

MSE 200-002

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Textbook

Foundations of Materials Science and Engineering

Fourth Edition

**William F. Smith
Javad Hashemi**

Policies and Procedures

Home work: See the syllabus. You are NOT required to turn in your home work

Tests:

- 4 closed-book tests
- 3 best grades each contribute 30 % toward the final grade and the worst grade contributes 10%
- Bring your student ID
- Re-grading: Give written request together with the test to the TA within 1 week. Whole test will be re-graded.

Missed tests:

- No documented excuse or pre-approval.** Make-up tests in the last week of class
- With documented excuse or pre-approval.** Will be dealt individually
- Only 1 make up test per semester

Grading:

Weighted average	>97	96.9-93	92.9 – 89	88.9-85	84.9 - 81	80.9 - 77	76.9 - 72	71.9 - 67	66.9 - 62	61.9 - 52	<52
Letter grade	A+	A	A-	B+	B	B-	C+	C	C-	D	F

Targeted grade ranges: , 15-30% A, 30-50% B, 30-40% C, XX% D.....

Teaching style

- Active student participation in class
- Interrupt anytime for questions!
- 3 surveys
- Powerpoint will be used, expect students to bring the printout
- Important concepts will be underlined (tests problems will be from them **and HW**).

Quizzes

- A dice will be rolled to determine who participate
- **0.5% will be deducted** if you are not present in the class;
- 0.5% will be given if you give the right answer
- 0.5% will be given to a volunteer who gives the right answer
- No credit will be given or deducted if you give an wrong answer to a regular quiz
- **0.5% will be deducted** if you give an wrong answer to a **reading assignment** quiz

History of Materials

Stone age \Rightarrow copper age \Rightarrow iron age

Materials determine the advance of technologies



The first Boeing airplane was made of wood in 1916.



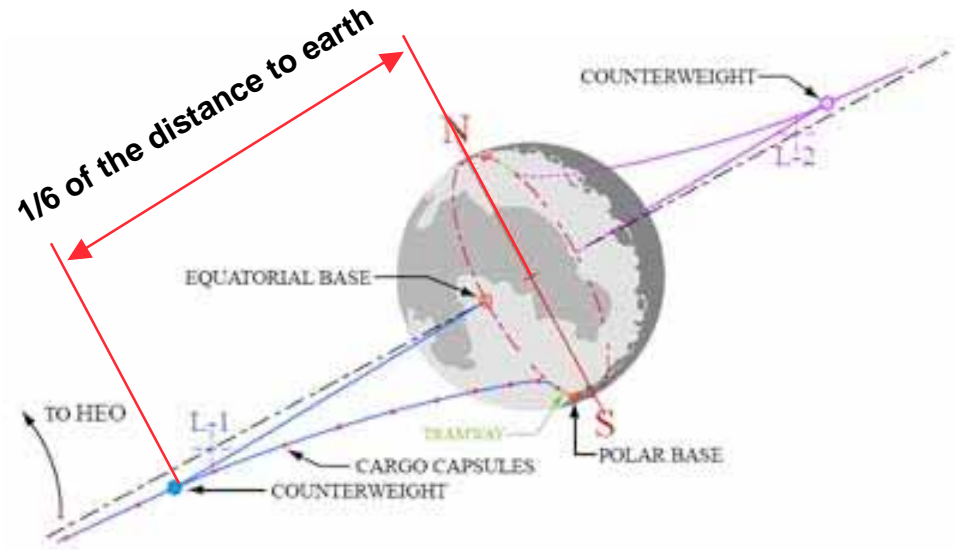
The first Boeing 787 dream liner made of carbon fiber composites.

Space Elevators?

