Two Full-Quality Stanford Courses Free On-Line Now

Rick Dove, Paradigm Shift International

Machine Learning

Classes run from October 10 through December 16. Sign up here, now:
www.ml-class.org/course/auth/welcome

Professor Andrew Ng is Director of the Stanford Artificial Intelligence Lab. In 2008 he started SEE (Stanford Engineering Everywhere), which was Stanford's first attempt at free, online distributed education. A bold experiment in distributed education, "Machine Learning" will be offered free and online to students worldwide during the fall of 2011.

Students will have access to lecture videos, lecture notes, receive regular feedback on progress, and receive answers to questions. When you successfully complete the class, you will also receive a statement of accomplishment.

This course provides a broad introduction to machine learning, data mining, and statistical pattern recognition.

The class has not yet officially started, but in this pre-launch period, you can begin looking at the first week of content so that you can see what's coming and get a head start.

The machine learning class is offered in two tracks. The advanced track is intended to be an undergraduate or early graduate level course, and you should plan on spending around ten hours a week or more on it. It will involve watching video lectures, weekly review questions and programming exercises.

The basic track is for people interested in the material but who do not have the time or would prefer not to do the programming assignments. You will be able to access the same materials as the advanced track. You may switch between the tracks at any time.

Artificial Intelligence Intro

Classes run from October 10 through December 18. Sign up here now:
www.ai-class.com/

Taught by Sebastian Thrun and Peter Norvig, the curriculum draws from that used in Stanford's introductory Artificial Intelligence course. The instructors will offer similar materials, assignments, and exams. The course will include feedback on progress and a statement of accomplishment.

This class introduces the basics of Artificial Intelligence, which includes machine learning, probabilistic reasoning, robotics, and natural language processing.

Like the Machine Learning course, this course is offered in two tracks, advanced and basic. You may switch between the tracks at any time.

Sebastian Thrun is a Research Professor of Computer Science at Stanford University, a Google Fellow, a member of the National Academy of Engineering and the German Academy of Sciences.

Peter Norvig is Director of Research at Google Inc, and a Fellow of the American Association for Artificial Intelligence and the Association for Computing Machinery. Norvig is co-author of the popular textbook Artificial Intelligence: A Modern Approach. Prior to joining Google he was the head of the Computation Sciences Division at NASA Ames Research Center.

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You as Director on the Board

Heidi Hahn, Chapter President

An important election season is upon us! Well, maybe not *national* elections, but important elections nonetheless…

In late August, Mary Compton, our Enchantment Chapter Secretary, sent out a call for nominations to our members, noting that the Chapter is seeking nominees for all officer positions, except President — which is not an electable position, as the current Vice President assumes the President's position. Also available are up to ten At-Large Director positions for the 2012 INCOSE Enchantment Chapter Board of Directors.

The Officers and Directors serve for one year; the term of office begins at the first INCOSE Enchantment Chapter meeting held after 1 January 2012.

Leadership positions in INCOSE chapters offer members the opportunity to learn, develop, and practice leadership skills. Serving as committee chairs, officers, and board members, our members bring back to the workplace the skills to motivate and lead teams to successful accomplishments. There are few management challenges greater than working with teams of volunteers to produce quality products. Likewise, there are few rewards greater than of being part of a team that achieves its goals.

While I'm pleased to report that several new individuals as well as many of our current Board members have stepped up and volunteered to be part of the Chapter leadership team, we do not yet have nominees for Treasurer or for all of the At-Large Director positions — by my count, we could use three more.

It's not too late! Won't you consider volunteering to help your chapter today?

To submit your name for self nomination, please send an email to me at hahn@lanl.gov indicating the office you would like to be considered for, and supply a picture and a brief biography by October 14. I will be sending the slate of nominees to our membership for consideration during the week of October 17, and elections will follow in mid-November.

We'll Miss You, Mark and Bill…

Coincidently, Mark De Spain, of Sandia National Labs, and Bill Bearden, of Los Alamos National Lab, who have served long and well as Board members, are both planning, independently, to move out of state, likely sometime during early next term. As a result, neither will be running for a Director's position for next term, but both will finish out the current term.

