The nanoHUB-U Initiative
re-shaping education for engineers and applied scientists

Mark Lundstrom for the nanoHUB-U team:
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NCN, ITaP/Hubzero, PEC, Marketing and Media,
Office of Provost

https://nanohub.org/u
things are happening...

Sebastian Thrun Aims to Revolutionize University Education With Udacity

by Peter Murray January 28th, 2012 | Comments (8)

162 147

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This past August fellow Singularity Hub writer Aaron Saenz wrote about Udacity, the online university created by Stanford artificial intelligence professor and Google autonomous vehicle leader, Sebastian Thrun. At the time Thrun was gearing up to teach his Introduction to Artificial Intelligence course to a class of 200 at Stanford. But why teach 200 when you can teach 1,000...or 160,000? With Udacity, Thrun and fellow AI giant Peter Norvig created an online version of the course, and anyone that wanted to enroll could — for free. The homework assignments and exams would be the same.

singularityhub.com/2012/01/28/sebastian-thrun-aims-to-revolutionize-university-education-with-udacity/
MIT launches free online 'fully automated' course

By Sean Coughlan
BBC News education correspondent

Massachusetts Institute of Technology (MIT), one of the world's top-rated universities, has announced its first free course which can be studied and assessed completely online.

An electronics course, beginning in March, will be the first prototype of an online project, known as MITx.

The interactive course is designed to be fully automated, with successful students receiving a certificate.

The US university says it wants MITx to "shatter barriers to education".

This ground-breaking scheme represents a significant step forward in the use of technology to deliver higher education.

http://www.bbc.co.uk/news/education-17012968
The campus will be organized around **three interdisciplinary hubs**: Connective Media, Healthier Life, and the Built Environment. Cornell will immediately offer Master and Doctoral degrees in areas such as Computer Science, Electrical and Computer Engineering, and Information Science and Engineering. In addition, after receiving the required accreditation, the campus will also offer **innovative Technion-Cornell dual Master of Applied Sciences degrees**.

http://www.pressoffice.cornell.edu/releases/release.cfm?r=62752
Could Many Universities Follow Borders Bookstores Into Oblivion?

by Marc Parry

Atlanta — Higher education’s spin on the Silicon Valley garage. That was the vision laid out in September, when the Georgia Institute of Technology announced a new lab for disruptive ideas, the Center for 21st Century Universities. During a visit to Atlanta last week, I checked in to see how things were going, sitting down with Richard A. DeMillo, the center’s director and Georgia Tech’s former dean of computing, and Paul M.A. Baker, the center’s associate director. We talked about challenges and opportunities facing colleges at a time of economic pain and technological change—among them the chance that many universities might follow Borders Bookstores into oblivion.
“The vision of the National Nanotechnology Initiative (NNI) is a future in which the ability to understand and control matter at the nanoscale leads to a revolution in technology and industry that benefits society.”

http://nano.gov/about-nni/what/vision-goals

- to re-shape education in engineering and applied science
- to develop student’s skills to work across disciplines
- while exploiting Purdue’s HUBzero IT platform
- and identifying a Purdue role in this new environment
nanoHUB.org

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Resources

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- MOSFET
- atomic force microscopy

Eric Pop, University of Illinois at Urbana-Champaign - Contributions: 48

ANTSY—Assembly for Nanotechnology Survey Courses - In Topics

NEW IN RESOURCES

Theoretical studies of rolled-up and wrinkled nanomembranes in Publications, Feb 20, 2012

ECE 616 Lecture 23a: High Order Propagation Effects - Delayed Nonlinear Index and Raman Scattering
“electronics from the bottom up”

Fifty years ago electrical engineering faced a challenge brought on by the advent of the transistor …

“Electronics from the Bottom-up” is a new way of teaching electronic devices designed to prepare students to contribute to the development of 21\textsuperscript{st} Century nanoelectronics.

Launched in 2004 / viewed by more than 100,000 individuals
**Objective:** To bring new insights and approaches from nanoscience into the traditional fields of engineering and applied science.

