



KHALIFA
UNIVERSITY



ENGR110

Introduction to Professional Engineering

Engineering Profession



Course Information for Students

Course General Information:	
Course Title	Introduction to Professional Engineering
Course Code	ENGR - 110
Course Instructor	Assoc. Prof. Andrzej Sluzek andrzej.sluzek@kustar.ac.ae Phone: 02 501 8578 Office: 313
Office Hours	Monday: 1:00 - 3:00 PM Tuesday: 1:00 - 3:00 PM Wednesday: 2:00 - 4:00 PM (alternatively by appointment)



Course Information for Students

Aims :

- To develop an understanding of the various branches of professional engineering and the role of the engineering in design, manufacturing, and society.
- Identify ethical issues involved in engineering professional practices.

Learning Outcomes :

- Identify the engineering roles and processes.
- Identify the position of engineering in business and society.
- Identify ethical issues involved in engineering professional practices.
- An ability to function on multi-disciplinary teams
- An ability to communicate effectively.

Instructional materials

Textbook: Kemper and Sanders. *Engineers and Their Profession*, 5th Edition., Oxford, 2001.

Reference materials:

M. David Burghardt. *Introduction to Engineering Profession*, Prentice Hall, 1997.
John Reader, *Globalization, Engineering, and Creativity*, Morgan and Claypool Publishers, 2006.

Methods of Assessment

HW / Quizzes* :	40 %
Case Studies *:	20 %
Final Exam:	40 %

* Three quizzes.

* Two case studies that require teams of 2-4 students.



Course Topics

	Topic
1	Engineering Profession
2	Branches of Engineering
3	Engineering Employment
4	Engineering Education
5	Engineering Creativity
6	Professional Registration, Management, and Ethics
7	Intellectual Property and Product Liability



THE ENGINEERING PROFESSION

Contents:

What do engineers really do?

Science *versus* engineering

Public image

What is a profession?

Professionalism by legislation

Shortage of engineers: Fact or Myth?

Women in engineering

The functions of engineering



WHAT DO ENGINEERS REALLY DO?

A question asked
by a high school
senior

- Working in office or somewhere else
- Coming up with new ideas
- Defining problems
- Solving problems
- Working with others

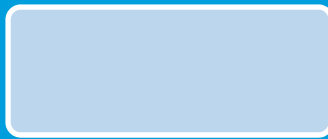
A question asked
by an engineering
college/university
graduate

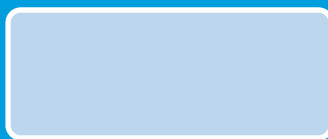
- Engineering practice does not resemble college/university experiences
- Making the right choices
- Variety of things can be done
- Matching talents and interests



SCIENCE *versus* ENGINEERING

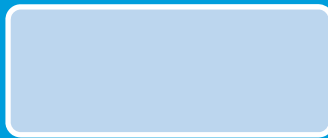
 Scientists primarily produce knowledge

 Engineers primarily produce processes and things.

 Engineering and science are intimately related.

 Engineering projects tend to become a mixture of these two fields.

 A scientist may be primarily (but not always!) a theoretician

 Engineers are concerned with the creation of devices, systems, processes, and structures for human use.



SCIENCE *versus* ENGINEERING

Science

- studies laws of nature
- generates new knowledge

Engineering

- converts science into technology
- technology into useful products
- requires creativity, judgment, imagination, experience

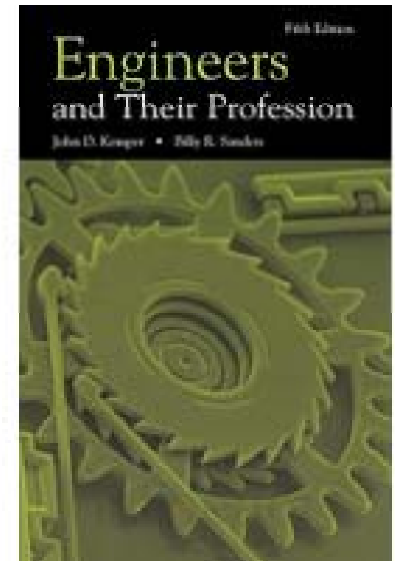
What about mathematics?

- one of the best engineering tools



ENGINEERING...

