td><strong>Seminar</strong></td>
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<tr>
<td><strong>Problems</strong></td>
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<tr>
<td><strong>Dissertation Hours</strong></td>
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<tr>
<td><strong>TOTAL</strong></td>
</tr>
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</table>

**Note** – If the NSMS core was taken as a part of a MS program these classes do not need to be repeated. Any NSMS courses already taken will be converted to electives. Degree requirement deadlines for PhD graduation are; July 15th for the summer, November 15th for the fall, and April 15th for the spring. Paperwork is crucial for graduation. Please review the various OGS checklists (forms page on their website) to be sure you are submitting in the correct order.

* MEMS will be worth 4 credits by Spring 2011. Ethics will be worth 1 credit after fall 2011. MGMT require a special approval to enroll.

** All 18 dissertation hours can be taken in a single semester. You must be enrolled in dissertation hours the semester of graduation. Dissertation credits may be taken before passing the comprehensive exam (e.g. summer) but will not count toward the 18. Six dissertation credits may be taken during the semester in which the comp is passed, and will count toward the required 18 credits.
9.2 Dissertation Hours

The program for the doctorate includes a minimum of 18 hours of Dissertation (NSMS 699) credit. You should consult with your Major Advisor concerning the time of the initial enrollment and the number of NSMS 699 hours to be carried each semester, 12 hours being the maximum. You may not count credit hours from dissertation courses of which you are enrolled in prior to the semester in which you take your comprehensive examination. If you fail to complete the comprehensive examination in the semester of the initial 699 registration, you will not receive 699 credit for that semester. If you begin Dissertation research prior to completion of the comprehensive exam, IT IS POSSIBLE TO DO SUCH RESEARCH UNDER PROBLEMS 551 and still receive credit.

Having once registered for Dissertation credits, you must continue to register for 699 during each regular semester (exclusive of Summer, except if the student is graduating in the summer) until the dissertation is approved by the Graduate Dean. All students registered for Dissertation (699) must enroll for 3-9 hours/semester, the number of hours to be determined by consultation with your Major Advisor. The maximum in the Summer Session is 9 hours.

After completing 18 hours of Dissertation enrollment, you may meet the continuous enrollment requirement by enrolling for 3 hours of 699. The Dean of Graduate Studies will not accept a dissertation from a student who is not enrolled for the current semester.

9.3 Five-Year Limit

As a general rule, all work offered toward the requirements for the Doctorate must fall within a five-year period after successful completion of the doctoral comprehensive examination. Candidates who have interrupted their graduate education for professional work in their field will generally be granted an extension of the time limit, but a petition must be filed. (See also Taking a Leave of Absence Pg. 45) Any request for an extension of the limit for this or other reasons must be originated by the student, supported by the Department, and addressed to the Graduate Dean.

Note that the period of the department’s obligation of financial support to PhD students is the first five years (10 semesters) of their period of graduate study.

9.4 Candidacy

The Doctoral student applies for candidacy once s/he has passed their comprehensive exam. The Application for Candidacy is the vehicle that formally summarizes your program of studies.

It is mandatory that all the following requirements be successfully met before you file the Application for Candidacy form (Pg. 84). Those requirements are as follows (in no required order):

1. Required course work (4 courses, all 400 level or above, at least 2 courses must be 500 level or above). Can use a 502 course if it is not a discussion course or if your Committee on Studies approves it); and
2. Comprehensive Examination.

The student cannot advance to candidacy until these requirements are successfully completed.

Courses selected to satisfy this requirement will, of course, also count to satisfy the total number of credit hours accumulated for the degree.

Application for Candidacy forms are available at the Office of Graduate Studies, the OGS web site http://www.unm.edu/~grad/forms/forms.html, the Nanoscience and Microsystems Department Office, or Pg. 84. The form must be approved by the Committee on Studies and returned to the Graduate Program Specialist for further processing.

9.5 Doctoral Comprehensive Examination

The Doctoral student must pass written and oral comprehensive examinations in the major field of study. The examinations are not limited to the areas of your course work, but will test your grasp of the field as a whole. You must be in good academic standing to take these examinations. The comprehensive examination may be taken at any time; however, it must be prior to your Application for Candidacy. At least two weeks prior to the planned examinations, you must notify (by using a form available in the Department Office) the Dean of Graduate Studies of the date, time and place of the examinations.

The examinations are normally conducted by the Committee on Studies and such other persons as are appointed by the Department in consultation with the student and with the approval of the Graduate Dean.

You must be notified of the results of the examinations no later than two weeks from the date of the examinations. If your committee anticipates having difficulty in meeting this deadline, you must be given written notice to this effect prior to the examinations; in this event, you must be notified of the results of the examinations no later than three weeks after the first day of classes of the next regular semester.

Results of the examinations shall be reported to the Dean of Graduate Studies on the form provided. If a student fails the examinations, the Committee on Studies shall make an appropriate recommendation to the Dean of Graduate Studies regarding a possible re-examination, which must be administered within one year from the date of the last exam. Failure to pass the second time will result in the student’s termination from the graduate program.

9.6 Doctoral Final Examination (Defense)

All candidates must pass a final examination dealing primarily with the dissertation and its relationship to the candidate’s major field.

At least two weeks before the date set for the final examination, you should notify the Dean of Graduate Studies of the date, time and place of the defense (form available from the Department’s Graduate Program Specialist’s office). The examination is chaired by your Major Advisor. A complete copy of the
dissertation must be submitted to each member of the Dissertation Committee at least two weeks before the defense.

At the conclusion of the examination, the members of the Dissertation Committee shall confer and vote their recommendations, which must be agreed upon by at least three of the four members. The Committee may 1) recommend that the dissertation be approved without change; 2) recommend that the dissertation be approved subject only to minor editorial corrections, or 3) require that the dissertation be revised before approval. In the case of 1) and 2), no further meeting of the Committee will be needed, although in the case of 2) the Major Advisor will be responsible for seeing that the corrections are made before the dissertation goes to the Office of Graduate Studies. In the case of 3), the full Committee will decide that their stipulations have been met.

A portion of the final examination must consist of a formal, 50-minute oral presentation open to the general public. Formal announcement of this event should be made at least one week in advance of the presentation using the normal format that is used by the Department for regularly invited seminar speakers. After the seminar, the candidate and the Dissertation Committee will meet privately to continue the examination. Each reader of the dissertation must fill out an evaluation form (Report on Dissertation Form Pg. 90), and the Chairperson of the Dissertation Committee must, in addition, fill out a Certification of Final Form for Manuscript Pg. 91, which needs to be turned in to the Office of Graduate Studies immediately after the defense. These forms are available at the Nanoscience and Microsystems Department Office or from the OGS web site http://www.unm.edu/~grad/forms/forms.html.

9.7 PhD Dissertation
All Plan I MS students and doctoral students are required to prepare a thesis or dissertation respectively, as part of the fulfillment of the degree requirements. There are two acceptable, alternative formats for the thesis or dissertation: the traditional and the manuscript-based. The latter is often referred to in the Department as a "hybrid" thesis or dissertation. Students may opt to use either style. However, approval of which style is used will be obtained from their major advisor and the members of their examination or dissertation committee prior to preparing the thesis or dissertation.

For either style, the rules and regulations established by the Office of Graduate Studies (OGS) regarding format (Front Matter, Text, Reference Matter, paper dimensions, margins, etc.) must be adhered to. The OGS guidelines are available at http://www.unm.edu/~grad/forms/forms.html.

Traditional Thesis or Dissertation
The traditional thesis or dissertation is a single manuscript, authored solely by the student, presenting original research performed by the student. The text section is typically subdivided into: Introduction, Materials and Methods, Results, Discussion, References, and Appendices (optional).
9.8 Manuscript-based Thesis or Dissertation

A manuscript-based thesis or dissertation is a collection of manuscripts or articles formatted for publication and presented as separate chapters of a single thesis or dissertation. This style must satisfy the following guidelines:

1. The articles or manuscripts must report original research that is primarily the student's or to which the student contributed significantly. The student must be the first author on at least one of the manuscripts in their thesis or dissertation. The inclusion of a particular manuscript in the thesis or dissertation will be with the approval of the student's advisor and the members of the examination committee.

