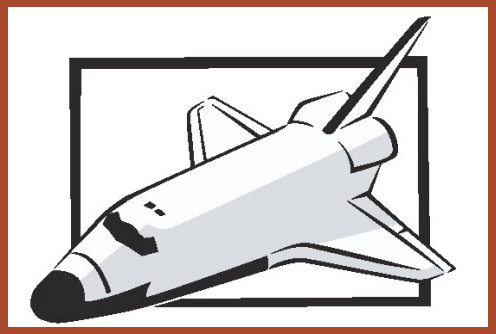
Week 4

The Engineering Profession (Continue)



Overview

- Important Fields for the Future
- Sustainability
- Engineering as a Profession

14 Grand Challenges for Engineering

1. Make solar energy economical
2. Provide energy from fusion
3. Develop carbon sequestration methods
4. Manage the nitrogen cycle
5. Provide access to clean water
6. Restore and improve urban infrastructure
7. Advance health informatics

14 Grand Challenges for Engineering (continued)

8. Engineer better medicines
9. Reverse-engineer the brain
10. Prevent nuclear terror
11. Secure cyberspace
12. Enhance virtual reality
13. Advance personalized learning
14. Engineer the tools of scientific discovery

Sustainability

Sustainability is meeting the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainability
Major environmental problems

- Global warming/climate change
- Ozone depletion
- Water quality and quantity
- Air pollution
- Dependence on fossil fuels/energy crisis
- Unsustainable agriculture
- Threat of disease
- Waste management and land pollution
- Over-consumption
- World hunger
- Loss of ecosystems/deforestation/animal extinction

***The significant problems we face cannot be solved at the same level of thinking we were at when we created them.* –** Albert Einstein

Attributes of “Green Engineering” and Sustainable Designs

- Designs that use less energy or reduce emission
- Designs with minimal carbon footprints
- Designs that reduce material usage or waste in manufacturing
- Designs with no toxic materials
- Designs that comply with environmental standards and regulations
- Manufacturing processes that use less energy and natural resources
- Products that can be disposed of safely, including biodegradable materials and packaging
- Manufacturing processes that minimize the usage or production of substances of concern
- Designs that use renewable/recyclable/recycled materials
- Products that require less packaging