VIRTUAL TRITON DAY

NANOENGINEERING DEGREE PROGRAM

Professor Vlado Lubarda

THIS PRESENTATION WILL NOT BE RECORDED

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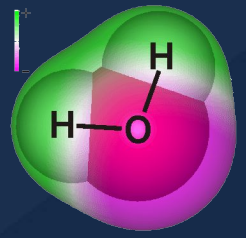
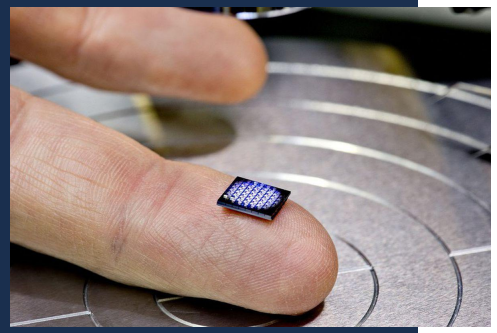
Nanoengineers (that could be you!) control materials and processes on the scale of 1-100 nm.

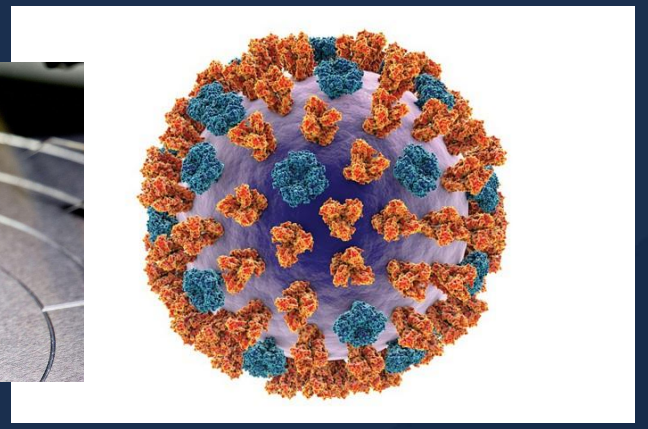


Water molecule
~0.2 nm

DNA
~2 nm



Transistor
~10 nm



Flu Virus
~100 nm

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This highly interdisciplinary research is of fundamental importance for

Nanomedicine, flexible and stretchable electronics, energy conversion and storage, biomaterials and bioinspired materials, nanophotonics, nanoelectronics, nanomagnetics, complex metallic and ceramic materials, composites and alloys, computational materials science, high-performance computing, machine learning, data science and artificial intelligence, … etc …

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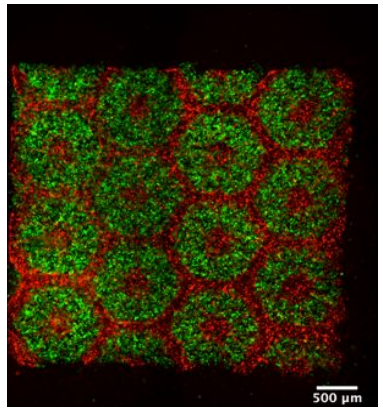
Impact of Nanoengineering

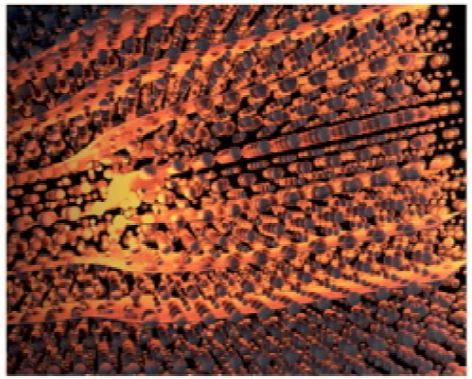
- In the coming years, nanotechnology will impact nearly every aspect of human life, in tangible, obvious ways.