2. The manuscripts must be articles published in a peer-reviewed national or international journal and/or manuscripts prepared for publication in a peer-reviewed national or international journal. This guideline allows for a single thesis or dissertation to consist of a mixture of published and unpublished material.

3. The chapters may be in the format style for the journal to which they are intended. However, the student's advisor and the members of the examination committee have the option to require re-formatting of chapters to a single uniform style.

4. The names of all co-authors on multi-authored manuscripts will be included. If one or more of the manuscripts are already published at the time the thesis or dissertation is submitted, the article's citation will be provided at the beginning of each chapter.

5. Students should consult OGS regulations regarding issues related to copyright. Students are responsible for obtaining permission to use a published, copyrighted manuscript in their thesis or dissertation from the journal in which the paper is published. Students are advised to consult the policies of the journal regarding release of copyright for use in theses and dissertations. Many journals openly state in their policies and guides to authors that published manuscripts may be used for theses and dissertations without obtaining additional permission.

6. The completed thesis or dissertation will contain:

   a. An abstract that collectively summarizes the individual manuscripts or chapters;

   b. A general introduction that lists the individual manuscripts and describes how each chapter or manuscript relate to a general theme of the thesis or dissertation is recommended. The student should seek the advice of their faculty mentor and members of their thesis examination or dissertation defense committee on the content of the introduction.
c. The articles or manuscripts as separate chapters;

d. A conclusion or summary that provides an overview of the collective findings reported in the separate chapters is recommended at the discretion of the committee;

e. An optional appendix containing any additional material that will not be submitted for publication may be included or a literature review section, as appropriate.

9.9 Doctoral Snapshot

The following requirements must be met before a student’s name can be submitted for graduation.

• For all graduate students, no student may not graduate with an Incomplete grade. Grades must be posted by the end of the semester. A copy of the grade change should be sent to the Graduation Coordinator at OGS as soon as the grade is posted.

• The student must follow the UNM Catalog in place at the time of his/her admission, plus any additional departmental requirements.

• The student should check his/her academic record (LoboWeb) at the end of each term to ensure that his/her status, degree program, grades and GPA are correct and in compliance with University policies.

• The student must meet the general degree requirements published in the UNM Catalog.

• The student is required to pass a doctoral Comprehensive Examination (Section 9.5, Pg. 36). The Announcement/Report of Examination form (Pg. 76) must be submitted to OGS a minimum of two weeks before the scheduled date of the examination. The student must be enrolled and complete a minimum of one hour of graduate credit in the term s/he takes the comprehensive examination and must be in good academic standing. Students may not take the exam if three or more semesters have elapsed since their last enrollment. The Report of Examination form must be turned in by November 15th for Fall Graduation, April 15th for Spring Graduation, and July 15th for Summer Graduation.

• The student must submit an Application for Candidacy (AC) (Pg. 84) listing all the courses that apply to the degree. The AC form should be filed the term the student passes the comprehensive examination and no later than the last day of the term before the student intends to graduate.

  • The Application for Candidacy (AC) form should be forwarded to OGS during the semester in which the student has both passed the comprehensive examination and completed any required language or research skill. It should be accompanied by the Report of Examination (Pg. 76) and Certification of Language Skill Requirement (Pg. 95) forms.
• The student must submit an Appointment of Dissertation Committee form (Pg. 89) within the first term of dissertation (699) enrollment.

• The student is Advanced to Candidacy (All but dissertation [ABD]) by the Dean of Graduate Studies in the term when all the following criteria have been met:
  1. The doctoral comprehensive examination has been passed;
  2. OGS has approved the Application for Candidacy;
  3. Language/skill requirement (if appropriate) is satisfied; and
  4. OGS has approved the Appointment of Dissertation Committee form.

• The student must notify the degree program of his/her intent to graduate (Pg. 93) the term prior to the term of graduation. The student should confirm additional deadlines with his/her program.

• The student must defend his/her dissertation. An Announcement/Report of Examination form (Pg. 76) must be submitted two weeks prior to the dissertation defense date. The dissertation must be submitted no later than 90 days after passing the dissertation defense, or the term graduation deadline, whichever comes first.

• The student must satisfy degree requirements (defended and submitted dissertation) by the deadlines of July 15 for summer graduation, November 15 for Fall graduation, or April 15 for Spring graduation.

• The student must complete a minimum of 18 hours of dissertation/699. Once a student begins enrollment in 699 s/he must enroll in 699 every term (summer term is excluded, except if the student is graduating in the summer) until the manuscript is accepted by OGS.

• The student must meet all dissertation requirements. Please refer the Graduation Checklist form (Pg. 72). The dissertation must be submitted no later than 90 days after passing the dissertation defense, or the term graduation deadline, whichever comes first. Manuscript formatting guidelines are available through this link.

1. The student who misses the term graduation deadline, but completes degree requirements by the last day of that term may choose to follow the Courtesy Policy.

*NOTE: Deadlines that fall on a weekend or holiday are automatically moved to the end of the next business day.*
10. Planning Worksheets

### 10.1 Degree Planning Worksheet

<table>
<thead>
<tr>
<th>Requirement</th>
<th>MS Plan I</th>
<th>MS Plan II</th>
<th>PSM Plan II</th>
<th>PhD w/MS</th>
<th>PhD w/out MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSMS 510</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Other</td>
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<td>MGMT 513</td>
<td>MGMT 514</td>
<td>MGMT 516</td>
<td>NSMS 600</td>
</tr>
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<td>7cr</td>
<td>3cr</td>
<td>1cr*</td>
<td>22cr*</td>
</tr>
<tr>
<td>Seminar</td>
<td>3cr*</td>
<td>3cr*</td>
<td>3cr*</td>
<td>3cr*</td>
<td>3cr*</td>
</tr>
<tr>
<td>Problems</td>
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<td>6cr*</td>
<td>6cr*</td>
<td>9cr*</td>
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<td>33cr</td>
<td>24cr</td>
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<tr>
<td>Dissertation</td>
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<td></td>
<td></td>
<td>18cr</td>
<td>18cr</td>
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<tr>
<td><strong>Total</strong></td>
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<td><strong>32cr</strong></td>
<td><strong>33cr</strong></td>
<td><strong>42cr</strong></td>
<td><strong>66cr</strong></td>
</tr>
</tbody>
</table>

*Note* - You can create any combination of STEM elective, seminar or problems to arrive at the total required credits. Don’t go over maximum allowed for seminar or problems for your degree.
### 10.2 Coursework Checklist

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Semester/Year Complete</th>
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<tbody>
<tr>
<td>NSMS 510 - Chemistry &amp; Physics at the Nanoscale</td>
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<td>NSMS 512 - Characterization Methods for Nanostructures</td>
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<td>NSMS 518 - Synthesis of Nanostructures</td>
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<td>NSMS 519 - MEMS Transducer Devices and Technology</td>
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<td>NSMS 550 - Social and Ethical Implications of Nanotechnology</td>
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<td>ME 556 – Entrepreneurial Engineering*</td>
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<td>MGMT 513 – Assessment &amp; Forecasting *</td>
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<tr>
<td>MGMT 514 – Technology Entrepreneurship *</td>
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<tr>
<td>MGMT 516 – Entrepreneurial Finance *</td>
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<tr>
<td>NSMS 600 – Research Experience*</td>
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<tr>
<td>NSMS 602 – SMP MI &amp; T Workshop/Seminar*</td>
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<tr>
<td>NSMS 601/MGMT 519 – Independent Project (Internship)*</td>
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<tr>
<td>STEM Elective</td>
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<td>Seminar</td>
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<td>Problems</td>
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<td><strong>TOTAL COURSE WORK</strong></td>
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<tr>
<td>Thesis</td>
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<tr>
<td>Dissertation</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
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</tr>
</tbody>
</table>

*PSM requirement only.

**KNOW YOUR DEADLINES! (Ignorance isn’t an excuse!)**

Do yourself a favor and look over OGS's Graduate Checklists & Snapshot for MS & PhD students! These are available on the OGS website [www.unm.edu/~grad/index.html](http://www.unm.edu/~grad/index.html) ---> OGS Forms, under the heading of Graduation.

