INTERNATIONAL ENGINEERING EDUCATION DIGEST

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A periodic electronic newsletter for engineering education leaders,
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CONTENTS

1 - International developments
- *European Union steps back from open-access*
- *Russia prepares to follow Bologna Declaration*
- *US universities expanding into India*
- *International Polar Year launched*
- *Foreign student visas still a problem for US*

2 - US developments
- *Report tells NSF to think more boldly*
- *ABET sticks to dual-level accreditation prohibition*
- *US needs to improve foreign language skills*
- *Democrats rescue technology research program*
- *Guidelines for licensing inventions*

3 - Technology
- *Scholars find ways to circumvent Internet filtering*
- *Oil-rich Emirate prepares for post-oil world*
- *Digital overload?*
- *Alternative energy booming*

4 - Students, faculty, education
- *US agencies quiz universities on the status of women in science*
- *Faculty salaries favor engineering*
- *Early retirement for faculty*
- *Support for women faculty at RPI*
- *Ranking of doctoral programs*
- *Copy-and-paste papers put profs on offensive*
- *The rankings revolt*
- *Pleading for acceptance*

5 - Employment, competitiveness
- *Shortage of engineers?*
- *Eastern Europe snags research labs*

- ***Labor shortages in Europe***

6 – Journals

- ***International Journal of Engineering Education***
- ***European Journal of Engineering Education***

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1 - International developments

European Union steps back from open-access – Europe recently focused on the growing international debate over free access to the results of publicly funded research, as reported by Martin Enserink in the February 23rd issue of *Science.* An online petition signed by almost 14,000 researchers and 500 research organizations in the EU was presented to a meeting of the European Commission, asking it to take bold action on so-called open access. Traditional scientific publishers mounted a counteroffensive, arguing that the future of scientific communication – as well as their €3-billion European industry – is at stake. The publishers' argument carried the day for the moment, and the Commission failed to enact a mandatory open-access policy for EU-funded scientists. (See http://www.sciencemag.org)

Russia prepares to follow Bologna Declaration – Russia is likely to restructure its higher education system for implementation this fall by introducing a two tiered system of degrees that would bring it into line with the stipulations of the Bologna Declaration. The five year diploma would be replaced by a three to four year bachelor's degree, followed by a one to two year master's, writes Bryon MacWilliams in the March 23 issue of *The Chronicle of Higher Education*. The intent is to make higher education more responsive to the needs of the economy, in part by permitting students to change majors more easily. Engineering, however, along with medicine and some other professions, would retain the current five year diploma format. (See http://chronicle.com)

US universities expanding into India – India is the new frontier for US colleges and universities that want to expand overseas, writes Somini Sengupta in the March 26 edition of *The New York Times*. With only 7% of the 18 to 24 year old population in India entering into universities, opportunities for new institutions are vast. Doubling that percentage would require building 1500 additional colleges and universities, according to government figures. Rather than opening branch campuses, as they have in places such as Qatar and China, US institutions are electing to form partnerships with Indian counterparts, engaging in study abroad programs, distance education, and curriculum design along US models. While laws governing how foreign universities can operate in India are still not clear, a new law is under consideration in the Indian Parliament that may give them more latitude than government-accredited institutions currently have in terms of salaries and curricula. (See http://nytimes.com)

International Polar Year launched – March 1 marked the beginning of the International Polar Year, and the fiftieth anniversary of the International Geophysical Year, writes Richard Monastersky in the March 9 issue of *The Chronicle of Higher Education.* Sponsors of the IPY include the International Council for Science and the World Meteorological Organization. As many of 50,000 researchers from 63 countries may take part in the two year study of the Arctic and Antarctica, looking at those areas as early monitors of the changing earth environment. Organizers hope that the activities will help inspire a new generation of scientists, and serve as the basis for new curriculum development in high schools and colleges. (See http://chronicle.com)

