ENG 190, Winter Quarter 2013

Professional Responsibilities of Engineers

Spyros Tseregounis

(February 13-27)

ETHICS IN ENGINEERING

Further Reading:

1. "Engineering Ethics, Concepts and Cases"; Harris Jr., C.E., Pritchard, M. S., Rabins, M. J.; 4th Ed.; Wadsworth; 2009
2. "Ethics in Engineering"; Martin, M. W. and Schinzinger, R.; 4th Ed.; McGraw Hill; 2005

ETHICS IN ENGINEERING

Lecture 1

Wednesday, February 13, 2013

PROFESSION

A *profession* is a *number* of individuals in the same *occupation voluntarily* organized to earn a living by openly serving a *moral ideal* in a *morally permissible* way *beyond* what law, market, morality and public opinion would otherwise require

Michael Davis, " Is There a Profession in Engineering?", *Science and Engineering Ethics*, 3, no.4, 1997, p. 417

ETHICS

- a set of moral principles : a theory or system of moral values

PROFESSIONAL ETHICS

- the principles of conduct governing an individual or a group

Merriam-Webster Dictionary

Key Words

HONESTY INTEGRITY

Do you think you are an ethical person?

While supervising a construction project in a developing country, an engineer discovers that his client's project manager is treating laborers in an unsafe and inhumane (but for that country, legal) manner. When he protests, the engineer is told by company executives that the company has no choice in the matter if it wishes to remain competitive in the region, and he should just accept this as the way things are. What, if anything, would ethics require the engineer to do?

(A) Take no action—the company is acting in a perfectly legal manner.

(B) Withdraw from the project, returning any fees he may already have received.

(C) Report the company to the proper authorities for its human rights abuses.

(D) Assist the laborers in organizing a strike to obtain better working conditions.

Three types of ethics (or morality)

Common Morality

- *a set of moral beliefs shared by almost everyone*

Personal Morality

- *the set of moral beliefs that a person holds*

Professional Ethics

- *the set of standards (ethical) adopted by professionals insofar as they view themselves acting as professionals*

Charles E. Harris Jr., Michael S. Pritchard, Michael J. Rabins, *Engineering Ethics*, Wadsworth, 2009

CODE OF ETHICS OF ENGINEERS

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I. using their knowledge and skill for the enhancement of human welfare;

II. being honest and impartial, and serving with fidelity their clients (including their employers) and the public; and

III. striving to increase the competence and prestige of the engineering profession.

The Fundamental Canons

1. Engineers shall hold paramount the safety, health and welfare of the public in the performance of their professional duties.

2. Engineers shall perform services only in the areas of their competence; they shall build their professional reputation on the merit of their services and shall not compete unfairly with others.

3. Engineers shall continue their professional development throughout their careers and shall provide opportunities for the professional and ethical development of those engineers under their supervision.

4. Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest or the appearance of conflicts of interest.

5. Engineers shall respect the proprietary information and intellectual property rights of others, including charitable organizations and professional societies in the engineering field.

6. Engineers shall associate only with reputable persons or organizations.

7. Engineers shall issue public statements only in an objective and truthful manner and shall avoid any conduct which brings discredit upon the profession.

8. Engineers shall consider environmental impact and sustainable development in the performance of their professional duties.

9. Engineers shall not seek ethical sanction against another engineer unless there is good reason to do so under the relevant codes, policies and procedures governing that engineer's ethical conduct.

10. Engineers who are members of the Society shall endeavor to abide by the Constitution, By-Laws and Policies of the Society, and they shall disclose knowledge of any matter involving another member's alleged violation of this Code of Ethics or the Society's Conflicts of Interest Policy in a prompt, complete and truthful manner to the chair of the Committee on Ethical Standards and Review.

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8. Engineers shall consider **environmental impact** and sustainable development in the performance of their **professional** duties

…safety, health and welfare of the public …

…environmental impact and sustainability …

- Notify higher authority if your judgment is overruled
- Confirm conformity with standards when approving documents

and also related:

- Associate your name only with reputable enterprises
- Report violations of the code to proper authorities

An example:

- What might happen if the safety, health and welfare of the public is compromised?

- If environmental impact is not considered?