The Appendices contain the checklists provided by OGS to ensure you get all forms in on time.
11. Qualifying Exam

11.1 Qualifying Exam Procedures

Objectives of the Qualifying Exam: To test critical thinking skills in the context of the first year coursework. Specifically, the exam will assess the student’s ability:

- to critically read and analyze a scientific paper
- to develop a line of questioning based on the chosen paper
- to outline an experimental approach that addresses questions arising from the chosen paper
- to propose original research as an extension of the paper

Role of Qualifying Exam in NSMS: The Qualifying Exam should provide the students’ Steering Committee with an opportunity to decide which students are prepared to make the transition from programmatic core and selective courses to dissertation research and divisional requirements. The exam is undertaken by Ph.D. students who meet the below Prerequisites, as well as M.S. students who wish to petition for a Change of Degree. The exam must be fairly and consistently applied to all students with a clearly defined outcome.

Dates: The Qualifying Exam is given at the beginning of the Fall semester. Students must inform the NSMS office of their intent to take the Qualifying Examination. An email will be sent out prompting students to notify the NSMS office of their intent. At the discretion of the NSMS Steering Committee, a second exam could be scheduled at the beginning of the Spring semester.

Prerequisites:

1. Completed all required first year course work.

2. Be in good academic standing with a cumulative GPA of greater than or equal to 3.0 and no grade less than B- (core curriculum and electives)
   - Note: A 3.7 average (A-) GPA in core courses is required to avoid a written qualifying exam.

3. If the above conditions are not met, a student will be expected to take not only the oral qualifying exam, but a written qualifying exam as well.

Description of exam: Students will choose a paper from a list of 3 papers. They will have 14 days to prepare a presentation on the paper. The presentation will include: background, succinct description of the
experiments, critical analysis and hypothesis about future directions. The student will then be examined on this presentation and on aspects of the core and selective courses that are related to it.

11.2 Criteria for Assessment

The student must:

- Present a succinct oral synopsis of the assigned paper, using PowerPoint or equivalent presentation software, and correctly answer questions related to the content of the paper.
- Critically evaluate the validity of the results and the conclusions of the paper.
- Outline potential future directions for research based upon the conclusions of the paper.
- Correctly answer general knowledge questions drawing on material covered in the first year of coursework.

Paper list: All core and selective course directors will provide a list of 3 papers and a short list of topics from the core and selective courses that relate to each of the papers. These papers should be respected papers in the field that are broadly based.

Examination committee: To insure the uniformity of examinations, a small number of examination committees will be assembled. Each department chair will be asked to assign 2 department members and from this group of 12, there will be 4 three member examination committees. All of the students taking the Qualifying Exam will be examined by one of these examination committees. No advisor can serve on a committee for one of his or her students.

Time line for examination:

- Within a week after final examinations the Steering Committee will meet and decide which students are qualified to sit for the examination and will assign these students to a committee. It will be necessary at this time to have obtained grades from all course directors, have received the reports on rotations, and to have any petitions from students.

- The Examination Committee will then meet and decide from the list of papers, a unique short list of 2-3 papers for the examination.

- The student must then contact their examination committee to determine a date and time of examination.

- Two weeks before the assigned examination day, each student will be given the short list of papers and will be asked to choose one paper from that list for the exam.

- On the day of the examination, each student will be examined by a three member examination committee.
Format of examination: Students will give a 10 minute presentation including background, a succinct description and critical analysis of the paper; followed by 20 minutes of a novel research proposal related to the research focus. The committee will then conduct an oral exam that does not exceed 1 ½ hrs.

Grading: Students can receive grades of: Honors, Pass, and Fail. Students who fail can be admitted to the MS program, can be asked to withdraw from BSGP, or can petition the Steering Committee once to retake the exam at the next time it is offered.

12. Evaluation of Progress
Your Committee on Studies is responsible for the evaluation of your progress toward a degree. A normal, timely completion of program course work and research (along with completion of the various Graduate School requirements) is considered satisfactory progress. The Committee on Studies must meet at least once a year and it must enter a brief progress report (form available from the department Graduate Program Specialist’s office) into the student’s departmental file.

13. Taking a Leave of Absence
Students may find themselves in circumstances that require them to withdraw temporarily from their graduate program. Under such circumstances, the student should request, in a carefully justified letter to the departmental chairperson, a leave of absence. The written request, together with a memo of support from the chairperson or designee of the graduate unit is forwarded to the Graduate Dean who will make the final decision. The time spent in a leave of absence will not count against a student’s eligibility for departmental support.

Students should not take a leave of absence to undertake research work related to their degree. It is not, for example, permissible to take a leave of absence to work on a research grant related in any way to your degree program. PhD students who have passed their comprehensive exam and started enrollment in Nanoscience and Microsystems 699 (Dissertation) must maintain continuous enrollment in this course during their leave of absence.

In cases where the leave of absence becomes prolonged, and there is little hope of a student returning to finish his/her degree program, the chairperson may, in consultation with the student’s Committee on Studies, terminate the student’s relationship with the department.

14. Petition Procedures
Any policy of the Nanoscience and Microsystems Department applying to graduate students that is not also a policy of the College of Arts & Sciences or other institutional body is open to petition for waiver or modification. Such a petition, however, should be made only under exceptional circumstances. The petition must be made by the advisor, must have been approved by the Committee of Studies, and must
be made prior to admission to candidacy. In the case of core requirements, the petition must demonstrate that none of the core courses offered during the relevant two-year period where appropriate and that the suggested substitution is. Granting the petition is solely at the discretion of the Graduate Policy Committee. Petitions will be entertained twice an academic year: once during the Fall semester and once during the Spring semester.

In the event of a disagreement between the Graduate Policy Committee and a student and/or the student’s Advisor or Committee on Studies on the interpretation or implementation of departmental policies, a decision may be appealed to the Chairperson of the Nanoscience and Microsystems Department. The appeal should indicate the nature of the problem and the justification for the appeal. If either party involved wishes to dispute the Chairperson’s decision, the disagreement may be appealed to a meeting of the Nanoscience and Microsystems Department Faculty. Subsequent appeals must follow standard university procedures. University policy for the petition process is described in the Graduate Program section of the UNM Catalog.

15. Policy on Termination
A student may be terminated from graduate status for the following reasons:

1. Receiving three grades of NC and/or F
2. Having a cumulative GPA of less than 3.0 for two consecutive, or three cumulative, enrollment periods (semesters)
3. Failure to meet program requirements

If, in the opinion of the Nanoscience and Microsystems Department, a student shows little promise of completing the degree program, the Department will notify the Dean of Graduate Studies in writing that the student is suspended from further work in that program. This can occur for the following reasons:

1. Twice failing the Master’s, PhD Comprehensive, or PhD Dissertation Defense. (Note: the Committee on Studies may choose not to grant a second try after a failure, in which case termination would occur after a single failure.);
2. Failure to complete various degree requirements within a reasonable length of time.
3. In the event that a graduate student no longer has a Major Advisor (see p.19).
4. Termination will be by personal conference with the student.
16. Financial Aid

Application

Students seeking advanced degrees may apply for financial aid in the form of service awards (assistantships) and non-service awards (fellowships). Non-service awards are available only in limited numbers. All persons receiving financial aid are rigorously evaluated by the entire faculty each spring with regard to their academic progress and job performance.

Assistants who are not legal residents of the state of New Mexico are asked to apply for such status toward the end of their first year at UNM. A form to apply for residency status is available in the Department Office, or at the Student Services Center. These applications must be notarized.

ASSISTANTSHIPS AND FELLOWSHIPS

The following general principles and regulations apply to Assistantships and Fellowships of various kinds.

1. All Assistantships and Fellowships are primarily grants-in-aid given in recognition of the academic promise of the student and to enable the student to earn a graduate degree. Financial need may also be considered.

2. These awards are made only to students currently enrolled, or about to be enrolled, in graduate study.

3. To be eligible for appointment or reappointment as an assistant or a fellow, the student must be in good standing in the Department and the Office of Graduate Studies. “Good standing” includes a cumulative GPA of at least 3.0 in their graduate work.

