

Oral Qualifying Exam - Biomaterials

STUDY REFERENCES

1. Biomaterials. The intersection of Biology and Materials Science, J.S. Temenoff and A.G. Mikos, 2008, Pearson Prentice Hall.
2. Biomaterials Science: An Introduction to Materials in Medicine 2nd Edition, Ratner (ed), Academic Press, 2000.
3. Molecular Biology of the Cell, by B. Alberts, et al., 4th edition, 2002. An authoritative textbook for introductory cell biology and molecular biology. Familiarity with the content in chapters 1-3 is highly recommended.

Other suggested reference books:

1. Essential Cell Biology: An Introduction to the Molecular Biology of the Cell, Alberts et. al. (eds.), Garland Publishing, 1998.
2. Essentials of Human Anatomy & Physiology, Marieb, Addison Wesley Longman, 2000
3. Intermolecular and Surface Forces, by J. Israelachvili, 1986, Academic Press. A classic textbook on aspects of complex fluids and colloid science relevant to biology

TOPICS

Basic cell biology, cell adhesion and the extracellular matrix (suggested reading: Chapter 3 of Reference Book-2; Chapter 1-3 and Chapters 18-19 of Reference Book-3)

Chemical, Physical and Mechanical properties of biomaterials. (suggested reading: Chapter 1-4 of Reference Book-1; Part-I of Reference Book-2)

Biomaterials degradation (suggested reading: Chapter 5 of Reference Book-1; Chapter 6 of Reference Book-2)

Biomaterials Synthesis: bioceramics, biometals and biopolymers (Suggested reading: Part-I of Reference Book-2; Chapter-5 of Reference Book-1)

Surface properties of materials and characterization methods (suggested reading: Chapter 7 of Reference Book-1)

Protein and cell interactions with biomaterials (suggested reading: Chapter 8 and 9 of Reference Book-1)

Biological testing of biomaterials (suggested reading: Chapter 5 of Reference Book-2)

Applications of biomaterials (suggested reading: Section 2.5, 2.6, Chapter 7 and Chapter 8 of Reference Book-2); in particular biomaterials for orthopedic, dental, drug and gene delivery, sensing and diagnosis and tissue engineering applications.