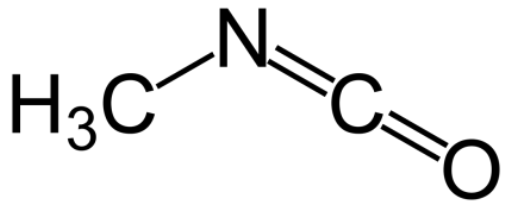
Bhopal, Madhya Pradesh, India. December 2–3, 1984
Union Carbide Pesticide Plan
Released of methyl isocyanate (MIC) gas and other toxins,

Bhopal, Madhya Pradesh, India. December 2–3, 1984
Union Carbide Pesticide Plan

Released of methyl isocyanate (MIC) gas and other toxins

About 3,800 people died immediately
As many as 20,000 may have died today due to the exposure

- Poor maintenance and defective equipment
- Inadequacy of the MIC storage tank
- Inoperative critical equipment for control of leaking MIC
- Lack of effective warning systems and alarms



Reaction of MIC with water → Highly exothermic → MIC boils

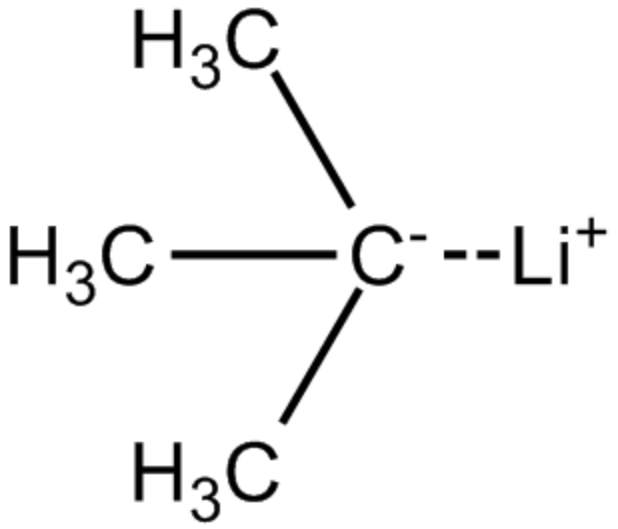
Another example:

A simple advise could have saved a life

On Jan. 16, Sheharbano (Sheri) Sangji, a 23-year-old chemistry research assistant, died from injuries sustained in a chemical fire on Dec. 29, 2008, in a laboratory at the University of California, Los Angeles (C&EN Online Latest News, Jan. 22).

On Dec. 29, Sangji was drawing tert-butyllithium from a bottle into a syringe when the plunger came out of the syringe barrel. The chemical, which ignites spontaneously in air, splashed onto Sangji's clothes and set them on fire. Her hands, arms, and upper torso—about 40% of her body—suffered burns.

PYROPHORIC: A recommended set-up for syringing tert-butyllithium includes inert gas supply and venting to a bubbler, as well as a glass syringe.



tert-butyllithium is a pyrophoric substance, easily igniting and burning when exposed to air

By Kim Christensen, Los Angeles Times December 28, 2011

Felony charges have been filed against the University of California and a UCLA chemistry professor in connection with a laboratory fire that killed a staff research assistant three years ago.

…

Her death raised questions about lab safety practices at UCLA and about Sangji's training and supervision by professor Patrick Harran, a prominent researcher who joined the faculty in July 2008.

…

On Tuesday, the Los Angeles County district attorney's office charged Harran and the UC regents with three counts each of willfully violating occupational health and safety standards, resulting in Sangji's death.

…

The inspectors found that employees were not wearing requisite protective lab coats and that flammable liquids and volatile chemicals were stored improperly.

…

Harran and UCLA are accused of failing to correct unsafe work conditions in a timely manner, to require clothing appropriate for the work being done and to provide proper chemical safety training.

…

An arrest warrant was issued for Harran, 42, who faces up to 41/2 years in state prison, according to a district attorney's spokeswoman.

…

UCLA could be fined up to $1.5 million on each of the three counts.

Disasters could happen if responsibility is overlooked.

On March 23, 2005, 15 people were killed in an explosion at the isomerization unit of the BP Texas City Refinery

But after a six month inspection, it has been revealed BP has not complied and the safety violations could lead to another catastrophe.
In a statement the Secretary of the US Department of Labor, Hilda Solis, said BP "had agreed to take comprehensive action to protect employees. Instead of living up to that commitment, BP has allowed hundreds of potential hazards to continue unabated. An $US87 million fine won't restore those lives, but we can't let this happen again."