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Working Group News from IS11

Transportation WG

Sharissa Young, Sandia National Labs

Overall, the transportation working group (TWG) seemed cohesive and active with a core group of very engaged members who sponsored various activities during the IS including a technical tour, an industry round-table, a TWG dinner at an off-site restaurant, and a TWG planning meeting.

The TWG-sponsored tour on Monday 6/20 included a trip to the Colorado DOT metro transit center, the command and control center where the local highway system is monitored and trouble spots are managed. While there, a talk was given on the contracting strategies and progress for a new non-RF dispatch and control system for the RTD (Denver regional light rail and bus system) that is in process. The FCC mandate for narrowing bandwidth by 12/31/2012 was the primary driver for the new RTD system, but the opportunity to implement improved dispatch and communication technology was a close second.

The TWG met on Wednesday afternoon 6/22 from 3:30-5:30. The TWG has defined the focus for the group to be ground transportation (excludes air and water transportation). The primary constituents of the TWG are associated with rail and bus industries, but the group would like to reach out more to highway system colleagues.

A representative from the TWG attends and reports on the ISSWG activities (In-Service Systems Working Group), because all public transportation systems are in-service systems, which lead to unique difficulties in implementing new technology.

Attendees at the TWG meeting included officials from UK rail, NYC transit, Netherlands rail, assorted US and UK contract company providers of rail and bus-oriented services, and one French automaker (a first-time attendee).

The TWG meeting included a recap of the last ISSWG and action items from the last TWG 6 month prior at the last TWG meeting in Chicago.

The tour was briefly discussed at the TWG on Wednesday and a consensus was that the Co-DOT was not as engaged in Systems Engineering as the RTD organization was, and that generalization seemed to be true (DOT highway organizations are less engaged than rail companies). In addi-

tion, preliminary results were reported for the previously assigned task to compile case studies of SE implementation in transportation organizations. This generated much discussion.

Following the tour discussion, all participants were involved in brainstorming for topics that TWG members thought the working group should address. This resulted in the compilation of a list of themes that were narrowed down to four areas for action. Breakout groups then coalesced to develop specific action plans for each of the topic areas.

I attended the outreach breakout group. The result was that members will be developing a pdf brochure that can be sent to highway departments and other bus and light rail organizations to communicate the benefits of INCOSE membership with a specific emphasis on TWG membership and participation.

For more info, contact Sharissa at:
sgyoung@sandia.gov

Preparation, Mentoring and Progress at UTEP

Samantha Dominguez,
University of Texas El Paso (UTEP)
Student Chapter President Elect

A lot has changed for the Systems Engineering graduate program at the University of Texas at El Paso (UTEP) since its inception in 2008, when 3 students were pursuing a Master of Science degree that was only formally recognized by the Texas Higher Education Coordinating Board in 2009. New enrollment for Fall 2011 is 25 engineers. In three years, the number of students involved in the program has jumped from 3 students to 78 students, whether enrolled or graduated and working. Even with the growth of the program, the hard work of the students and advisors has resulted in the majority of the graduating students being placed in industry.

Academic scholarships have also supported the program. The National Science Foundation recently awarded UTEP a 4-

year $700,000 grant for academic scholarships and educational support, in an effort to jointly bolster the Software Engineering and Systems Engineering programs. As El Paso's economy has an average unemployment of 10.9% (June 2011), this scholarship support has filled a desperate need for many students excelling in their studies, but encountering financial instability.

This past summer, Dr. Ricardo Pineda and program supporters were able to send students to industries across the United States, including Lockheed Martin, Los Alamos National Laboratory, Raytheon, NASA, and AT&T.

"I am excited to have the opportunity to apply my studies and participate in real-world situations. I feel that my Practicum has really centered me in my aspirations as a future systems engineer!" Ana Melendez, 2011, AT&T intern.

The program plans to continue growing wonderful student opportunities and is always looking for new internship sponsorship.