*“Engineering is the profession in which a knowledge of the natural and mathematical sciences, gained by study, experience, and practice, is **applied** with judgment to develop ways to utilize, economically, the materials and forces of nature for the benefit of mankind.”*



PUBLIC IMAGE

Four classic sources of confusion on “who is an engineer”:

- The matter of science *versus* engineering
- People who perform as engineers but possess no degree
- People with engineering degree but done engineering for a short time only (or never)
- Use of the title of engineer for someone who operates a train or stationary power plant



PUBLIC IMAGE

A survey conducted in 1998 in the United States reveals that most people believe that technology makes a positive contribution to society and engineers are credited for it.

The survey revealed also that many parents would be pleased if their children became engineers.

Today's typical engineer is a college/university graduate (increasingly likely to have an advanced degree)

Salary and standard of living frequently make today's engineers the envy of other workers.

The engineer's place is an office, or a factory floor, or a conference room, or a lab, or a construction site.



PROFESSIONALISM BY LEGISLATION

- Title “*Professional Engineer*” is protected by law in US
- The term professional employee means:
 - (a) any employee engaged in work that is:
 - Predominantly intellectual and diversified in character
 - Involving consistent exercise of performance judgment
 - Of such a character that outputs produced cannot be standardized in relation to a given period of time
 - Requiring knowledge in field of specialization
 - or
 - (b) any employee who:
 - Has completed course of specialized intellectual instructions
 - Is performing related work under supervision of a professional person to qualify himself to become a professional employee



WHAT IS A PROFESSION?

Specialized knowledge

Intensive preparation

Organization

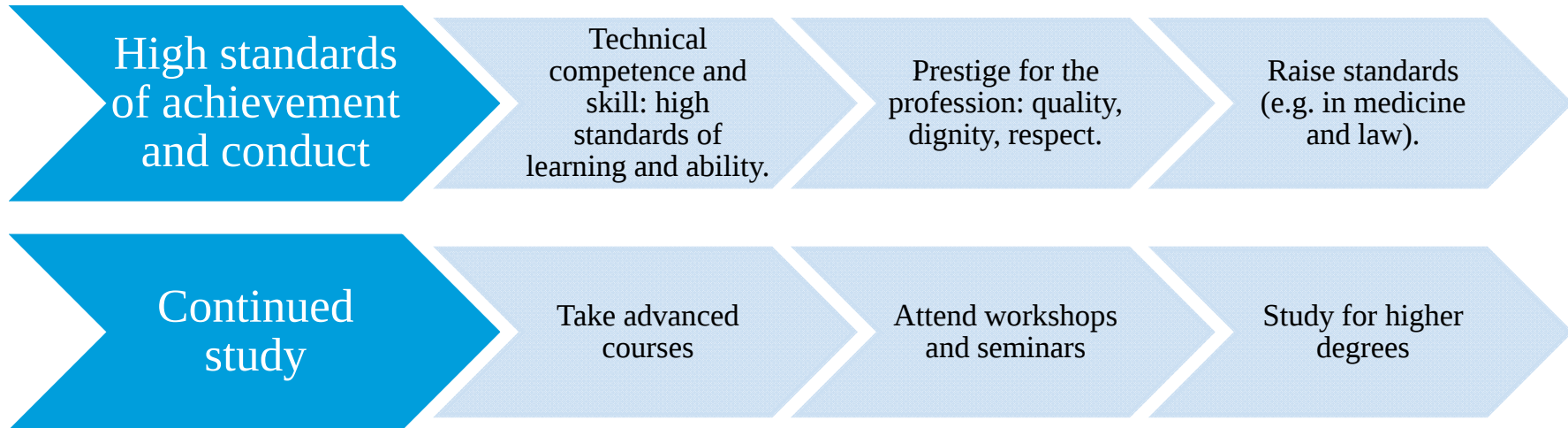
High standards of achievement and conduct

Continued study

Public service



WHAT IS A PROFESSION?



WHAT IS A PROFESSION?

Public service

- Engineer's public service is real one, but it is not as evident as a doctor's or lawyer's.
- fact that most engineers are employees of corporations make their public services less apparent.
- Effect of engineering on the public's well-being is a vital one.
- There is hardly anything we touch, use, or eat that has not been subjected to an engineer's influence at some state in its development.
- Engineer is engaged in the creation of things that did not exist before.



WHAT IS A PROFESSION?