Nanomedicine



Nanoparticles and targeted drug delivery

Energy storage



Long -life battery technology

Computing

Computational design of new, smart and functional materials

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A detailed description of research activities in NanoEngineering at UCSD has been recently described in ACS Nano 14 (2020):

www.acsnano.org

Exploring Frontiers in Research and Teaching: NanoEngineering and Chemical Engineering at UC San Diego

Cite This: *ACS Nano* 2020, 14, 9203–9216

Read Online

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Industries Employing Nanoengineers

- Earning a B.S. in Nanoengineering will provide training for a traditional engineering fields, in addition to new, developing fields that involve nanostructured materials. These include:
  - Electronic materials & device manufacturing
  - Polymers and composite materials
  - Sensor technology & environmental remediation
  - Alternative and renewable energy
  - Paints, coatings, advanced inks
  - Agriculture; food and drink
  - Pharmaceuticals, drug delivery, & toxicology
  - Advanced textiles
  - Personalized medicine: tissue engineering, gene therapy, stem cell development
- Competitive average salary of department grads
- 90% employed in a position related to major

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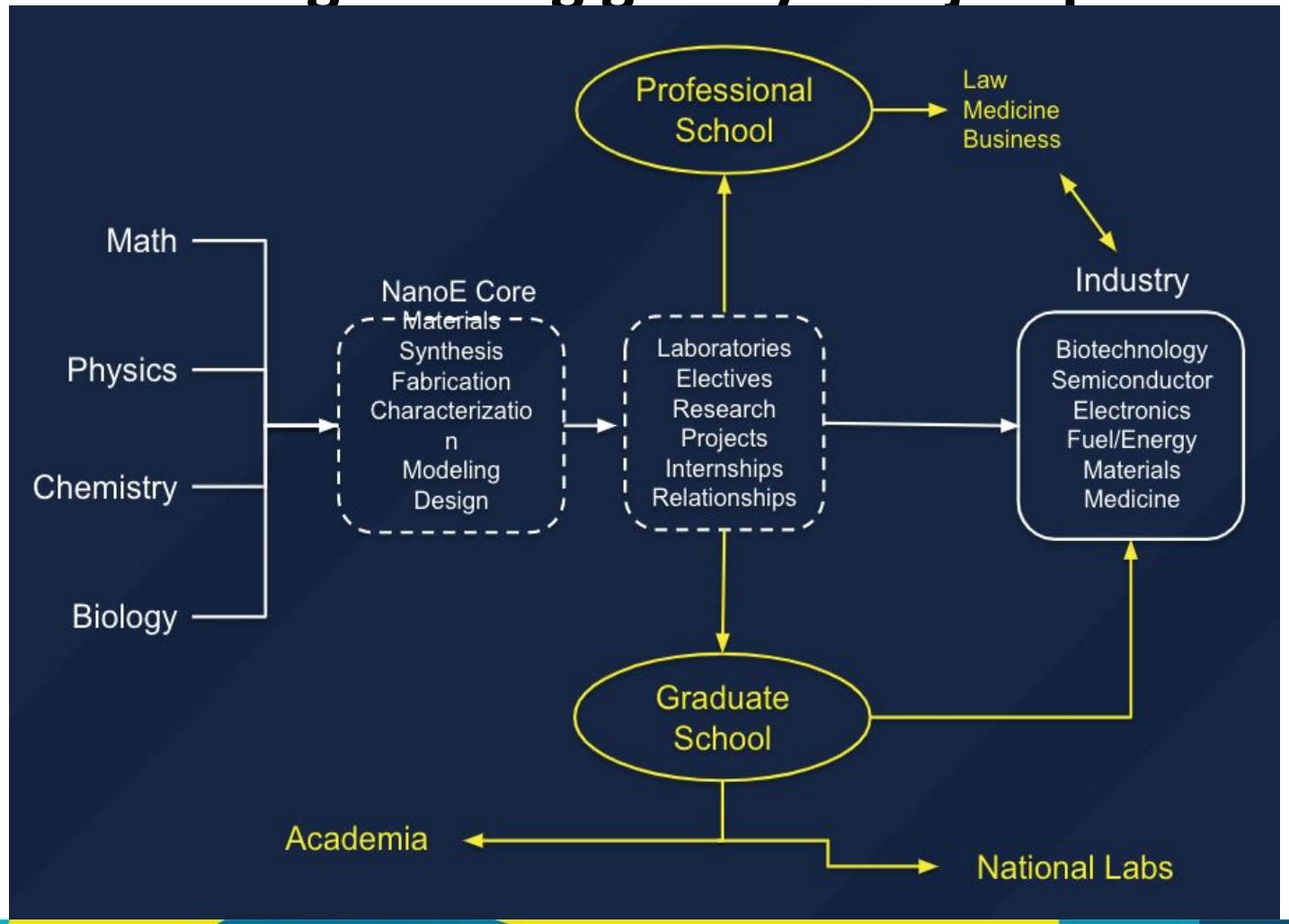
A degree in NanoEngineering gives you a jumpstart in training!