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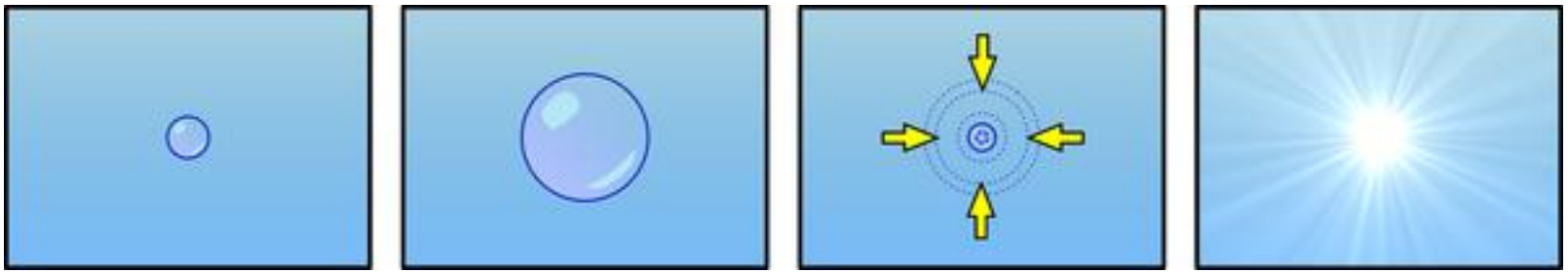
…objective and truthful manner…

- Be objective and truthful in reports, statements, or testimony
- Be competent and know the facts before expressing public opinions
- Identify any interested parties on whose behalf you are expressing opinions or arguments

By not being objective and truthful your career and your reputation may suffer.

Bubble fusion, also known as **sonofusion**

acoustic cavitation experiments conducted with deuterated acetone (C_3D_6O)



Left to right: apparition of bubble; slow expansion; quick and sudden contraction; *possible* fusion event.

Tom Laurin

Allegations of fraud can take a long time to show up and can take even longer to investigate and prove. But the process is worth it: Innovation will falter without integrity.

On page 57 of this issue, editor Hank Hogan takes an in-depth look at research misconduct, from the difficulties associated with identifying it, to how scientists in our industry can educate themselves (and others) on how to fight it. The article also looks at policies and procedures currently in place that can help deter and uncover future falsification, fabrication and plagiarism in scientific research.

Remember the bubble fusion scandal? That particular case certainly took a long time to develop. In autumn 2008, Purdue University in West Lafayette, Ind., stripped nuclear engineering professor Rusi P. Taleyarkhan of his named professorship after a university appeals committee upheld findings that he had falsified research records not once but twice in reporting his work on sonofusion.

In the March 2002 issue of *Science*, Taleyarkhan reported that he was the first to demonstrate sonofusion in a beaker. The technique, also known as bubble fusion, involves using sound waves to compress bubbles in deuterated liquids to the point of collapse, producing fusion normally only possible with enormous, expensive machinery.

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…faithful agents or trustees…

…conflicts of interest…

…appearance of conflicts of interest…

- Disclose all potential conflicts of interest or appearance of conflict of interest
- Accept compensation only from the party (or parties by consent) that supports a specific project
- Do not accept outside compensation for the work you are responsible within your firm
- Do not solicit or accept contracts from a public source where members of the public enterprise also serve as officers in your firm
- Do not influence decisions about a potential contract to your organization awarded by a public source if you also serve as consultant to the public enterprise

Conflicts of Interest in Academic Research: Policies, Processes, and Attitudes

Shira Lipton (University of California, Los Angeles), **Elizabeth Boyd** and **Lisa Bero** (University of California, San Francisco, San Francisco)

… Our study suggests the need for renewed efforts to encourage awareness of the relevance of conflict of interest policies for all faculty, new efforts to increase understanding of the situational nature of conflicts of interest, and a reexamination of the processes of policy implementation at the campus level…

Accountability in Research, 11: 83–102, 2004

A situation where disregard of the conflict of interest turned ugly

Former Air Force acquisition chief begins prison term

By George Cahlink gcahlink@govexec.com January 5, 2005

Darleen Druyun, the former **Air Force acquisition executive who steered contracts to Boeing in exchange for a lucrative job**, began serving a nine-month sentence in a federal prison on Monday.

Druyun, 57, was sentenced last fall after violating federal conflict of interest laws by **negotiating a $250,000-a-year job with Boeing, the Pentagon's second largest contractor, while managing the Air Force's federal contracts**. Druyun admitted to favoring Boeing in at least four separate contract negotiations, in exchange for jobs for her daughter and son-in-law.

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…each person is different and each one has unique capabilities…

…respect and recognition of your coworkers unique skills will help us all achieve our goals…

…unless there is a good reason…

Never tolerate harassment.

U.S. Equal Employment Opportunity Commission

Harassment

Harassment is a form of employment discrimination that violates Title VII of the Civil Rights Act of 1964, the Age Discrimination in Employment Act of 1967, (ADEA), and the Americans with Disabilities Act of 1990, (ADA).