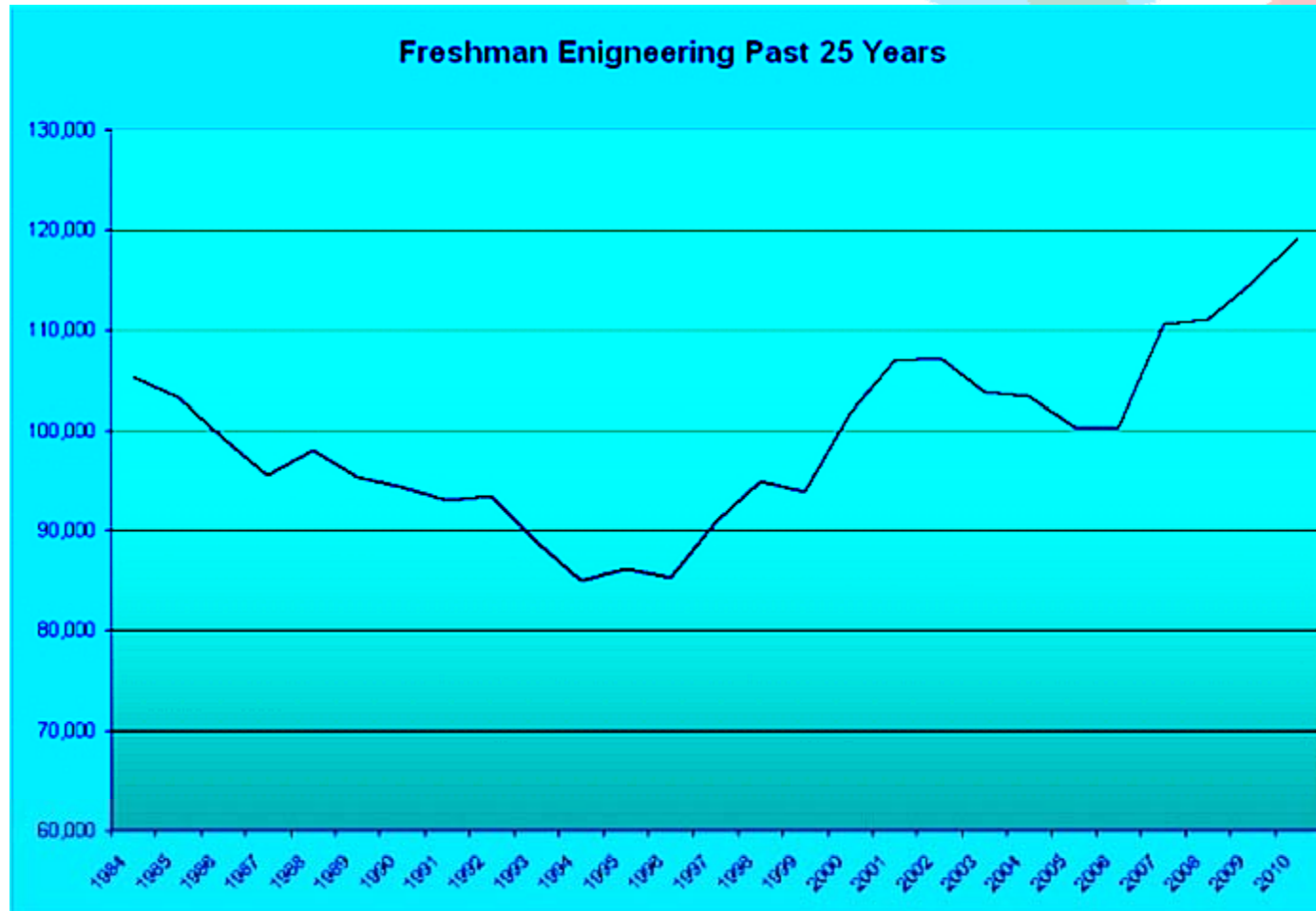
Table 1-1 Comparison of Engineers with Other Professionals

Occupation	Number in 1997
Teachers (all except college and university)	4,798,000
Engineers	2,036,000
Lawyers and judges	925,000
Teachers (college and university)	869,000
Physicians	724,000
Dentists	138,000

Source: Statistical Abstract of the United States, 1998 (Washington, DC: U.S. Bureau of the Census).



ENGINEER SHORTAGE: FACT OR FANCY?

