BOMATERIAL
introduction

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KONTRAK KULIAH

Deskripsi mata kuliah

- Mata kuliah ini menjelaskan tentang siklus biomaterial, klasifikasi biomaterial, potensi material dari produk pertanian baik produk utama maupun limbah/produk samping berbasis karbohidrat, selulosa, protein dan komponen lain. Aplikasi biomassa (agro based material).

Setelah menyelesaikan kuliah Biomaterial mahasiswa diharapkan mampu :

Memahami potensi dan penggunaan biomaterial

Tujuan khusus:

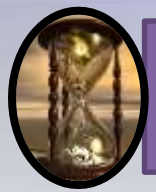
Memahami siklus biomaterial
Menjelaskan klasifikasi biomaterial
Menjelaskan potensi material dari produk pertanian baik produk utama maupun limbah
Menjelaskan biomaterial berbasis karbohidrat, selulosa, protein dan komponen lain
Menjelaskan aplikasi biomassa (agro based material)

Course content

Penilaian

No	Unsur Penilaian	Persentase
1	Tugas	30
2	KUIS	20
3	UTS	25
4	UAS	25
Total		**100**

Tata tertib perkuliahan



Come early, leave class as finished

Submit by due date, in group

No late submission !!

Participate actively

Dress politely

Silent your mobile phone
Ask permission to use laptop

No cheating, misconduct & plagiarism

INTRODUCTION

What is it biomaterial?

- A material intended to interface with biological systems to evaluate, treat, augment, or replace any tissue, organ or function of the body (Williams, 1999).

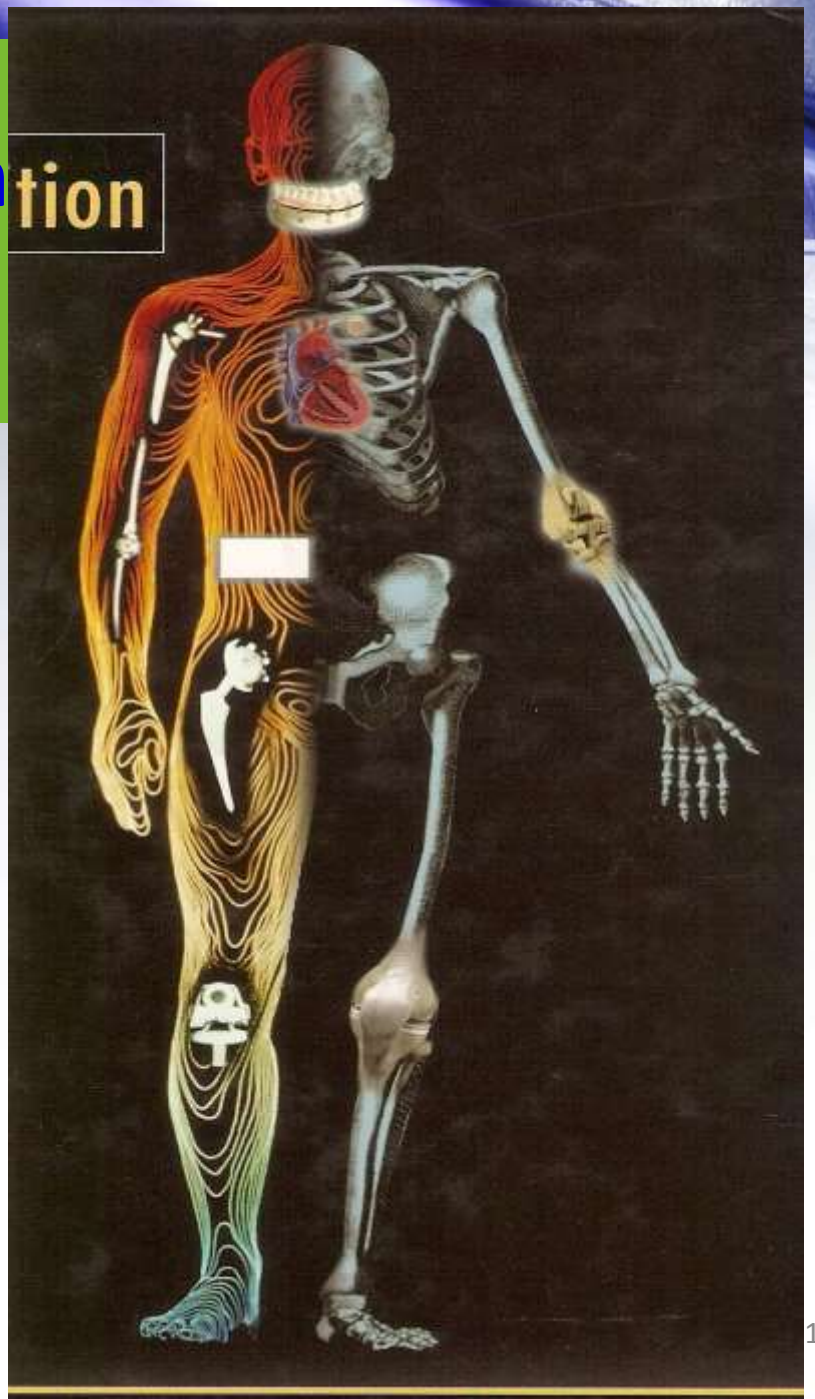
- Any substance (other than drugs) or combination of substance , synthetic or natural origin, which can be used for any period of time, as a whole or as a part of a system which treats, augments, or replace any tissue, organ or function of the body (Williams, 1987).

- **Material that was formed by biological substance**

Biomaterials ….

- Coatings
- Fibers
- Plastics
- Adhesives
- Cosmetics
- Oil Industry
- Paper
- Textiles
- Water treatment
- Biomedical
- Pharmaceutical
- Automotive
- Rubber

Biomaterial Application in Human Body



Biomaterials history

Year	Development
Late 18th–19th century	Various metal device to fix bone fracture: wire and pins from Fe(Iron), Au (gold), Ag(silver), Pt (platinum)
1860-1870	Aseptic surgical units (The use of biomaterials did not become practical until the advent of an aseptic surgical technique develop by Dr J. Lister.)
Early 1900	Bone plates were introduced to aid in fixation of long bone fracture. However, many of these early plates broke due unsophisticated mechanical design; -too thin -Had stress concentrating corners. -Corrode rapidly in the body Introduction of stainless steel and cobalt chromium alloys

Biomaterials history

Year	Development
1930s	Introduction of stainless steel and cobalt chromium alloys
1940s	First used polymethyl methacrylate (PMMA) for corneal implant and replacement of section of damaged skull bone. (During World War II shattered perspex in pilots didn't cause problem.)
1946	First biomechanically designed femoral head replacement prosthesis: first plastic (PMMA) used in joint replacement.
1950s	First successful blood vessel replacement
1960s	First commercial heart valve replacement Cemented joint replacement

Current status of the field

- Today, biomaterials represent a significant portion of the healthcare industry, with an estimated market size of over $9 billion per year in the United States.

Future Directions

- Starting 1960s-1970s
  - The first generation of biomaterials was designed to be inert, or not reactive with the body
  - Decreasing the potential for negative immune response to the implant.
- In 1990's until now
  - Materials designed to be bioactive, interacting in positive manner with the body to promote localized healing.

Future Directions

- Development of “smart” material which can help guide the biological response in the implant area.
- Design of **injectable materials** that can applied locally and with minimal pain to the patient.
- New set of **nano-structured** biomaterials for nano-scale objects as reinforcing agents.

Thank You!