Foreign student visas still a problem for US - A new study is casting a damper on the favorable interpretation of last November's "Open Doors" study, which some believed indicated that the crisis in foreign student enrollments in the US was over. Education Sector, a Washington think-tank, studied the student visas actually issued by the US in various countries around the world. Despite a 15% increase in the number of visas issued in 2005-2006, the total number of visas issued is about 20,000 less than before 9/11. At the same time, writes Scott Jaschik in *Inside Higher Ed*, the study points out that other countries such as Australia and France are working hard to attract foreign students and largely succeeding. US visas for students in China, India and Korea, which have traditionally sent large numbers of students to the States, are increasing. International education leaders in the US are confirming that much still needs to be done to attract more foreign students, including have more consistent policies, so that Homeland Security, for example, cannot cancel out decisions made by the State Department. (See http://insidehighered.com/news/2007/03/22/visas)

2 - US developments

Report tells NSF to think more boldly – A draft report from its oversight body calls on the National Science Foundation to be more receptive to funding wild-eyed ideas that just maybe could revolutionize science, according to an article in the March 9th *Science* by Jeffrey Mervis. The Board's proposal calls for a separate "transformational research initiative," but NSF Director Arden Bement feels that adding another program would tax the already overburdened staff. NSF's peer-review system is widely seen as the gold standard for selecting high-quality research proposals, but Board members say they are worried that some scientists do not even apply for grants that cut across the scientific grain because of "the external perception that NSF is not as welcoming as it should be to such research". The Board report asks NSF to come up with a management plan for its suggested direction by August. (See http://www.sciencemag.org)

ABET sticks to dual-level accreditation prohibition – In response to a recommendation in the National Academy of Engineering's "Engineer of 2020" report, ABET has reviewed its longstanding policy which prohibits accreditation at both bachelors and advanced levels in a particular curriculum at a given institution. In a recently released white paper, introduced by ABET past president Richard Seagrave, the arguments presented for and against allowing dual level accreditation of engineering programs are

reviewed. The discussion in this review is similar to that in 1968 and in 1989, when the rule prohibiting dual level accreditation was previously reviewed. Those supporting removal of the prohibition argue that the material necessary to properly prepare graduates for the profession can no longer be accomplished in four years, and that institutions that offer both bachelor's and master's degrees deserve the opportunity to have them both accredited. Those opposed to a change in the current prohibition argue that institutions would be pressured to seek accreditation at both levels, that identifying the necessity of a fifth year would negatively impact engineering enrollments, and that employers appear to be satisfied with current four-year graduates. ABET has decided that "…it is neither prudent nor appropriate for ABET to unilaterally change its policy at this time without a clear consensus from the engineering community". (See http://www.abet.org)

US needs to improve foreign language skills – A new report from the National Research Council indicates that Department of Education programs designed to strengthen education in foreign languages and in international area studies have made some progress but lack the resources to keep pace with their mission. The report indicates that more support from all levels of the US education system is needed to develop an integrated approach to improving foreign language skills and expertise in other cultures, beginning in the primary grades. Universities should play key roles, partnering with federal officials to create systems to continuously improve the programs. (See http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=11841)

Democrats rescue technology research program – Written off as dead by critics and fans alike, the Advanced Technology Program has been given a $79-million lifeline from Democrats in the US Congress, according to an article by Eli Kintisch in the March 2nd *Science.* ATP was begun in the early 1990's as a way to help companies conduct research aimed at commercializing new products. Critics have derided it as so-called corporate welfare. But top congressional Democrats view the program as an essential part of their "Innovation Agenda". (See http://www.sciencemag.org)

Guidelines for licensing inventions – New guidelines have been issued by some of the US universities that have been most successful in commercializing inventions. These guidelines suggest ways to balance "doing well" and "doing good." For example, universities are urged to sue only when necessary, to seek fewer exclusive licenses for ideas which involve human health, and to ensure that licensing does not impede benefits for developing nations. "In the Public Interest: Nine Points to Consider in Licensing University Technology," is the white paper which resulted from a 2006 meeting held at Stanford University, writes Goldie Blumenstyk in *The Chronicle of Higher Education.* The eleven universities hope that their experience will provide best practice advice to the increasing numbers of institutions that are becoming active in licensing. (See http://chronicle.com)