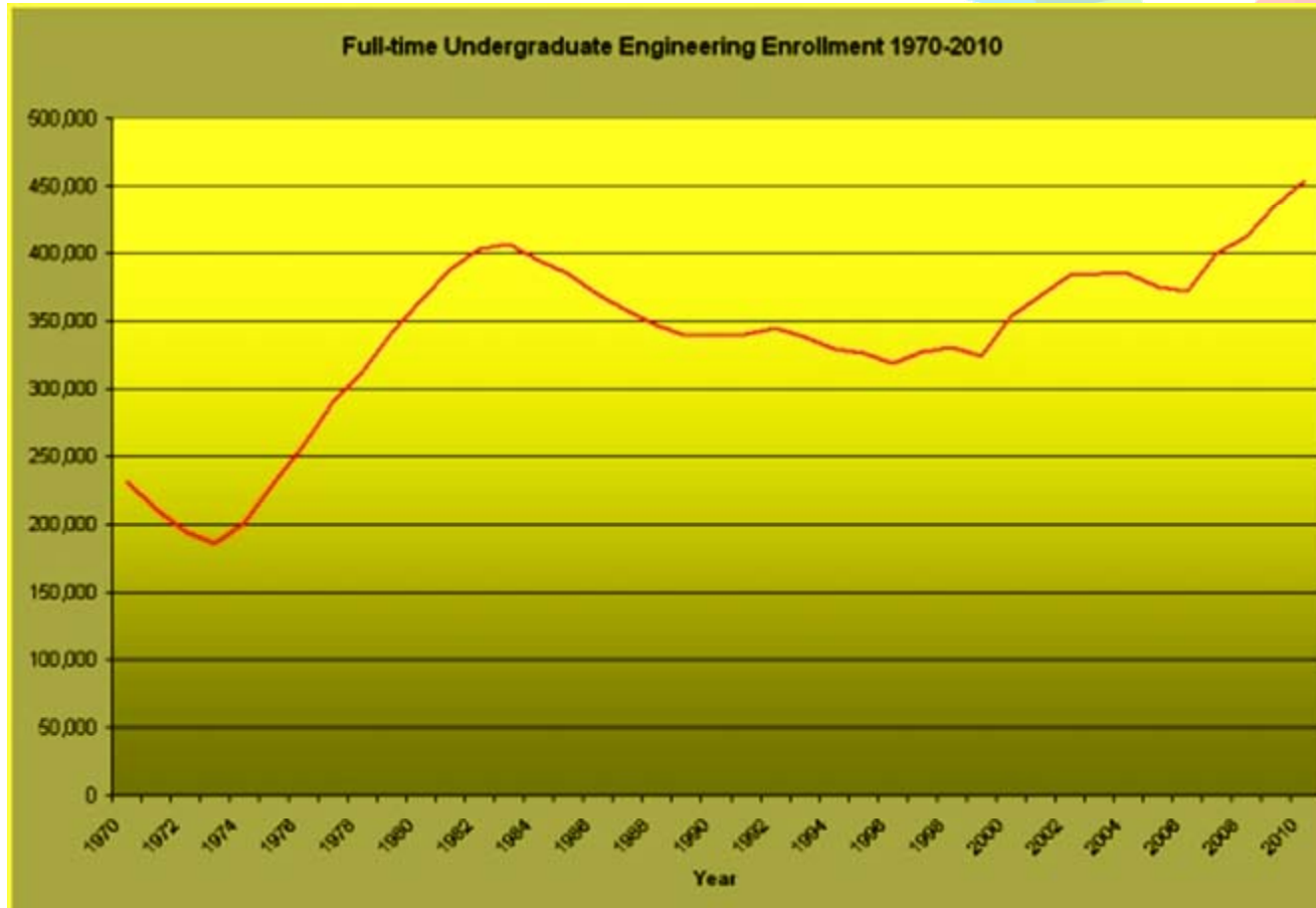


Source: *Engineering Workforce Commission of American Association of Engineering Societies*

http://www.ewc-online.org/data/enrollments_data.asp



ENGINEER SHORTAGE: FACT OR FANCY?