4. Research Assistants:
   a. Assist in research work that is relevant to and ultimately used for the candidate’s Thesis, Dissertation, or other requirements for the graduate degree.
   b. Are employed for a period not less than one academic semester or the summer period between semesters.
   c. Do not generally receive a tuition waiver, but are eligible for the resident tuition rate, provided his/her FTE is .25 or higher.
   d. Are usually employed for 20 hours/week. A research assistant who has been advanced to candidacy may be employed more than half time with the approval of his or her Major Advisor, the Department Chairperson and the Dean of Graduate Studies. Further, a research assistant may be employed up to a maximum of 40
hours/week during the period between the Fall and Spring Semesters and during the Summer Session, if not registered for classes.

17. Student Loans
The University administers National Direct and Guaranteed Student Loans and cooperates in the administration of a number of other such funds, including the New Mexico Student Loan Program, for which a pre-loan interview must be scheduled before an application is available from the lender. The deadline for filing loan applications varies for each semester. For information, please contact the Student Financial Aid and Career Services Office, Student Services Center (505-277-2041). Please apply through the Graduate Office for fellowship grants, and to the Student Financial Aid and Career Service Office for loans and work-study programs.

18. Student Employment
The University maintains a Career Services Center to assist undergraduates, graduate students and alumni in finding suitable employment. Students desiring part-time employment on or off campus are urged to contact the Student Aid Office.

19. Sources of Research Funds
Research usually costs money; you should not hesitate to explore the limited sources of funding available to graduate students. There are three primary sources of research funding on campus available to graduate students:

20. Outreach
Outreach is always encouraged and extremely important to the success of the NSMS program and UNM as a whole. As a scientist it is our responsibility to educate the general public of the important work we are doing in order to inspire the next generation of scientists and engineers. Outreach opportunities are always available and most likely one of the requirements for any government funded project. A list of currently available opportunities can be found by contacting the NSMS Program Specialist.

21. Facilities & Resources

21.1 Equipment Use and Availability
Material purchased by a faculty member’s grant is under control of that individual. Negotiations should be undertaken with that person for use of equipment or facilities. It is a general departmental policy to maximize the use of equipment, and financial reality does not permit duplication of many items. The
Building Coordinator and the Storekeeper are best informed as to what equipment is in the department and who controls it.

21.2 Telephones
The University of New Mexico is on a centrex system. Within the UNM campus, dial “7” or “2,” as appropriate (UNM phones begin with either “277” or “272”), followed by the last four digits of the number. Outside lines are obtained by dialing “9” for local calls.

21.3 Library
The library should be a key resource for every graduate student. To realize the benefits (and problems) associated with using the UNM Library, you should become familiar with its organization and facilities. Not all the collections are housed in the same building. The Science, Engineering and Map collections, which will be of special interest to you, are located in the Centennial Library near Farris Engineering Hall. Should you wish to arrange a tour of the facility, please contact the Reference staff at the library and they can arrange one for you.

21.4 Teaching Assistant Resource Center (TARC)
TARC was established to provide resources and training for UNM teaching assistants. The center sponsors workshops and provides consulting services. All T.A.s are encouraged to contact TARC, which is located in 218 Marron Hall (277-2759 or 277-3019).

21.5 Graduate and Professional Student Association
Graduate students may need additional information about the university community, including the university administration, the Graduate Professional Student Association at UNM and the neighborhoods around the university. As many graduate students are temporary residents of the Albuquerque area and, frequently, new residents in New Mexico, they may also have specific questions regarding renters’ rights and responsibilities in New Mexico and Albuquerque. The university-wide Graduate Professional Student Association has prepared a handbook. Additionally, the New Mexico Public Interest Research Group has prepared a Renter’s Guide.

21.6 Nanoscience & Microsystems Graduate Student Association (NSMS-GSA)
The purpose of the Nanoscience and Microsystems Graduate Student Association (NSMS-GSA) is unification and collaboration. Nanoscience and Microsystems is an interdisciplinary degree program comprised of students who are mentored by faculty from the School of Engineering, Health Sciences Center, as well as the School of Arts and Sciences. As a student body, we are as physically remote from one another and from diverse areas of research. And there is no other single medium available to meet and interact outside of the classroom. The main goal of this association is to give students a social and academic outlet for collaboration and networking and the opportunity to be actively involved in the administration of the Nanoscience and Microsystems (NSMS) degree program.
22. Biographical Sketches

22.1 Professors:

Dr. Abhaya Datye
Chair of the NSMS Degree Program & Distinguished Professor
PhD: University of Michigan, Chemical Engineering, 1984
Classes taught: NSMS 512 Characterization Methods for Nanostructures
Office/Lab Location: Farris Hall
Contact information: datye@unm.edu
Research Interests: The Datye group researches active sites in bimetallic catalysts for the steam reforming of alcohols, specifically methanol. The group also investigates the phenomena leading to sintering of metal nanoparticles and the loss of metal surface area, including the synthesis of nano-structured catalysts for improved hydrothermal stability during conversion of biomass derived reactants.

Dr. Deborah Evans
Associate Professor, Department of Chemistry
Masters: University of the Witwatersrand, South Africa, 1990
PhD: University of Pittsburgh, 1995
Classes taught: NSMS 512 Chemistry & Physics at the Nanoscale
Office/Lab Location: Clark Hall
Contact Information: debi@unm.edu, 505 277-0570
Research Interests: Our research interests are focused on quantum dynamics in condensed phase systems and materials. Studies of electron transfer in complex materials have been sparked to a large extent by two factors: first, the interest in developing electronic devices in the nanoscale regime and second, the expectation that these smaller systems may provide some insight into the behavior of much larger biological systems. In recent years, experiments of quantum processes in complex materials have provided a wealth of data. Our goal is to understand and predict the behavior of these processes employing time-dependent quantum mechanical calculations. These studies on potentially useful materials provide physically interesting systems where development of highly efficient numerical algorithms is imperative.

Heather Armstrong
Program Specialist, NSMS Nanoscience & Microsystems
Masters: Masters in Public Administration, expected 2013
Office Location: Farris Engineering, 203D
Contact Information: heathera@unm.edu, (505) 277-6824
Research Interests: My job is to make the administrative side of your educational life as smooth as possible. Never hesitate to contact me for any reason. You never know until you ask and you never get what you don't ask for.
22.2 Students:

Godwin Amo-Kwao (PhD)

Alexey Belyaev
M5: Mechanical Engineering, Moscow State University of Ecological Engineering, 2000
1st PhD: Chemical Engineering from Moscow State University of Ecological Engineering, 2004
2nd PhD: NSMS, expected 2013
Contact Information: abelyaev@unm.edu

Francisco Benito
Undergraduate: BS, Electrical Engineering, Universidad Ricardo Palma - Peru, 1996
Masters: MS, Electrical Engineering, University of New Mexico, Fall 2010
PhD: NSMS
Minor: (none)
NSMS concentration: Information Nanotechonology
Advisor: Dr. Zayd C. Leseman. (Mechanical Engineering)
Co-Advisors: Grant Biedermann, PhD. (Sandia National Laboratories)
Kevin Fortier, PhD. (Sandia National Laboratories)
Office/Lab Location: Sandia National Laboratories
Contact Information: fberam@gmail.com
Research Interests: Micro Cavities, Ion Traps, Lasers, Devices for Quantum Computing
After more than 10 years working in the semiconductor industry, I decided to turn over my career and get back to school to pursue a PhD degree in NSMS. In industry, I worked as Manufacturing Engineer and Field Service Engineer, of semiconductor metrology equipment. During this time, I was enrolled at UNM as a MSEE part time student. My Master’s Thesis research, involved the design, fabrication and characterization of a thermal actuator capable to set in motion a fiber cable in a micro-cavity(~20um length). It was completed at MTTC-UNM under the supervision of my advisor Dr. Zayd Leseman. Another part of my Thesis research involved the characterization of the ultra smooth micro mirrors completed at Sandia National Laboratories. Currently, I’m building a 729nm laser with few hundred Hertz of linewidth, capable to stimulate transitions in Calcium ions trapped using Paul technique. The goal of this experiment is measure the heating rate in the trapped calcium ions.