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The NANO curriculum will enable you with different engineering skills than other majors, by combining strong fundamentals of applied science with nanoengineering skillset.

YEAR 1	• **Engineering Prep**
YEARS 2-3	• **Fundamentals in Applied Science** (102:Chemistry, 104:Physics, 103:Biology, 106:Crystallography) • **Nanoengineering Skillset** (111:Characterization, 107:Electronics, 112:Fabrication, 110:Modeling)
YEAR 4	• **Capstone Design**

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There are courses to provide experiential training at all levels

YEAR 1	• NANO 4: Experience Nanoengineering (1 units)
YEAR 2	• NANO 20L: Nanomaterials Synthesis (1 unit), concurrent with NANO 102: Chemical Principles
YEAR 3	• NANO 100L: Physical Properties of Materials Laboratory (4 units, NANO 108: Materials Science prereq)
YEAR 4	• NANO 119: Engineering Design (1 unit) • NANO 120 A&B: Nanoengineering System Design, Capstone Design (8 units, 2 quarters)

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NANO 199. Independent Study for Undergraduates

Independent reading or research on a problem by special arrangement with a faculty member. P/NP grades only. ***Prerequisites:*** upper division, department stamp, and agreement of faculty advisor.

- Equivalent to Senior Thesis (but could be done as a junior)
- Minimum GPA of 3.0
- Two consecutive quarters
- Most continue beyond the two quarters

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Advanced B.S./M.S. Program

- A contiguous program leading to a bachelor of science and a master of science degree in nanoengineering is offered to a student with junior standing who has an upper-division GPA of 3.5 or better.
- Students are admitted without having to take the GRE.
- The degree is offered under both the Thesis Plan and the Comprehensive Examination Plan.

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NANO majors can earn a minor in Data Science!

The emerging discipline of **Materials Informatics** is at the intersection of materials science, computational science, and information science. Data science tools are currently being developed to accelerate the rate at which new materials can be designed, manufactured, and deployed.

If interested, schedule a meeting with a Data Science Undergrad Advisor:
https://datascience.ucsd.edu/academics/undergraduate/advising/

Lower-division courses (36 units): COGS 9, DSC 10, DSC 20, DSC 30, DSC 80, MATH 18, MATH 20A, MATH 20B, MATH 20C
Please be advised: students must plan to complete DSC 40A and DSC 40B as pre-requisites to their required courses.

Students are required to take one course from each of the following five groups of upper-division courses for a total of 20 units.
MATH 183 or CSE 103 or ECE 109 or MATH 181A (4)
MATH 189 Exploratory Data Analysis and Inference (4)
CSE 158 Data Mining (4)
DSC 106 Data Visualization Laboratory (4) or COGS 108 (Data Science Practice) (4)
Upper-division Data Science course (4)

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NanoEngineering Student Affairs