Harassment is unwelcome conduct that is based on race, color, religion, sex (**including pregnancy**), national origin, age (40 or older), disability or genetic information. Harassment becomes unlawful where **1) enduring the offensive conduct becomes a condition of continued employment, or 2) the conduct is severe or pervasive enough to create a work environment that a reasonable person would consider intimidating, hostile, or abusive.** Anti-discrimination laws also prohibit harassment against individuals in retaliation for filing a discrimination charge, testifying, or participating in any way in an investigation, proceeding, or lawsuit under these laws; or opposing employment practices that they reasonably believe discriminate against individuals, in violation of these laws.

U.S. Equal Employment Opportunity Commission

Genetic Information Discrimination

Title II of the Genetic Information Nondiscrimination Act of 2008 (GINA), which prohibits genetic information discrimination in employment, took effect on November 21, 2009.

…

Definition of "Genetic Information"

Genetic information includes information about an individual's genetic tests and the genetic tests of an individual's family members, as well as information about the manifestation of a disease or disorder in an individual's family members (i.e. family medical history). Family medical history is included in the definition of genetic information because it is often used to determine whether someone has an increased risk of getting a disease, disorder, or condition in the future. …..

Harassment Because of Genetic Information

Under GINA, it is also illegal to harass a person because of his or her genetic information. Harassment can include, for example, making offensive or derogatory remarks about an applicant or employee's genetic information, or about the genetic information of a relative of the applicant or employee.

Conduct themselves in a fair, honorable and respectful manner.

“A work colleague of mine recently came into work smelling strongly of alcohol and in a foul mood, after two minutes of threatening to walk out, swearing at me and then eventually walking out before he booked on duty he was reported by myself for gross misconduct.

For whatever reason, the company I work for decided not to go down the disciplinary route as it was felt there was exceptional circumstances and therefore decided to let the matter drop. “

http://uk.answers.yahoo.com

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6. Engineers shall associate only with **reputable persons or organizations**.

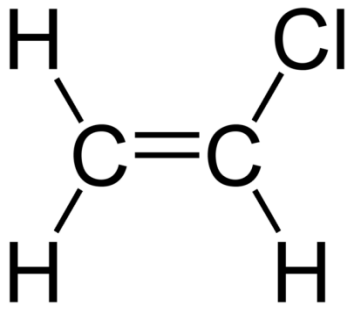
…only in areas of their competence…

Formosa Plastics VINYL CHLORIDE MONOMER Explosion

Illiopolis, IL, April 23, 2004

A preventable human error leads to a vinyl chloride explosion, killing five

Release to Atmosphere → Flash Evaporation → Dense Cloud → Fire and Explosion
(low boiling point) (lower temperature) (heavier than air) (low flash point)



…reputation on the merit of their services…

…associate only with reputable persons or organizations…

The RepTrak™ 100: The World's Most Reputable Companies

REPUTATION INSTITUTE

32 World's Most Reputable Companies (2012 Rep Trak™):

1. BMW
2. Sony
3. Walt Disney
4. Daimler (Mercedes-Benz)
5. Apple
6. Google
7. Microsoft
8. Volkswagen
9. Canon
10. LEGO Group
11. Adidas Group
12. Nestle
13. Colgate-Palmolive
14. Panasonic
15. Nike
16. Intel
17. Michelin
18. Johnson & Johnson
19. IBM
20. Ferrero
21. Samsung Electronics
22. Honda Motor
23. L'Oreal
24. Nokia
25. Philips Electronics
26. Kellogg
27. Goodyear
28. Amazon.com
29. Danone
30. 3M
31. Hewlett-Packard
32. Nintendo

32 Best US Companies to Work For (No. of Employees):

Source: Fortune 2013

1. Google, Inc. (34,311)
2. SAS (6,373)
3. CHG Healthcare (1,378)
4. The Boston CG, Inc. (2,314)
5. Wegmans Food (43,927)
6. NetApp (7,426)
7. Hilcorp Energy (1,012)
8. Edward Jones (35,114)
9. Ultimate Software (1,440)
10. Camden Property Trust (1,896)
11. Qualcomm (15,693)
12. DreamWorks Animation (2,181)
13. Quicken Loans Inc. (5,744)
14. Robert W. Baird & Co. (2,612)
15. DPR Construction (1,371)
16. The Container Store (3,865)
17. REI (10,757)
18. Burns & McDonnell (3,586)
19. salesforce.com (5,474)
20. Millennium (1,396)
21. W. L. Gore (6,234)
22. Intuit, Inc. (7,405)
23. Alston & Bird LLP (1,646)
24. World Wide Technology (1,816)
25. Plante & Moran, PLLC1 (584)
26. Chesapeake Energy (13,242)
27. Devon Energy (3,523)
28. Kimpton Hotels (7,480)
29. Southern Ohio MC (2,189)
30. Mercedes-Benz USA (1,785)
31. Zappos.com (1,243)
32. JM Family Enterprises (3,737)

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“Knowledge is power”

That statement was true when Sir Francis Bacon said it four centuries ago, and it’s still true today.