This spring, the UTEP Systems Engineering program will continue its tradition of hosting its "Systems Engineering Day" annual conference featuring systems engineering speakers. We excitedly announce that the 4th annual conference is set to occur on April 26-27, 2012. Preparations started in September and the UTEP INCOSE student chapter is interested in recruiting speakers. Last year's event brought speakers from establishments such as Lockheed Martin, Los Alamos National Laboratory, MIT, Raytheon, NASA, Sandia National Laboratories, FAA, INCOSE, and AT&T. We are looking forward to expanding both the breadth and depth of topics in order to advantage the upcoming systems engineering workers of the 21st century.

For more information:
sndominguez@miners.utep.edu
http://engineering.utep.edu/incose/about.htm
http://rimes.utep.edu/
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Recent Meetings

Mary Compton, Sandia National Labs

Slides for all three presentations are posted at the Enchantment Chapter website.

July 2011—Stephen Sutton, Independent Consultant (retired from TASC, Inc.) and Co-chair INCOSE Anti-Terrorism Working Group, presented *Defending Software Applications from Threats Through Code Analysis.* Ann Hodges reviews:

The most common cyber attacks are focused on applications. Application risks arise from process, governance and methodology flaws. NIST 800-53 is the source standard for intelligence community and DoD policies. Developers need to conduct independent, objective application assessment throughout the development life cycle to address vulnerabilities and provide environmental mitigations.

Stephen presented a code analysis concept of operations. Automated tools support code analysis, but analysis and prioritization of results are still needed. Automated analysis results on an SOA framework example uncovered significant weaknesses that were among the top 25 most dangerous listed in the Common Weakness Enumeration at http://cwe.mitre.org/top25/.

Strengths of automated analysis tools include speed, flexible reporting options, and references/links for remediation. Weaknesses include breadth of language support, tool not "aware" of the run-time environment, some serious vulnerabilities may be missed, and special agreements may be needed to allow commercial software scanning. There are companies that provide code analysis services (e.g., ProServices Corp.) and some that analyze binary files (e.g., Veracode).

Stephen recommends using multiple analysis tools, having the expertise to evaluate results, doing manual review where necessary, and building in security from the start.

August 2011—Steven R. Booth, Engineering Economist in Process Modeling and Analysis at Los Alamos National Laboratory, presented *Waste Processing Cost Recovery at Los Alamos National Laboratory — Analysis and Recommendations.*

Steven described the analysis performed for full cost recovery of waste processing at Los Alamos. Sending accurate price signals to waste generators is economically sound, and leads to waste minimization and reduced expense.

Los Alamos faced significant implementation challenges because of its status as a government-owned, contractor-operated, national scientific institution, with a diverse suite of experimental and environmental cleanup activities. Steven described the issues of transition and the selection of the business model.

September 2011—Jennifer Narkevicius, Managing Director Jenius LLC and co-chair INCOSE Human Systems Integration Working Group, presented *Human Systems Integration Railroad applications: HSI beyond DoD.*

Jennifer explained Human Systems Integration (HSI) as a management and technical approach to incorporating human considerations into the design and implementation of systems; and showed how HSI can improve performance, enhance safety, and reduce cost.

While primarily used in military materiel acquisition, HSI can be used in large scale infrastructure systems like railroads, to help meet safety and operational effectiveness goals which translate to reduced expense. The underlying technical approaches, based in the human domains, are the same across organizations employing complex, large scale technologies. The use of these technologies has resulted in: improved safety, better performance, and manpower cost savings. ∞

Next Meetings

Mary Compton, Sandia National Labs

October 12: Configuration Management Basics
Ann Hodges, Systems Engineer, Defense Systems & Assessments Mission Assurance Department, Sandia National Laboratories
Abstract: This presentation will define traditional configuration management (CM), based on industry standards and best practices. CMII, a more holistic CM model developed by the Institute of Configuration Management, will be summarized. Suggestions will be presented for applying CM practices using a risk-informed graded approach.