Elena Berliba-Vera

Alicia Billy (MS) 2010-2011

Paul Bisong (PhD) 2008-2009

Brittany Branch
Undergraduate: BS, Chemical Engineering, The University of New Mexico, 2007
Masters: (none)
PhD: NSMS, expected 2013
Minor: Chemical Engineering
NSMS concentration: Nano-Bio Interfaces
Advisor(s): Dimiter Petsev (Chemical Engineering)
Lee Anna Cunningham (Neurosciences)
Office/Lab Location: Farris Engineering Center (FEC)
Research Interests: We have developed a novel method for analyte focusing and separation. The method is based on decoupling of the analyte electrophoresis from the convective electroosmotic flux. This is achieved by using a loop-shaped microfluidic channel and a combination of alternating (AC) and direct (DC) current electric field. The alternating field is locally...
converted to direct field by a pair of semiconductor diodes located alongside the channel. The local direct field then applies electroosmotic force on the adjacent fluid resulting into a circulatory motion in the loop. In addition to rectification of the AC field the diodes short circuit the DC field creating a gradient in the electric field on either side of the diodes. The direct field has no effect on the fluid but leads to electrophoresis of the dissolved analytes. Hence the fluid and analytes are independently controlled by the magnitudes of the applied alternating and direct fields. Balancing the electrophoretic against the convective flux allows focusing the analyte particles or molecules at specific locations in the channel. Incorporating multiple diodes with a nonlinear spacing will result in different magnitudes of the electric field contributing to the electrophoretic flux enabling multiple focusing points for complex analyte separation. The focusing has been numerically modeled and analyzed by computational fluid dynamics simulations. Model experiments have been performed to prove the concept and the applicability of the method.

Anthony Bravo (PSM) 2010-2011

McKensey Buley (PhD) 2010-2011

Avid Cahan
Masters: (none)
PhD: NSMS, expected 2014
NSMS concentration: Nano-Bio Interface
Advisor: (none)
Contact Information: anibesin@gmail.com
Research Interests: Catalysis at the Nanoscale. At my current position, I direct a team of scientists researching biochemical pathways to produce infrastructure-compatible liquid fuels from multiple types of biomass (agricultural wastes, waste paper and algae). Once identified, key enzymes facilitating those pathways are being replaced with alternative structures made of DNA (DNA origami). Amino acid residues are placed in the same conformation found at the active site of the original enzyme and the structure is rigorously tested until activity is confirmed.

Athena Christoudoulou (PhD) 2010-2011

Kirsten Cicotte (PhD) 2010-2011

Vince Cowan
Undergraduate: BS, Electrical Engineering, Oregon Institute of Technology, 2006
Masters: MS, Electrical Engineering, University of Dayton, 2008
PhD: NSMS, expected 2011
Minor: (none)
NSMS concentration: (none)
Advisor: Sanjay Krishna (Center for High Technology Materials)
Office/Lab Location: Air Force Research Laboratory, Kirtland Air Force Base
Contact Information: vincent.cowan@kirtland.af.mil
Research Interests: My research interests include the characterization of the electrical and optical properties of novel IR detector architectures used in photon starved space based imaging applications. In particular, I’m interested in strain-layered superlattice (SLS) based barrier architectures, namely nBn mid wave infrared (MWIR) detectors. Currently, I’m trying to develop a better understanding of the dark current mechanisms limiting the performance of InAs/GaSb based SLS nBn MWIR detectors. The goal of my research is to develop an improved MWIR nBn detector design that will suppress dark current further.

Noel Dawson (PSM) 2010-2011

Paul Durfee (PSM) 2010-2011
Mark Fleharty
Undergraduate: BS, Computer Science, University of New Mexico, 2000
Masters: MS, Computer Science, University of New Mexico, 2010
PhD: NSMS (in progress)
Minor: (none)
NSMS concentration: Nano-Bio Interfaces
Advisor: (none)
Office/Lab Location: (none)
Contact Information: fleharty@unm.edu
Research Interests: I am interested in algorithmic self-assembly of nanoparticles to form macromolecular assemblies and using nanoparticles to develop novel catalysts.

Andrea Gonzales (PSM) 2010-2011

Eric Hill
Undergraduate: BS, Chemistry - ACS-accredited, minor: German, Southern Oregon University, 2009
Masters: (none)
PhD: NSMS, expected 2013
Minor: Chemistry
NSMS concentration: Nano-Bio interfaces
Advisor: David Whitten
Office/Lab Location: CBME South labs, Centennial Engineering Center
Research Interests: I am currently working on the photochemistry and photophysics of novel polymers and oligomers, both through experimental and theoretical work. In addition I work at the Mass Spectrometry facility on campus, where much of the workflow is geared towards the field of proteomics. My scientific interests are very widespread, though I have a particular interest in photochemistry, nanostructure fabrication, and establishing provenance of natural products through chemical means.

Patrick Johnson
Undergraduate: BS, Physics, UC San Diego, 2007
Masters: (none)
PhD: NSMS
Minor: (none)
NSMS concentration: Nano-Bio interfaces
Advisor: Jeffrey Brinker (Advanced Materials Lab)
Office/Lab Location: Advanced Materials Lab
Research Interests: After completing my undergraduate degree in physics at the University of California, San Diego, I accepted a position in the Brinker Nanostructures Group within the NSMS department at UNM. I currently work with Drs. Jeff Brinker and Graham Timmins performing various lab wizardry including the development of state of the art vaccines for Tuberculosis. This project involves pairing living cells with synthetic nanomaterials, which together form durable, versatile Bio-Nanomaterials that afford the cells to withstand extreme conditions that would otherwise destroy them. Outside of the lab, I enjoy normal things such as skiing during the day, brewing beer and art projects in addition to abnormal things like driving Smart cars, skiing in the dark and wishing to one day become “that crazy old professor”.

Emmalee Jones
Undergraduate: BS, Applied Physics, Brigham Young University, 2009
Masters: (none)
PhD: NSMS, expected 2014
Minor: (none)
NSMS concentration: Nano-Bio Interfaces
Advisor: Dr. Eva Chi (Center for Biomedical Engineering)
Office/Lab Location: CBME (Centennial Engineering Center)
Contact Information: ejones02@unm.edu
Research Interests: Nano-Bio Interfaces. At BYU I conducted research in the physics department developing higher efficiency amorphous silicon solar cells. Currently at UNM, I am most interested in protein misfolding and aggregation in human diseases. Specifically I work in the Center for Biomedical Engineering investigating the interaction between lipid membranes and tau protein, a protein which is found in an abnormal state in Alzheimer’s disease patients. My lab also investigates other protein interactions, and I have contributed to research on the interaction of lipid membranes with known biocidal polymers as well.

Sarah Kintner
Undergraduate: BS, Mechanical Engineering, Villanova University, 1982
Employment Experience: Professional Engineer, 25 years+ in graphic arts, holography, start-up x-ray film replacement ventures, pharmaceutical consulting and semiconductor mechanical support systems
Masters: (none)
PhD: NSMS, expected 2014
NSMS concentration: Nano-Biological, Nano-Surface Chemistry
Contact Information: skintner@unm.edu
Research Interests: Currently working with Geobacter Uraniumreducens surface energy characterization on SAMs for use in microbial fuel cell anodes.

David Kissel

Patricia Langan (PSM) 2010-2011

Jean Leger (MS) 2010-2011

Shalini Low-Nam
Undergraduate: BS, Molecular and Cellular Biology, The Johns Hopkins University, 2004
Masters: (none)
PhD: Biomedical Sciences, expected 2011
Minor: NSMS
NSMS concentration: (none)
Advisor: Dr.s Bridget Wilson and Diane Lidke (Cell Pathology)
Office/Lab Location: Cancer Research Facility, 205
Contact Information: SLow-Nam@salud.unm.edu
Research Interests: We are interested in the dynamics of proteins in the plasma membrane with an emphasis on spatial arrangements, temporal reorganization, and the effects that these phenomena have on signal transduction. The ErbB, or Her, family of receptor tyrosine kinases requires dimerization to initiate signaling. We are collecting quantitative data of erbB receptor diffusion and dimerization rates using quantum dot technology and single particle tracking and Hidden Markov Model analytic approaches. We are studying homo- and hetero-dimer interactions, as well as studying oncogenic mutants of the erbB receptors. Ultimately, the parameters generated in this work will be useful in predictive and computational models of erbB signal transduction.