- **Each student has a C**ollege Advisor who can help with general education and university-wide questions
- Questions about Chemistry, Math, Physics, and Biology requirements: direct to the respective department
- **All courses on academic plan must be taken for a letter grade** (except NANO 4, CENG 4, or NANO/CENG 199). Stick to the academic plan. Core courses only offered once a year
- We recommend that you register for general courses (CHEM, MATH, PHYS) during your first pass, and major courses (CENG/NANO) during your second pass (two passes start your Winter quarter)
- Pre-authorization Request vs Petitions: know the difference and when to use what form. Info is on our website.
- How to contact advising: Virtual Advising Center messages, walk-in advising, and appointments only
- Familiarize yourself with our website, and the student handbook!

www.nanoengineering.ucsd.edu

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Undergraduate Career Development

- Career Center (campus-wide)
- Panels on graduate school & industry
- Resume workshops
- Local outreach (Fleet Science Center)
- Undergraduate development / service organizations

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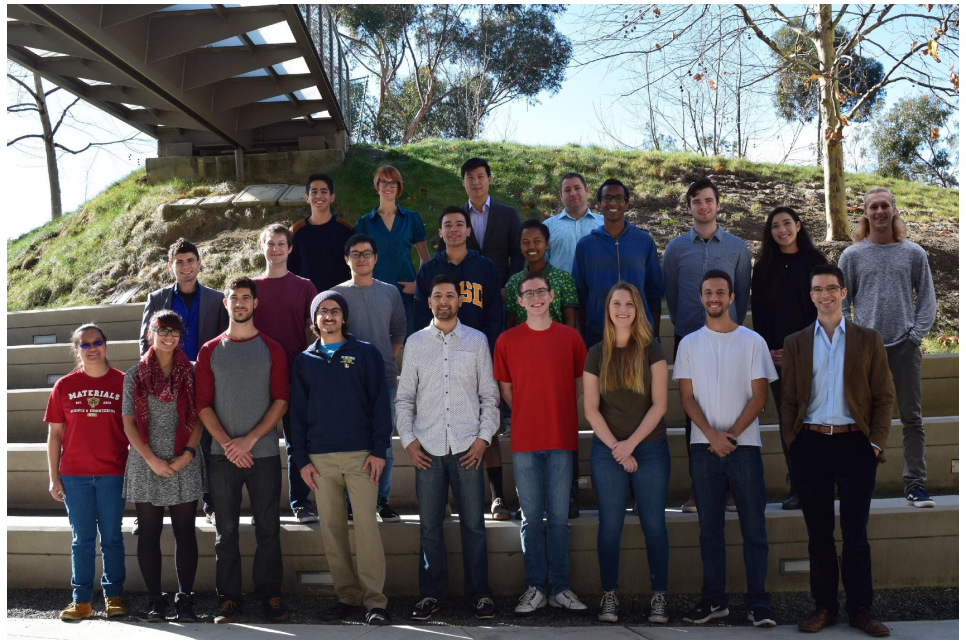
Undergraduate Involvement in Research

- Undergraduate research is the reason many people decide to come to UC San Diego
- Some research groups have as many as 10-20 undergraduate researchers
- Research can be taken on a volunteer basis or for NANO 199 technical elective credit
- Many opportunities exist for getting funded over the summer
- Write specific emails to professors, talk to your TAs, be persistent!



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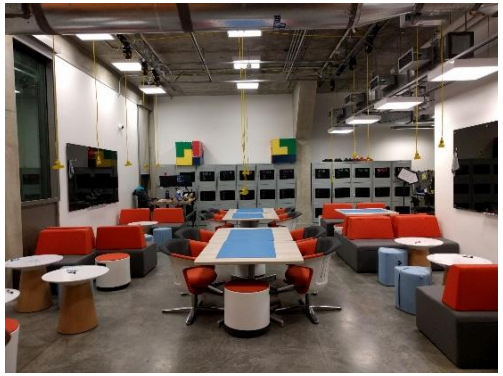
EnVision

Arts and Engineering Maker Studio

- Hands-on classes
- Open hours for your own projects
- ENVISIONARIES student org
- Envision.ucsd.edu

The Jacobs School's Makerspace

SME 301



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