November 9: Security Rick Management and Cost-Benefit Analysis: Method and Example Applications
Gregory Wyss, Risk Analyst, System Security Analysis Department, Sandia National Laboratories
Abstract: A 2010 National Academy of Sciences report asked DOE to focus on "effective security risk management," and place less emphasis on quantifying or communicating "how much or little [security] risk exists." This may seem counterintuitive. After all, how can one manage security risk without first quantifying security risk? Common security risk metrics require analysts to assess the likelihood of each scenario - something that is highly uncertain and can be rapidly changing, especially for rare attacks against high-security targets. This presentation will describe a new risk management method in which scenarios are evaluated and compared based on the degree of difficulty an adversary will encounter to successfully execute the attack scenario, as well as the consequences that would be expected to occur if the attack were successful. This method allows comparison of scenarios and security risks across a variety of targets or consequences, or even across an entire enterprise. The method enables decision makers to provide objective and unbiased justification for investment decisions that are intended to balance competing security interests (e.g., multiple facilities), resulting in more robust and cost-effective security systems. This presentation will summarize the theory behind the method and illustrate it through the use of examples.

December 16: INCOSE Enchantment Chapter Annual Holiday Social
Save this date for dinner, socializing, and fun at El Pinto New Mexican Restaurant in Albuquerque's beautiful North Valley. Watch upcoming Chapter announcements for more information. ∞

Call for Essays
INCOSE INSIGHT, July 2012, Theme:

Systems of the Third Kind:
Distinctions, Principles and Examples

Autonomous Systems Testing & Evaluation Working Group
Send abstract and working title now to dove@parshift.com
2,000 word draft essay due January 6, 2012
Download the full Call For Essays from:
www.parshift.com/s/CallForEssays-SystemsOfTheThirdKind.pdf

We choose to categorize systems of the first kind as deterministic, of the second kind as probabilistic, and of the third kind as non-deterministic. Systems of the third kind include variations of currently popular labels such as chaotic, complex-adaptive, autonomous, resilient, sustainable, agile, and human activity. They move among us already: cars that drive themselves in urban environments, helicopters that land autonomously, lethal weapons that decide when and where to shoot, unmanned aircraft in the national airspace. Some work alone, others are being taught to work in packs and swarms. Emergent behavior is expected, with consequences, and with virtually no current system engineering guidance.

Purpose: These essays are intended to spur interest and urgency within the systems engineering community for exposing and addressing the largely unaddressed system engineering issues of non-deterministic systems. The intent is to launch a foundation of thought for guiding the incorporation of non-deterministic system engineering in the system engineering body of knowledge.

15 Aug   2011:   Call for essays issued.
15 Sep   2011:   (and beyond) Declare intent with brief abstract to dove@parshift.com
06 Jan   2012:   First (complete) draft essay submission.
29 Jan   2012:   Symposium – Presentation/discussion at IW12 (or by LiveMeeting).
28 Feb   2012:   Notification of acceptance – with detailed comments for improvement.
31 Mar   2012:   Final draft submission.   ∞

New Chapter Members
Francis Peter, Management Sciences

We welcome new INCOSE members to Enchantment Chapter, with membership at 105:

Shannon Delgado	Sandia National Laboratories
David M. Ferguson	National Technical Systems
Johnathon D. Huff	Sandia Staffing Alliance, LLC
Thomas Lindgren	Sandia National Laboratories

We welcome new Student Chapter members of the University of Texas, El Paso, with membership at 17:

Matthew Hernandez
Andrea Mucino

Resources

From Michael Nielsen, who wrote the acclaimed book, *Quantum Computation and Quantum Information*, now comes a series of digestible short videos on the basics of quantum computing, which Nielson calls Quantum computing for the determined. No comfort in quantum mechanics is required – but some linear algebra is needed.

So...Nielson recommends Kahn Academy's 155 ten-minute videos on linear algebra. What an awesome concept and site! 2400 10-15 minute videos in the library of videos, covering K-12 math, and college science topics such as biology, chemistry, physics, and higher math.

BusinessWeek reports that Khan Academy has a new fan in Bill Gates. Gates and his 11-year-old son have been soaking up videos, from algebra to biology. At the Aspen Ideas Festival in front of 2,000 people, Gates gave Khan a shout-out, touting the "unbelievable" Khan Academy tutorials that "I've been using with my kids." And since then, with cash injections from Google and Gates, the Khan Academy is going big time.

We are witnessing the dawn of a whole new era in education.