Eric Martin (PhD) 2010-2011

Ulises Martinez
Undergraduate: BA, Chemistry, Goshen College, IN, 2004
BA, Physics, Goshen College, IN, 2004
Masters: MS, Chemical Engineering, University of New Mexico, NM, 2009
PhD: Chemical Engineering, University of New Mexico, In progress
Minor: Nanoscience and Microsystems
NSMS concentration: None
Advisors: Plamen Atanassov (Center for Emerging Energy Technologies)
          Abhaya Datye (Center for Micro-Engineered Materials)
Office/Lab Location: Farris Engineering Building
Contact Information: ulisesam@unm.edu
Research Interests: Binary catalytic systems offer a number of advantages over pure metal catalysts. Bimetallic catalysts provide stability, increased reactivity, and functionality. My research interests involve the synthesis, characterization, and testing of single-phase bimetallic catalysts for the electro-oxidation of a number of fuels such as hydrazine and ethanol for fuel cell applications.

Amber McBride
Undergraduate: BA, Political Science, The University of Kansas, 2004
B5, Molecular Biology, Kansas State University, 2007
Masters: (none)
PhD: NSMS, expected 2014
Minor: (none)
NSMS concentration: Nano-Bio Interfaces
Advisor(s): Pavan Mutttil (College of Pharmacy)
Office/Lab Location: Clinical and Translational Science Center (CTSC)
Contact Information: aamcb@unm.edu
Research Interests: Drug delivery via inhaled aerosol microparticles. I am interested in the development of novel inhaled drug and vaccine delivery systems by the pulmonary route for the treatment of tuberculosis and lung cancer.

Ryan Molecke
Undergraduate: BS, Computer Engineering, UNM 2006
PhD: NSMS, expected 2011
NSMS concentration: Nano-Bio Interfaces
Advisor(s): C. Jeffrey Brinker, Ph.D. (Sandia / ChNE)
          P. Randall Schunk, Ph.D. (Sandia / ChNE)
          Stanly Steinberg, Ph.D. (Mathematics)
          Susan Atlas, Ph.D. (Physics)
Office/Lab Location: Advanced Materials Lab (AML)
Contact Information: reason@unm.edu

John Montoya

Stephen Myers
Undergraduate: BS, Engineering Physics, Tarleton State University, Stephenville, Texas, 2007
Masters: ECE, expected Fall 2010
PhD: NSMS, expected Spring 2012
NSMS concentration: Information Nanotechnology
Advisor(s): Sanjay Krishna (Center for High Technology Materials, CHTM)
          Marianne Berwick (Health Sciences Center, HSC)
Office Location: CHTM 117
Lab Location: CHTM 175A and 165A, Dykewood Facility MICA Lab
Contact: email: smyers@chtm.unm.edu phone: 505-272-7849
Research Interests: III-V semiconductor based infrared (IR) detectors. Fabrication and characterization of infrared detectors for mid-wave (MWIR, 3 – 5 μm) and long-wave (LWIR, 8 – 12 μm). I am currently working with the optimization of a detector
architecture that utilizes a barrier design known as nBn for the ternary InAsSb and InAs/GaSb type-II superlattice material systems. This work includes analysis of current – voltage and capacitance voltage behavior for determining experimental bandstructure characteristics as well as signal and noise measurements for determination of responsivity, detectivity, efficiency and gain. I am also interested in applications of IR detectors to medical imaging specifically for diagnostics of skin cancer.

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Duy Nguyen
Undergraduate: BS, Optical Science and Engineering, University of California, Davis, 2005
BS, Biological Science, University of California, Irvine, 2002
Masters: (none)
PhD: NSMS (currently pursuing)
NSMS Concentration: Complex Materials
Advisor: Wolfgang Rudolph (Physics and Astronomy)
Office/Lab Location: Physics and Astronomy 146, B15
Research Interests: Femtosecond light pulses interaction with dielectric materials. Focusing on laser induced damage threshold (LIDT) of various oxide thin films (fundamental science and applications).

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Mario Paz
Undergraduate: BS, Mechanical Engineering, University of New Mexico, 2006
Masters: (none)
PhD: NSMS, expected 2013
Minor: (none)
NSMS concentration: Nano-Bio Interfaces
Advisor(s): Diane Lidke (University of New Mexico Pathology Department)
Office/Lab Location: CRF 205 (Cancer Research Facility)
Contact Information: romeous@unm.edu
Research Interests: Nano-Bio Interfaces. Conducting experimental research on the kinetics of adapter proteins in the EGF Receptor signaling cascade. Currently developing a protocol for one way to investigate these proteins and there interaction. I am most interested in cancer and pathological research, in general. Overlapping fields of research are materials science, biochemistry, microscopy, cell signaling, and cell trafficking.

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Jonathan Paiz
Undergraduate: BS, Chemical Engineering, University of New Mexico, 2009
Masters: (none)
PhD: Engineering Chemical, expected 2013
Minor: NSMS
Advisor: Abhaya Datye (Center for Micro Engineereed Materials)
Office/Lab Location: Farris Engineering Center
Contact Information: jpaiz1@unm.edu
Research Interests: Catalysis is an essential area of research that shapes our chemical economy. Catalysts are used throughout industry to achieve selective synthesis of desired chemical products. Heterogeneous catalysts are generally composed of metals or oxides. Transition metals such as platinum and palladium are good catalysts in their own right, but their properties can be dramatically improved by addition of a second metal component .The objective of my research is to develop methods for producing nanoparticle bimetallic catalysts of controlled size and composition. The bimetallic nanoparticles will be tested in a number of catalytically important reactions, such as selective acetylene hydrogenation, and alcohol reforming.

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Jennifer Pelowitz
Undergraduate: BS, Chemistry and Biology, UNM, 2009
Masters: (none)
PhD: NSMS, expected 2013
Minor: (none)
NSMS concentration: Nano-Bio Interfaces
Advisor(s): Jeffrey Brinker (Chemical Engineering)
Cristina Takacs-Vesbach (Biology Dept)
Office/Lab Location: AML (Advanced Materials Lab)
Contact Information: pelowitz@unm.edu
Research Interests: Nano-Bio Interfaces. Researching how nano-confinement in sol-gel affects single cells and cell populations, currently focusing on S. cerevisiae. I am particularly interested in exploring gene expression, comparing proteomic and RNA approaches. Overlapping fields of research include materials science, molecular biology, cell signaling, and cellular anhydrobiosis.

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Eric J. Peterson
Research Interests: Structure of binary metallic compounds for catalysis, Rietveld analysis, X-ray Absorption Spectroscopy.

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John Plumley
Undergraduate: BS, Chemical Engineering, University of New Mexico Tech, 2008
Masters: (none)
PhD: NSMS, expected 2013
Minor: (none)
NSMS concentration: Nano-Bio Interfaces
Advisor(s): Marek Osinski (Center for High Technology Materials)
Erin Milligan (Center for Biomedical Engineering)
Office/Lab Location: CHTM (Center for High Technology Materials)
Contact Information: john9@unm.edu
Research Interests: Colloidal synthesis, characterization, and bio-functionalization of quantum dots (QDs). Researching QDs for their potential as a biomarker for the early detection of amyotrophic lateral sclerosis.

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Antonio Rivera (PhD) 2010-2011

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Michael H. Robson
Undergraduate: BS in Molecular and Cellular Biology from the University of Arizona
Masters: MS in Biochemistry from Texas State University
PhD: NSMS
Minor: (none)
NSMS concentration: 
Advisor(s): 
Office/Lab Location: Ferris Engineering Center
Research Interests: My research focuses on the design and development of platinum-free catalysts for fuel cell applications. Although catalysis is my focus, electrochemistry in general is my primary laboratory interest, which extends into piezoelectrics and quantum dot projects. I am very interested in novel applications for these materials and moving them into the market.