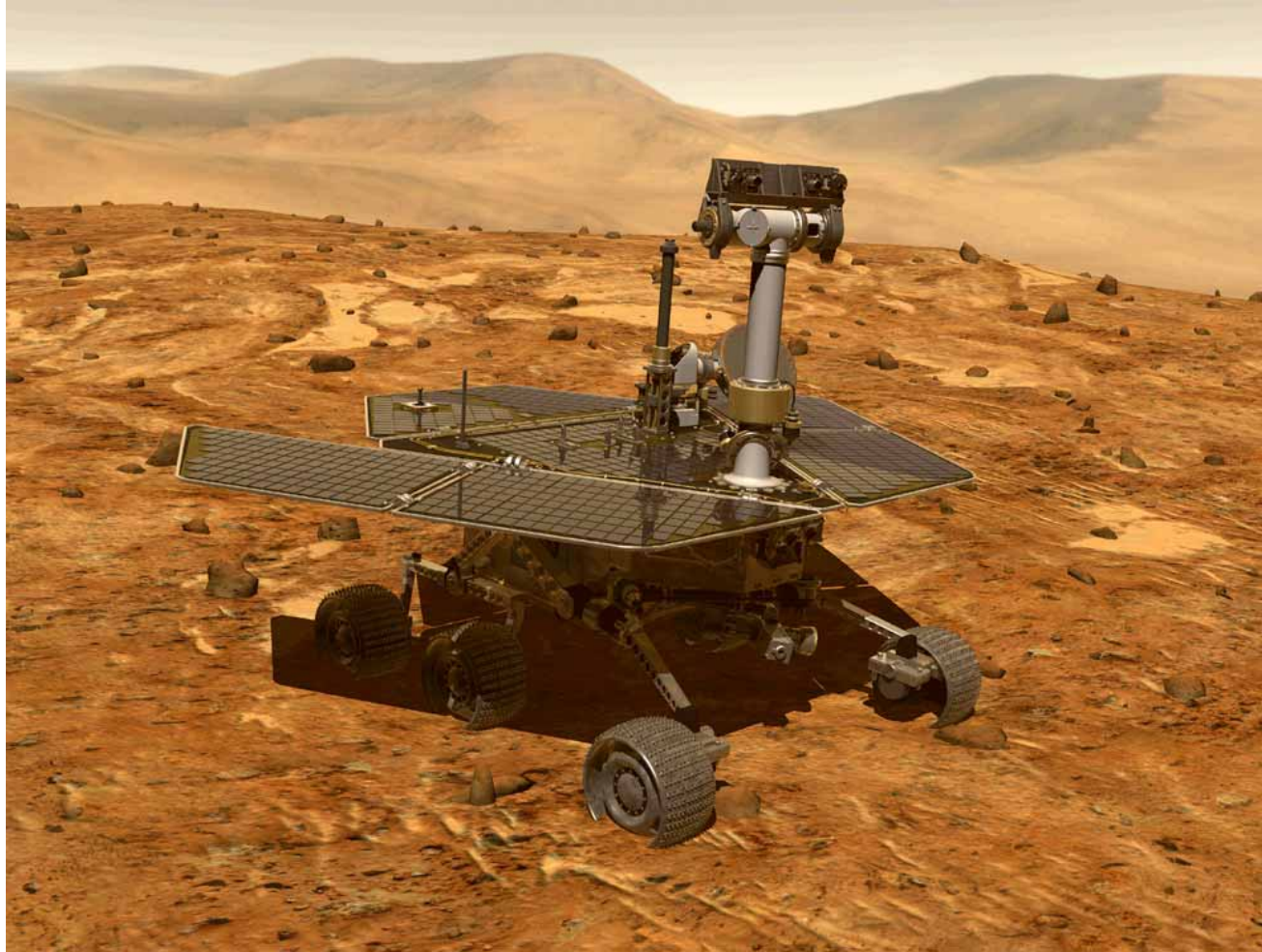


100,000km
62,000miles

Mission Impossible



The Mars Rovers - Spirit and Opportunity



**Spirit and Opportunity are made up of materials such as
* Metals * Ceramics * Composites * Polymers * Semiconductors**

www.nasa.gov

What are Materials?