When do skills become obsolete, and when does it matter?

Jim Allen, Rolf van der Velden

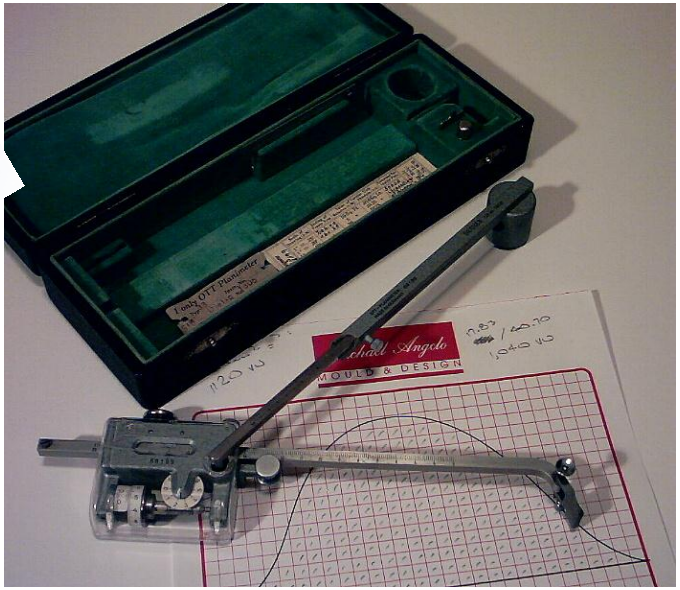
Abstract

In our analyses, using data on Dutch tertiary education graduates, we use a direct measure for skills obsolescence based on workers’ self-assessment. *On average, almost a third of the skills obtained in tertiary education were obsolete seven years later.* Skills obsolescence is strongly related to rapid changes in work domain, and to shortcomings in tertiary education. Obsolescence occurs as much in generic as in specific fields of study. It is only weakly related to current skill shortages, and not at all to the prospects for further skill acquisition, wages and investments in additional training.


Underwood


Therma-Flow


The Doors
MIRAGE
I THINK WE'RE ALONE NOW
TOMMY JAMES


Michael Angelo
MOULD & DESIGN


NORWOOD
Flashalite
DIRECTOR PRODUCTS CORP.


AGFAPHOTO
AGFAPHOTO
vista
100
36 Photos
vista
100
36 Photos
vista
AGFAPHOTO

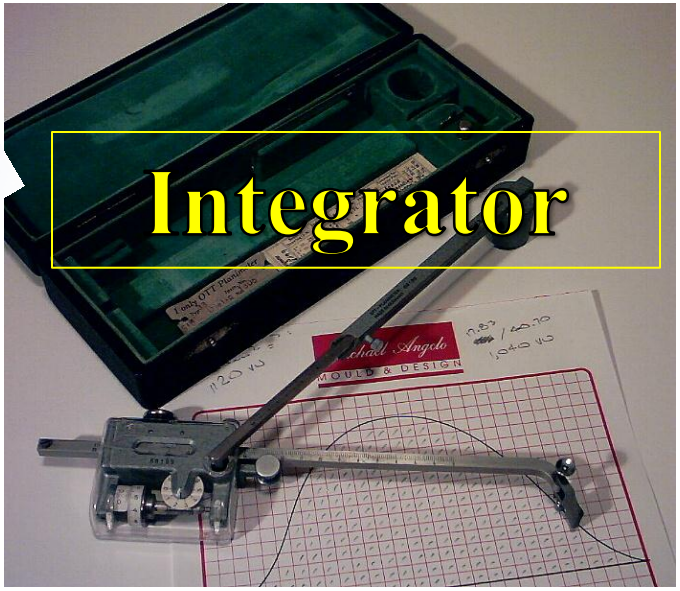

Logarithmic
Ruler


Typewriter


Drafting
instruments


Turntable


Calculator


Integrator


Exposure
meter


35 mm
film