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Joshua Roxby (PhD) 2010-2011

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Jared Neal Roy
Undergraduate: BS, Civil Engineering, The University of New Mexico, 2007
Masters: (none)
PhD: NSMS, expected 2013
Minor: Environmental Engineering
NSMS concentration: Nano-Bio Interface
Advisor(s): Plamen Atanassov (Center for Emerging Energy Technologies)
Office/Lab Location: Ferris Engineering Center
Environmental Engineering Laboratories (CENT)
Contact Information: JNR702@gmail.com
Research Interests: I am interested in the interface between the microbial and macro worlds: Researching the remarkable ability for some bacteria to interact with conductive surfaces to form communities engaged in anaerobic respiration and the exciting possibility to engage these microorganisms in environmental remediation. Currently I am working towards the standardization of these systems by silica thin film encapsulation to impede proliferation of the organisms at the interface. I am also currently engaged in the understanding of the mechanisms and phenomena by which these organisms can respire with metals and electrodes. All for the ultimate application of these systems, engineered, in microbial fuel cells for wastewater remediation.

Matthew Rush
Undergraduate: BS, Mechanical Engineering, New Mexico Tech, 2009
Masters: (none)
PhD: NSMS, expected 2013
Minor: (none)
NSMS concentration: Nano-Bio Interfaces
Advisor(s): Elizabeth Dirk (Center for Biomedical Engineering)
Jeffrey Brinker (Advanced Materials Lab)
Office/Lab Location: CBME (Centennial Engineering Center)
Contact Information: mrush@unm.edu
Research Interests: Nano-Bio Interfaces. Conducting research on the effects of mechanical stimuli on bone growth and cellular differentiation. Currently developing a Bio-reactor for mechanical straining of cells during growth. I am most interested in the field of bone tissue engineering, but work in a lab also conducting heart valve research, and have contributed to work on determining affinity of drug delivery particles to cancer cells. Overlapping fields of research are materials science, polymer chemistry & surface modification, cell signaling, and cellular attachment.

Christina Salas
Undergraduate: BS, Mechanical Engineering, California State University, Chico, 2005
Minor: Manufacturing
Masters: MS with Distinction, Mechanical Engineering, University of New Mexico, 2008
PhD: Mechanical Engineering, expected 2012
Minor: Nanoscience and Microsystems
Major concentration: Experimental and Computational Biomechanics
Advisor(s): Mahmoud Reda Taha (Department of Civil Engineering, Department of Mechanical Engineering)
Thomas A. DeCoster (UNMH, Department of Orthopaedics and Rehabilitation)
Dan Dragomir-Daescu (Mayo Clinic, Division of Engineering)
Office: Centennial Engineering Center Rm. 2000
Lab: Orthopaedic Biomechanics Lab – Basic Medical Science Building G82
Contact Information: csalas@unm.edu
Research Interests: Experimental and Computational Biomechanics. My Master’s thesis included an experimental and computational finite element analysis of periprosthetic fracture when using locking plates versus intramedullary nails in treatment of distal femoral fractures. Further research on this topic included a monte carlo analysis to determine the probability of periprosthetic fracture when using these two implants in osteoporotic bone. As the only engineering research assistant for the Department of Orthopaedics and Rehabilitation I assist with all research projects that have a basic science experimental component. The most recent topics of research include: benign osseous tumors of the femur, new treatment for early trapeziometacarpal joint arthritis, new external fixator configuration for the tibia, peg vs. screw for intramedullary nails, and irreducible dislocation of the metacarpophalangeal joint. My PhD research currently being completed at the Mayo Clinic in Rochester, MN is exploring methods for predicting femoral fracture initiation and failure patterns in patients using low resolution (minimal radiation) CT scans coupled with finite element techniques. The ultimate goal is to identify high risk patients in order to provide early treatment for prevention of catastrophic events.
Ron Salesky
Undergraduate: BS, Physics, Drexel University, 1989
Masters: Electronics Engineering, Drexel University, 1998
PhD: NSMS, expected (insanely hope by?) 2012
Minor: (none)
Advisor: Zayd Leseman (Mechanical Engineering)
Office/Lab Location: ME (Mechanical Engineering Bldg)
Contact Information: rsalesky@unm.edu
Research Interests: Molecular self-assembly into systems, mechano-chemistry of molecular motors, and computational chemistry. Conducting research on templated self-assembly of carbon nanotubes and aligned growth of carbon nanotubes. Currently doing molecular dynamics studies using NAMD and investigating feasibility of templated self-assembly of carbon nanotubes with nucleic acids. I am very interested in nano-applications to solar and thermal energy, molecular systems assembly for electronics and water filtration via carbon nanotube membranes.

Angelica Sanchez
Undergraduate: B.S., Chemical Engineering, cum laude, concentration in Materials Processing, University of New Mexico, 2009
Masters: (none)
Ph.D.: Chemical Engineering, expected 2013
Minor: Nanoscience and Microsystems
Advisor: Abhaya Datye (Chemical Engineering)
Office/Lab Location: Farris Engineering Center
Contact Information: asanch18@unm.edu
Research Interests: My research focuses on the development of a sinter-resistant catalyst with applications in energy, fuel, and chemical production. The project involves synthesizing gold catalyst nanoparticles on several different oxide supports and testing their stability during calcination treatments and reaction conditions. Techniques such as AFM, SEM and TEM are used to characterize both the support and the catalyst. The goal of this project is to obtain a fundamental understanding of nucleation sites of a thermally stable, sinter-resistant catalyst.

Samantha Schwartz
Undergraduate: BS, Physics, Carnegie Mellon University, 2006
Masters: (none)
Ph.D.: NSMS, expected 2012
NSMS concentration: Nano-Bio Interfaces
Advisor(s): Diane Lidke (Cell Pathology) and Keith Lidke (Physics)
Office/Lab Location: Cancer Research Facility, 205
Contact Information: samls@unm.edu
Research Interests: Fluorescence microscopy techniques for characterizing both the spatial distribution and the dynamics of proteins within the plasma membrane cell surface. Specifically, investigating the immune receptor FcεRI and how clustering at the cell surface initiates intracellular signal transduction.

Robin Sewell (PSM) 2010-2011

Josephine J. Sheng
Undergraduate: BS, Electrical Engineering, University of California, San Diego, 2001
Masters: MS, Electrical Engineering, University of New Mexico, 2007
PhD: NSMS, expected 2011
Minor: (none)
NSMS concentration: Information Nanotechnology
Advisor(s): Sang M. Han (Chemical and Nuclear Engineering)
Office/Lab Location: Farris Engineering
Contact Information: jsheng@unm.edu
Research Interests: For my masters, I focused on the minority carrier lifetime of germanium (Ge) grown on silicon (Si) by plasma enhanced chemical vapor deposition (PECVD). To utilize the knowledge I gained from my masters, my PhD research is focused on the electrical characterization of low defect "Touchdown" Ge on Si grown using molecular beam epitaxy (MBE). Electrical characterization techniques include capacitance-voltage (C-V) measurements, Hall effect, and minority carrier lifetime. My goal is to build a device using our patented Touchdown technique.

Greg Smith
Undergraduate: BS, Chemistry, Northeastern University, 1999
Masters: (none)
PhD: Chemistry, expected 2011
Minor: NSMS
Advisor: Hua Guo (Chemistry)
Office/Lab Location: Bandelier East
Research Interests: Quantum Mechanical Modeling of Catalysis. My first interest involves modeling of enzyme reaction barriers to investigate chemical mechanisms and provide transition state structures which can become templates for designing inhibitor molecules. My second interest involves modeling catalysis on metal surfaces using plane-wave DFT. Understanding all available pathways and their kinetic barriers can lead to better catalysis design by using morphology to maximize desired pathways and minimize undesired ones. My systems of interest have been bacterial enzymes involved in short circuiting the body’s immune response (MAPKs), protein kinases involved in the cell cycle (CDK2), and PdZn alloy, which has gained widespread interest as a catalyst in Methanol Steam Reforming, a potential solution to hydrogen storage issues.

Haytham Soliman (PSM) 2010-2011

Juanita Trevino
Undergraduate: BS, Mechanical Engineering, The University of New Mexico, 2009
Masters: (none)
PhD: NSMS, expected 2015
Minor: (none)
Advisor: Ron Lumia (MechE)
Contact Information: trevino3@unm.edu
Research Interests: My research involves using ionic polymer metal composites (IPMC) as dynamic sensors, transducers, and actuators. Strips of IPMCs will exhibit large dynamic deformations when placed in time-varying electric fields, allowing them to be used as small and compliant micro-grippers. When deformed, IPMCs act as transducers allowing them to sense displacement and force. Due to their compliant nature and ability to work in wet environments, IPMCs will enable the testing and manipulation of biological agents.