3 - Technology

Scholars find ways to circumvent Internet filtering – About forty countries around the world filter the Internet, thus limiting their scholars' access to information, reports Sam Kean in the March 23 issue of *The Chronicle of Higher Education*. But software has been developed that permits scholars to circumvent these filters and access forbidden sites undetected. Tor, for example, sends information through complex routes, thus discouraging anyone from attempting to trace illegal use of the Internet. Psiphon relies on social networks, where users in free societies can create nodes for colleagues working in censored environments. The colleagues then log into the node, establish a secure, encrypted connection, and then can access the internet without being filtered. (See http://chronicle.com)

Oil-rich Emirate prepares for post-oil world – The Masdar Initiative is a comprehensive and multi-faceted effort by the Abu Dhabi Emirate (UAE) to address energy-related issues and look toward a post-oil world. Included under the Masdar umbrella are the Clean Technology Fund (250 million US$) and a special economic zone for advanced energy industries. Plans are underway for a 500 megawatt solar power plant to be operating by 2009. A graduate level research partnership has been designed in collaboration with MIT, with a focus on renewable energy. MIT officials point out that Abu Dhabi is the first oil producing state that is facing the fact that oil may not always be the dominant form of energy in the world. The plan is for Abu Dhabi, under Masdar's leadership, to become a center of expertise in "solar energy, photovoltaics, energy storage, carbon sequestration and hydrogen fuel," writes Hassan M. Fattah in the March 18 edition of *The New York Times*. (See http://nytimes.com)

Digital overload? – There are two reputable estimates of how much digital information exists in the world, and whichever one you believe, the numbers are staggering. In 2003, the University of California at Berkeley said the globe produced 5 exabytes (5 billion gigabytes) of information. A new figure released by IDC, a technology research firm, gives the figure as 161 exabytes, the equivalent of 12 piles of books stacked on Earth and reaching to the sun. Contributing to the numbers are such factors as the increasing large role of individuals in creating information (think YouTube), and data-retention regulations. This leads to concerns about storage of increasing amounts of data, and the challenges associated with locating, retrieving and understanding it, says this Associated Press article from the March 6 edition of *The New York Times*. (See http://nytimes.com)

Alternative energy booming – Move over, dot.com, and make way for watt.com. Silicon Valley is witnessing a new cycle of enthusiasm as entrepreneurs, venture capitalists and miscellaneous professionals eager to catch the latest wave all discover the field of alternative energy. Matt Richtel, writing in the March 14 on-line edition of *The New York Times*, describes what he characterizes as an "energy boomlet," not yet quite as dynamic as the dot.com frenzy which peaked in 2000, but similar in attracting people who expect to make significant change in the world and to make money doing so. In contrast to the dot.com industries, alternative energy industries must develop products and services. If successful, these developments may well decentralize energy production to the level of solar panels on private homes. (See http://nytimes.com)

4 - Students, faculty, education

US agencies quiz universities on the status of women in science – The US government has begun questioning research universities to determine whether their treatment of women students in science and engineering violates federal law, according to an article by Yudhijit Bhattacharjee in the March 30th issue of *Science.* Federal officials have visited four academic departments on three campuses in the past 14 months to monitor their compliance with a 1972 law that prohibits sex discrimination in educational programs and activities receiving federal funds. The law's Title IX has traditionally been used to broaden women's participation in sports; educators say this is the first time the government has applied it to long-standing gender imbalance in fields such as physical sciences and engineering. (See http://www.sciencemag.org)

Faculty salaries favor engineering – Engineering, along with business and law, remain the fields where professors earn the highest salaries in the US, reports Scott Jaschik in *Inside Higher Ed.* According to data released by the College and University Professional Association for Human Resources, a new assistant professor of engineering averages $69,510 annually while a new assistant professor of music averages $46,212. At the full professor level, the average engineering faculty earns $102,954, while the average full professor of law and legal studies will take in $121,301.   Salary compression, where a newly appointed faculty member earns more than a more senior colleague, can be detected in engineering: that new assistant professor's salary of $69,510 is only slightly below the average for all assistant professors in engineering, $69,896. (See http://insidehighered.com/news/2007/03/12/cupa.)