**Level:** Serious treatments of fundamentals. Broadly accessible without a long string of pre-requisites.

**Format:** Five-week courses covering the same topics as the corresponding on-campus courses.

**Instructors:** Topics and instructors selected from the most popular content on nanoHUB.org.

**Timeline:** A 3-4 year initiative to create a comprehensive and innovative new curriculum.

Fundamentals of Nanoelectronics, Part 1: Basic Concepts
by Supriyo Datta, Distinguished Professor, Purdue University

608 PEOPLE ARE TAKING THIS COURSE

Special pre-order offer: Enter “LNN25” to get a 25% discount off when you order on worldscibooks.com

Expiry Date: 30 April 2012

Lessons from Nanoelectronics
A New Perspective on Transport
by Supriyo Datta (Purdue University, USA)

in production
how events unfolded

- **Sept 2011**: Idea proposed
- **Oct**: Team forms
- **Nov**: Flyer
- **Dec**: Fundamentals of Nanoelectronics: Part I by Supriyo Datta
  - **15,000 students enrolled**
- **Jan 2012**: News Release
- **Feb**: Promo Video
- **Mar**: Fundamentals of Nanoelectronics: Part II by Supriyo Datta
  - **323 students enrolled**
- **Apr**:
student population

- Abbott
- Applied Materials
- Hewlett Packard
- Honeywell
- Intel
student population

40% from the USA

Students from 58 Countries
course format

Lectures
~6 x 20min = 120mins

Quizzes
2-3 questions for each lecture

Discussion

Homework
3-4 problems

Solutions

Exam
~10 questions each week
2 hour window within 2 week period
1 retake allowed
learning by doing

Homework

3-4 problems

Students modify MATLAB code

View results
HUBzero for Online Education

“Hands-On” Learning With Simulation Tools

- Video Lectures
- Integrated Assessment
- HTML5, Podcasts, YouTube
- Groups, Wikis, Blogs & Discussions
- Web Analytics
Typical comment:
“Totally amazing on all counts! Awesome class. May all classes be like this one.”

Students enrolled (at $30): 609
- CEU students: (at $225): 26+

Students who earned:
- certificates (total): 203
- certificates with high distinction: 183 out of 203
- CEUs: 22

Institutional usage:
Univ. of Saskatchewan – 6 students enrolled for credit

Vellore Institute of Technology
Center for Nanotechnology Research, India - 37 students enrolled for credit
Courses 2, 3, 4, 5

COMING SOON

MARCH 19, 2012 – APRIL 20, 2012

Fundamentals of Nanoelectronics, Part 2: Quantum Models
by Supriyo Datta, Distinguished Professor, Purdue University

— Register for this class

323 students

COMING IN FALL 2012

Atomic Force Microscopy, Part 1
by Professor Arvind Raman and Professor Ron Reifenberger, Purdue University

Registration starting soon

COMING IN FALL 2012

Atomic Force Microscopy, Part 2
by Professor Arvind Raman and Professor Ron Reifenberger, Purdue University

Registration starting soon

COMING IN FALL 2012

Fundamentals of Nanotransistors
by Professor Mark Lundstrom, Purdue University

Registration starting soon

CHECK OUT THE COURSES PAGE TO SEE ALL NANOHUB-U OFFERINGS
nanoHUB-U curriculum

- Effective Technical Communication
- Statistical Analysis/Design of Experiments
- Principles of AFM/STM
- Materials Science from the Bottom Up
- Fundamentals of Nanofabrication
- Nanophotonics
- Statistical Analysis/Design of Experiments
- Nanotransistors
- Fundamentals of Nanoelectronics
- Thermoelectric Technology
- Thermal Transport at the Nanoscale
- Electrons and Phonon Transport
- Biosensors
- Solar Cells
- Engineering design and innovation
- Batteries
expected outcomes

• Recognition for leadership in an important, emerging area of engineering and applied science.

• Identification of best practices and extension of HUBzero technology for on-campus and on-line education.

• Programs that generate revenue for Purdue:
  o Low-cost, large audience online courses
  o Institutional partnerships that provide a unique, high-quality curriculum in areas of special Purdue strength.
  o A unique curriculum that can be offered for Purdue credit through traditional continuing education channels at Purdue.
  o On-campus (or on-line/on-campus) professional masters program in Engineering and Applied Science.
  o nanoHUB-U as a Purdue consortium
  o Other possibilities?