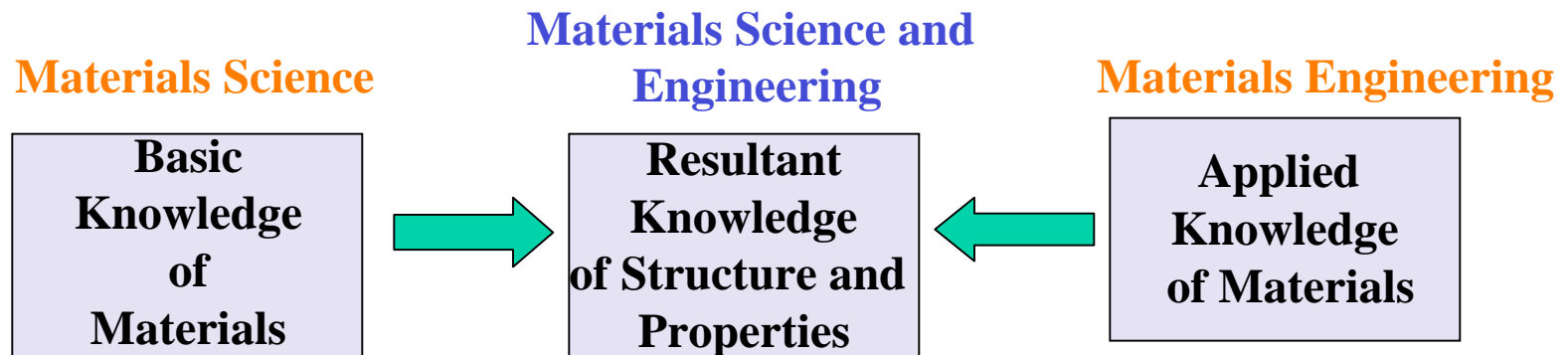
- **Materials may be defined as substance of which something is composed or made.**
- **We obtain materials from earth crust and atmosphere.**

Why the Study of Materials is Important?

- **Production and processing of materials constitute a large part of our economy.**
- **Engineers choose materials to suite design.**
- **New materials might be needed for some new applications.**
- **Modification of properties might be needed for some applications.**

Materials Science and Engineering

- Materials science deals with **basic knowledge** about the internal structure, properties and processing of materials.
- Materials engineering deals with the **application of knowledge** gained by materials science to convert materials to products.



Types of Materials

- **Metallic Materials**

- **Composed of one or more metallic elements.**

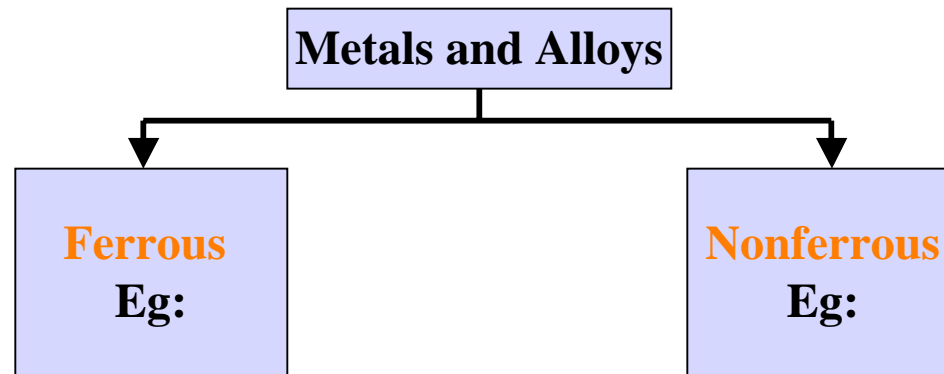
- ❑ *Example:-*

- **Metallic element may combine with nonmetallic elements.**

- ❑ *Example:-*

- **Inorganic and have **crystalline** structure.**

- **Good thermal and electric conductors.**



Types of Materials

- **Polymeric (Plastic) Materials**
 - **Organic giant molecules and mostly noncrystalline.**
 - **Some are mixtures of crystalline and noncrystalline regions.**
 - **Poor conductors of electricity and hence used as insulators.**
 - **Low densities and decomposition temperatures.**
 - *Examples :- Poly vinyl Chloride (PVC), Polyester.*
 - *Applications :*

Types of Materials

- **Ceramic Materials**

- **Metallic and nonmetallic elements are **chemically bonded** together.**
- **Inorganic but can be either crystalline, noncrystalline or mixture of both.**
- **High hardness, strength and wear resistance.**
- **Very good insulator.**
- **Also used in space shuttle to insulate it during exit and reentry into atmosphere.**
- **Other applications** : Abrasives, construction materials, utensils etc.

- *Example:-*

Types of Materials

- **Composite Materials**

- **Mixture** of two or more materials.
- **Consists of a filler material and a binding material.**
- **Materials only bond, will not dissolve in each other.**
- **Mainly two types :-**
 - **Fibrous: Fibers in a matrix**
 - **Particulate: Particles in a matrix**
 - **Matrix can be metals, ceramic or polymer**

When to drop

- Conditions:
 - You cannot tolerate my teaching style
 - You don't understand my lecture
- When:
 - Jan. 21:
 - March 11 (Last day)
- Your options:
 - Choose another section
 - Choose another semester