Early retirement for faculty – When 1361 institutions of higher education were surveyed on their early retirement incentive programs, of the 567 institutions which responded, 38% said that they had such a program, and half of those had been made available since 2000. Programs have a variety of features. Eligibility occurs mostly at ages 50, 55 or 60, and is sometimes coupled with a minimum number of years of service. Some institutions are offering phased retirement, to permit faculty to reduce their obligations in return for a promise to relinquish tenure at a future date. Once retired, a variety of benefits may be offered, including access to libraries, health facilities, e-mail, and parking, with a few institutions also providing some travel support, office space or secretarial support. This article was written by Scott Jaschik for *Inside Higher Ed.* (See http://insidehighered.com/news/2007/03/13/retirement)

Support for women faculty at RPI - RAMP-UP is the name of a new initiative of Rensselaer Polytechnic Institute (RPI) designed to move its women faculty through the academic ranks to full professor, writes Elia Powers in *Inside Higher Ed.* The program, with support from the National Science Foundation, follows up on various reports, including one by the National Academies in 2006, that point out the under-representation of women in science and engineering faculties due, in part, to institutional policies and structures. RAMP-UP emphasizes mentoring, with senior women helping more junior women to design a plan for development. RPI will also hire "coaches" to work in each college advising individual faculty and promotion and tenure committees. There is also

money available to help women in their research. (See
http://insidehighered.com/news/2007/03/28/rpi)

Ranking of doctoral programs – A new system of ranking doctoral programs is being
offered by PhDs.org, and provides an alternative to the controversial *U.S. News & World
Reports*' approach, writes Scott Jaschik in *Inside Higher Ed*. The new system gives – for
free – information on over 5,000 programs at 400 universities, and allows users to select
factors that are most important to them, for example tuition costs, time to degree, job
placement after graduation, etc. Then a weighting system is used and a personalized
ranking of departments is generated, with both an overall rank and how the departments
ranked in different criteria. The data come from information provided by institutions to
the US Department of Education, the National Research Council and the Survey of
Earned Doctorates. The NRC data are at this point old, leading to criticisms that these
new rankings are flawed, but on the other hand, the PhDs.org system allows for work-
arounds when data for a particular program are missing, something that the *U.S. News*
system doesn't do. A representative from *U.S. News* indicates that pretending that
reputation, which is fundamental to that publication's ranking system, isn't important is
disingenuous. (See http://insidehighered.com/2007/03/30/rankings)

Copy-and-paste papers put profs on offensive – More incidents of college students
plagiarizing other's work are popping up today than ever before, according to an article
in the March *The Institute.* A survey of students indicates that 10% admitted to
plagiarizing in 1999, whereas almost 40% said they did so in 2005. Many professors
place the blame on the Internet, which has made plagiarizing a simple copy-and paste
process. But lack of understanding of what plagiarism is, and a lack of basic education in
ethics also add to the increase. One key to stopping plagiarism is to make sure students
understand proper attribution. Spotting plagiarism has gotten easier with search engines
such as Google, and special detection software, but faculty members rarely run papers
through such time-consuming checks. One professor sets strict limits – using more than
four consecutive words or lifting an uncommon phrase may be plagiarizing. (See
http://www.ieee.org/theinstitute)

The rankings revolt – Fed up with arbitrary ratings lists, college presidents are teaming
up to develop a better alternative. According to an article in the April 2nd issue of *Time,*
few colleges are willing to risk their prestige by dropping out of what has become a
hugely influential beauty contest – *U.S. News and World Report's* annual college
rankings. *U.S. News* compiles such lists because readers buy them, but lists can invite
gamesmanship. This year, however, a small but growing number of schools are starting to
fight back. The heads of a dozen private colleges are preparing a letter to send to their
counterparts at 570 or so small to midsize schools, asking whether they would be willing
to pull out of the *U.S. News* ranking process. (See http://www.time.com)