However, if you want linear algebra or hundreds of other courses at MIT depth, visit MIT Open Courseware at
http://ocw.mit.edu/courses/

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Haiku Slam
Rick Dove, Paradigm Shift International

Jack Rings the bell with...
     requirements enchant
     process hides faulty compass
     agile finds North Star

Inspired by the security panel at IS11, Rick offers a synopsis of the panel positions...
     system engineer
     again intruders beckon
     ignorance is bliss?

MILLIONS of DOLLARS
COULD HAVE BEEN YOURS

Had you sent your system engineering haiku in. Look up haiku rules here. Winners will be announced in the next (Q1 2012) newsletter as among the best of the 2011 submissions, and each will receive an NM lottery ticket for a real slim chance at $$$Multi-Millions.   ∞

One of the most coveted prizes in science
The IgNobel Prize

Nobel laureate Dudley Herschbach (Chemistry '86) throws a paper airplane at the first Ig Nobel awards ceremony.

September 29, 2011 was the 21st Annual Ig Nobel Prize ceremonies, where some of the world's quirkiest scientists were honored at a sellout Harvard University bash. You can be there too. Watch the full video at www.improbable.com/, skipping over the first 28 minutes of audience seating.

A University of New Mexico team took an Ig Nobel prize in 2008. For details see
http://improbable.com/ig/winners/

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Mark Your Calendar

Dec 16, 2011, Annual social gathering of Enchantment Chapter members. This year at Albuquerque's El Pinto restaurant.

Jan 28-31, IW12, the INCOSE International Workshop, will be held January 29-February 1, 2012 in Jacksonville, Florida. Get a winter tan and get involved in some working group participation. See details at www.incose.org/newsevents/workshop/index.aspx.

Mar 19-22, Conference on System Engineering Research (CSER), will be held March 19-22, 2012 in St. Louis, MO .

Jul 9-12, IS12, the INCOSE International Symposium, will be held July 9-12, 2012 in Rome, Italy. Paper submissions are due November 3, 2011, fast approaching. More information about submissions and a call for reviewers will be sent out in October. Click here to view the Call for Papers.

Jan 24-27, Test and Evaluation (T&E) Systems-of-Systems Conference will be hosted by the White Sands chapter of The International Test and Evaluation Association, January 24-27, 2012 in El Paso, TX. The White Sands Chapter has made the focus of this conference a T&E System-of-Systems theme. More info at:
http://www.itea.org/files/2012/2012_Sytem_of_Systems_Workshop.asp.

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Connect to Your Community of Practice

Chapter meetings with a focus on systems engineering are held monthly, usually the second Wednesday, except in December. The December meeting is an annual social event, with mingling, dinner, and a speaker chosen for enjoyment by systems engineers and guests alike.

Monthly meetings feature speakers from out-of-town that are visiting the area for other reasons, and local (more or less) subject matter experts on topics of relevance.

On occasion special facility tours are arranged, sometimes as the monthly meeting, and other times on a separate schedule.

Chapter meetings begin at 4:45pm. After chapter news, announcements and introductions, the presentation and discussion generally lasts until 6:00pm, all carried live on Live Meeting for those who can't attend. Recordings are not made.

Tutorials with in-depth coverage on topics of interest are arranged approximately twice a year. Delivered by experts in the field, tutorials range from 1/2 day to day+ durations, and generally involve a tuition.

Mix with people who have the same professional interests as you do, but with a diversity of perspective beyond daily workmates. It comes in handy when you need help or answers to questions outside your accumulated experience, need a connection at another organization, or simply want some mind stretching thought.

Meeting and event notices routinely go to all INCOSE members within the Chapter's geographic territory; but Live Meeting connections, special notices, and collaborative opportunities are generally limited to registered Chapter members. Obtain chapter membership on the INCOSE web site by changing your profile or so selecting as you renew membership.

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Chapter Board

Heidi Hahn	President	505-665-4606	hahn@lanl.gov
Woody Weed	Vice President	505-845-9267	jwweed@sandia.gov
Tom Tenorio	Past President	575-405-0008	tenoriot@gmail.com
Tana Lucy	Treasurer	505-844-9730	tblucy@sandia.gov
Mary Compton	Secretary	505-845-9268	mlcompt@sandia.gov
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