Adam Tsosie
Undergraduate: BS, Biology, UNM, 2007
Masters: (none)
PhD: NSMS
Minor: Chemistry
NSMS concentration: Algal-Derived Biofuels
Advisor(s): Abhaya Datye (CMEM), David Hanson (Biology), Andy Schuler (Civil Engineering)
Office/Lab Location: CMEM main, Farris
Contact Information: atso45@unm.edu
Research Interests: Conducting research on algal growth rates and lipid production in various mediums, including wastewater, for biofuel applications. Currently working with Chlorella sorokiniana, and researching the various factors that affect lipid production by using experimental design for optimization.
Kristin Wilde
Undergraduate: BS, Chem. Engr., Auburn University, 2007
Masters: (none)
PhD: CHNE, expected 2012
Minor: (none)
Advisor: Heather Canavan (CHNE)
Office/Lab Location: Centennial Engineering Center 548
Contact Information: wildek@unm.edu
Research Interests: My research interests include biomaterials, nanotechnology, and surface and interfacial science. In particular, I am investigating the fundamental mechanism of how mammalian cells detach from poly(N-isopropyl acrylamide) (pNIPAM), a thermo-responsive polymer. This unusual behavior has potential applications in tissue engineering, biosensors, and cancer cell biology. However, due to health concerns associated with the NIPAM monomer, pNIPAM-based technologies will be limited until it is proven that the cells do not remove the polymer as they detach, hence there is a motivation to study the mechanism of detachment. I am using a mixture of traditional surface analysis techniques (e.g., X-ray photoelectron spectroscopy, mass spectrometry, electron microscopy), as well as novel biophysical techniques (e.g., semiconducting nanocrystals, or quantum dots, for fluorescence imaging).

Adam Wise
Undergraduate: BS, Applied Physics, Rensselaer Polytechnic Institute, 2007
Masters: (none)
PhD: NSMS, expected 2012
Minor: (none)
Advisor: Dr. John K. Grey (Chemistry)
Office/Lab Location: Clark Hall B74
Contact Information: wise.adam.jay@gmail.com
Research Interests: Spectroscopy of soft materials, photovoltaic materials, conjugated polymers, etc. Charge transport through the same.

Haynes Wood

Joshua Wu (PhD)

Shisheng Xiong

Jingshu Zhu
Undergraduate: B.E., Jimei University, China, 2006
Masters: M.S. Nanjing University, China, 2009
PhD: NSMS, expected 2015
Minor: (none)
NSMS concentration: Nano-Bio Interfaces
Advisor(s): Steven Graves (Center for Biomedical Engineering) Bruce Edwards (Department of Pathology)
Office/Lab Location: CBME (Centennial Engineering Center)
Contact Information: jingshu@unm.edu
Research Interests: My research is about microsphere based protease assay by flow cytometry, advised by Dr. Bruce Edwards and Dr. Steven Graves in Center of Biomedical Engineering. This work is capable of using full length protease substrates to measure proteolytic activity via loss of fluorescence testing by flow cytometry. As well, this assay is capable of being used in high throughput screening for small molecule inhibitors for proteases of medical relevance. Flow cytometry enables
simultaneous analysis of multiple substrates in the same sample via use of distinct microsphere populations for each substrate, each distinguished by differing amounts of internal fluorescence intensity.
### Nanoscience and Microsystems
#### 4 year PhD Flow Chart

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Semester 2</th>
<th>Semester 3</th>
<th>Semester 4</th>
<th>Semester 5</th>
<th>Semester 6</th>
<th>Semester 7</th>
<th>Semester 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 NSMS S10</td>
<td>3 NSMS S10</td>
<td>3 NSMS S18</td>
<td>1 COS</td>
<td>3, 6, 9, 12</td>
<td>3, 6, 9, 12</td>
<td>3, 6, 9, 12</td>
<td>3, 6, 9, 12</td>
</tr>
<tr>
<td>3 NSMS 510</td>
<td>3 NSMS 510</td>
<td>3 NSMS 518</td>
<td>Qualifying Exam **</td>
<td>+ AE + AC Comprehensive Exam **</td>
<td>+ ADC</td>
<td>+ AE</td>
<td>Thesis Defense ***</td>
</tr>
<tr>
<td>3 NSMS 512</td>
<td>3 NSMS 512</td>
<td>3 NSMS 518</td>
<td>1 Departmental Seminar</td>
<td>1 Departmental Seminar</td>
<td>1 Departmental Seminar</td>
<td>1 Departmental Seminar</td>
<td>1 Departmental Seminar</td>
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<tr>
<td>1 Qual Prep CHNE 502</td>
<td>1 Qual Prep CHNE 502</td>
<td>3 Elective 2</td>
<td>3 Elective 2</td>
<td>3 Elective 4</td>
<td>3 Elective 4</td>
<td>3 Elective 7</td>
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<tr>
<td>3 Elective 1 (opt.)</td>
<td>3 Elective 5</td>
<td>3 Elective 5</td>
<td>3 Elective 6</td>
<td>3 Elective 6</td>
<td>3 Elective 8</td>
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<td>3, 6, 9, 12 GD Dissertation (18 Hour Tot)</td>
<td>3, 6, 9, 12 GD Dissertation (18 Hour Tot)</td>
<td>3, 6, 9, 12 GD Dissertation (18 Hour Tot)</td>
<td>3, 6, 9, 12 GD Dissertation (18 Hour Tot)</td>
<td>3, 6, 9, 12 GD Dissertation (18 Hour Tot)</td>
<td>3, 6, 9, 12 GD Dissertation (18 Hour Tot)</td>
<td>3, 6, 9, 12 GD Dissertation (18 Hour Tot)</td>
<td>3, 6, 9, 12 GD Dissertation (18 Hour Tot)</td>
</tr>
</tbody>
</table>

Optional classes as recommended by your committee

+ Intent to Grad.

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**Required Core:** NSMS S10, S12, S18, S19, S20  
Nano-Bio Interfaces: NSMS S24L, S30, S38, S44L  
Complex Functional Materials: NSMS S20, S33, S59, S75  
Information Nanotechnology: NSMS S32, S71, S72, S73, S74L  

- Dissertation submit within 90 days of defense. Must complete Dissertation within 5 years of AC  
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**Required Core:** NSMS S10, S12, S18, S19, S20  
Nano-Bio Interfaces: NSMS S24L, S30, S38, S44L  
Complex Functional Materials: NSMS S20, S33, S59, S75  
Information Nanotechnology: NSMS S32, S71, S72, S73, S74L  

- Dissertation submit within 90 days of defense. Must complete Dissertation within 5 years of AC  
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- Dissertation submit within 90 days of defense. Must complete Dissertation within 5 years of AC

* Should be taken following completion of Core, Must be Finished by Sem 4  
** Should be taken in semester following Qual.  
*** Dissertation submit within 90 days of defense. Must complete Dissertation within 5 years of AC

- Announcement of Examination Form (submit 2 weeks prior)  
- Application for Candidacy Form (submit upon completion of Comp)  
- Appointment of Dissertation Committee Form  
- Graduation Deadline, complete by July 15 (Sum), Nov. 15 (Fall), April 15 (Spr.)  
- All But Dissertation  
- Committee on Studies, to be formed upon completion of Qual.
Appendix A: OGS Forms
1. OGS Master's Snapshot
2. Masters Checklist
3. Program of Studies – Masters
4. Transcripted Minor Form
5. OGS PhD Snapshot
6. Doctoral (PhD) Graduation Checklist
7. Announcement/Report of Examination
8. Qualifying Exam Directions/Procedure
9. Qualifying Exam Oral Exam Rubric
10. Application for Candidacy
11. Appointment of Dissertation Committee
13. Common Manuscript Problems
14. Certificate of Final Form for Manuscript
15. Intent to Graduate
16. Request of Certificate of Completion
17. Language Skill Requirement
18. NSMS Database Form
19. Commencement Ceremony Request