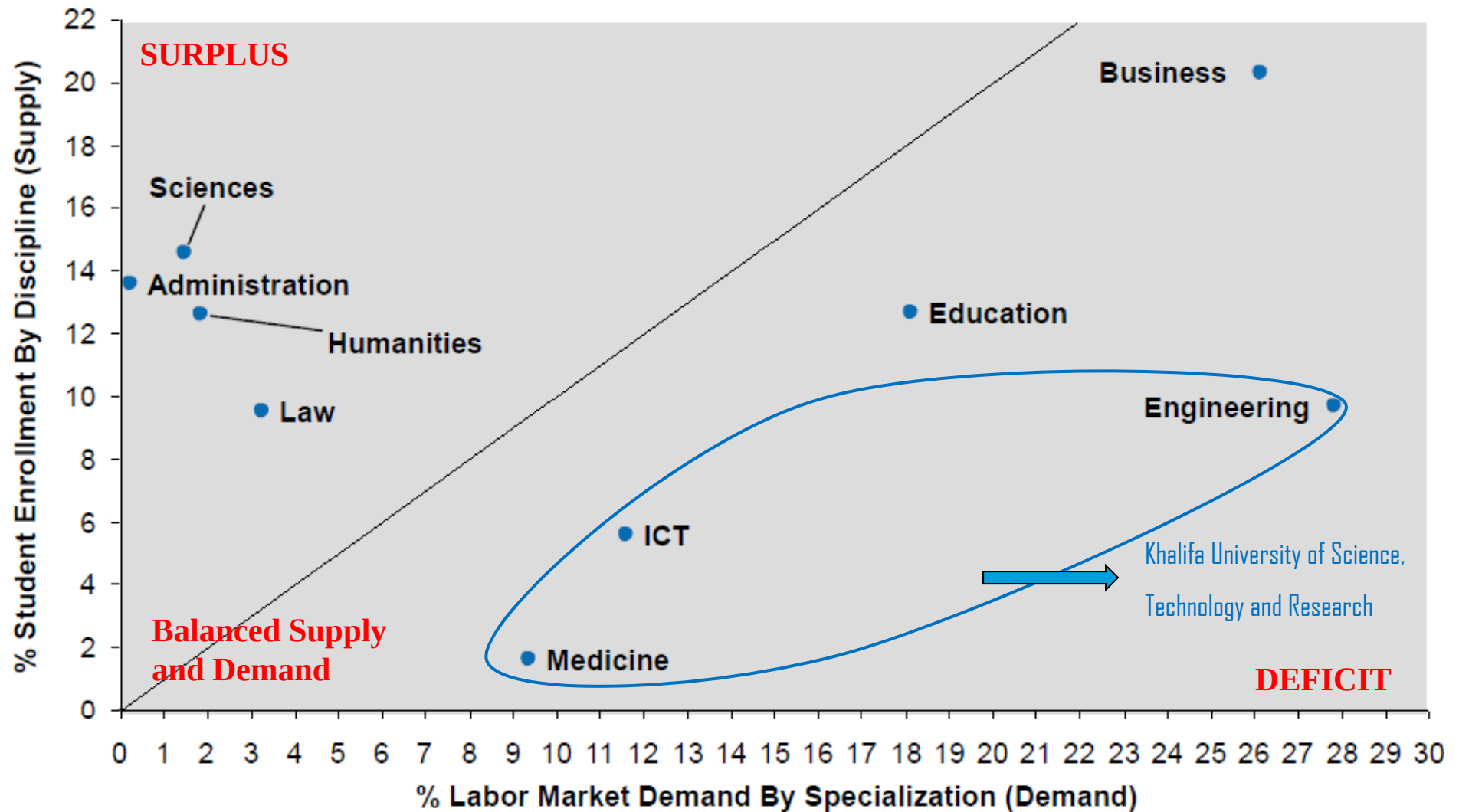


Source: *Engineering Workforce Commission of American Association of Engineering Societies*

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Higher Education Specialization Supply vs. Labor Market Demand



Source: Abu Dhabi Statistical Yearbook; Abu Dhabi Census 2005; Annual Report 2005-2006



WOMEN IN ENGINEERING

Until the 1970s, the number of young women who went into engineering was very small.

In 1984, the number increased to 14%.

Women engineers are playing important roles in the contemporary society.

In 1972, the number of women graduating with a bachelor's degree in engineering exceeded 1% of the total.

In 1997, the number increased again to 19.67%.



THE FUNCTIONS OF ENGINEERING

- Research and Development
- Design and Development
- Testing
- Manufacturing
- Construction
- Sales
- Consulting
- Government
- Management
- Teaching



Rewards & Opportunities of Engineering Career

Job satisfaction

Varied opportunities

Challenging work

Intellectual development

Social impact

Financial security

Prestige

Professional environment

Understanding how things work

Creative thinking



Important Fields for the Future

Information and communication systems

Smart and engineered materials

Bioengineering

Critical infrastructure systems

Homeland security

Improved health care delivery

Nanotechnology

Advanced environmental technology

Sensors and control systems