Pleading for acceptance – Community college graduates are a qualified group, but
according to an article in the March *Prism* by Jeffrey Selingo, the door to four-year
universities is often tough to open. While two-year colleges have long been seen as a
stepping stone to a bachelor's degree in the US, engineering is one of several academic

fields in which four-year colleges have been reluctant to establish formal transfer agreements with community colleges. A report released in 2005 by the National Academy of Engineering found that community colleges are "essential" to the education of American engineers, but "have not reached their full potential". The report noted that 40% of recipients of bachelor's and master's degrees in engineering in 1999 and 2000 had attended a community college. (See http://www.asee.org/prism)

5 - Employment, competitiveness

Shortage of engineers? – A group of researchers from the Pratt School of Engineering at Duke University has reported that there is no shortage of engineers in the US, but that shortages exist in both India and China, which are turning out record numbers of engineers. The report, "Where the Engineers Are," appeared in the spring issue of *Issues in Science and Technology*, writes Lauren Smith in the March 30 edition of *The Chronicle of Higher Education.* The researchers surveyed 58 American companies that are outsourcing engineering jobs. According to them, 80% of engineering jobs in their companies are filled within four months. Offshoring is occurring not because of any deficiencies in US education or workers, but because it is cheaper to hire engineers overseas. (See http://chronicle.com) Another article, written for the March 19 issue of *Business Week* by Pete Engardio*,* notes that the Duke report suggests that the real challenge will be for the US to increase its emphasis on graduate work in engineering, in order to retain its hold on research and design. (See http://www.businessweek.com)

Eastern Europe snags research labs – Google has joined IBM, Motorola and others and opened a research lab in Poland, to capture a share of the well-educated computer science graduates of such universities as AGH University of Science and Technology in Krakow, writes Colin Woodard in the March 13 edition of *The Christian Science Monitor*. In recent years Eastern Europeans have won top programming competitions pitting them against international contestants: this has attracted the attention of companies searching for new talent. Science and engineering both were emphasized under the former Soviet rule, and now students in Hungary, Poland and the Czech Republic have excellent education in mathematics and a keen interest in software. While competition from India is strong, Eastern European students are at an advantage when dealing with Western Europe in terms of geographic proximity and some shared cultural values. Local industry has discovered that partnerships with universities are vital to their continuing success. One large problem looms on the horizon, however. Since academic jobs do not pay as highly as industry, universities worry that there will not be enough students who will opt to pursue graduate degrees and become the next generation of professors who will keep the momentum going. (See http://www.csmonitor.com)

Labor shortages in Europe - Some sectors of European economies are suffering from labor shortages, reports Carter Dougherty (with contribution by Eric Sylvers) in *The New York Times* on March 10. The people who are looking for jobs do not have the skills required by industries which are more high tech and less involved in heavy industry. And European universities are not turning out appropriately trained people fast enough to

supply the needs of growing companies. The Association of German Engineers says that last year there was a 30% increase in the number of engineering jobs available in Germany, with 22,000 open positions. Solutions include recruiting from abroad, outsourcing, and going into the schools to persuade students to study in fields where there are labor shortages. (See http://nytimes.com)

6 – Journals

International Journal of Engineering Education – The current issue, vol.23 no.1, contains a special section on Trends in Pre-college (K-12) Engineering Education. A dozen papers focus on topics such as integrating engineering in middle and high school classrooms, partnering to bring engineering concepts to elementary students, and infusing design into the grade 7-12 curriculum. The issue also contains eleven papers on engineering education research, university-industry cooperation, engineering design, etc. (See http://www.ijee.dit.ie)

European Journal of Engineering Education – Issues 1 and 2 of Volume 32 have been released. The first has articles on learning of structural engineering concepts, quality in engineering education, peer assessment, and preparing foreign students for engineering studies. The second includes articles on active learning, teaching of sustainable design, enhancing university-industry cooperation, and continuous improvement in engineering education, (See http://www.informaworld.com)

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