KD2300 Biomedical Materials 7,5 hp

Biomedical Materials

När kurs inte längre ges har student möjlighet att examineras under ytterligare två läsår.

Fastställande

Kursplan för KD2300 gäller från och med HT10

Betygsskala

A, B, C, D, E, FX, F

Utbildningsnivå

Avancerad nivå

Huvudområden

Bioteknik,Kemi och kemiteknik,Kemiteknik

Särskild behörighet

Tre års studier inom Kemivetenskap på högskolenivå, eller motsvarande kunskaper.

Undervisningsspråk

Undervisningsspråk anges i kurstillfällesinformationen i kurs- och programkatalogen.

Lärandemål

After completion of the course the student will be able to:

• Give examples of application areas for different types of biomaterials.

• Apply knowledge from basic material courses to identify material properties that are critical for metallic, polymer and ceramic biomaterials, or their combination.

• Explain basic physical, chemical and mechanical processes that may occur on biomaterials in use.

• Analyse and evaluate corrosion and degradation reactions that occur for different biomaterials and their consequences.

• Suggest proper type of biomaterial for given applications, taking into account function, health risk and economic aspects.

Kursinnehåll

Various types of biomaterials for a wide range of biomedical applications. Fundamental structure-property relationships. Basic function and performance of passive and active implant materials. Physical, chemical and mechanical aspects of bulk and surface properties of metallic, polymer and ceramic biomaterials. Principles of surface engineering and combination of different materials. Host-tissue response, blood compatibility, extracellular matrix collagen, bioadhesion, protein adsorption, polymers for controlled drug release. Corrosion and degradation mechanisms of biomaterials in different applications. Selection of biomaterials based on function, biological environments, toxicity and economic aspects. Examples of biomaterials and implant objects and devices. Current research trends and medical device regulation.

Kursupplägg

The course consists of lectures and also laboratory exercises including a small project work. The lectures focus on basic function and performance of various types of metallic, ceramic and polymer biomaterials, and their physical, chemical and mechanical properties including corrosion and degradation mechanisms of biomaterials in different applications. In addition to chosen chapters in the course book, the lectures also present current trends in biomaterial research.
The laboratory exercises consist of one polymer lab (making and testing hydrogels), and one metal lab (electrochemical measurements of corrosion resistance of stainless steel and titanium). Moreover, as a small project, the students chose an implantable medical device, search information about functions of the device and material or material combinations used for the device, make a presentation at a seminar to discuss material properties critical for the application and risk for material deterioration and failure prob

Kurslitteratur

Selected chapters in “Biomaterials Science, An Introduction to Materials in Medicine", edited by B.D. Ratner, A.S. Hoffman, F.J. Schoen, J.E. Lemons. 2nd edition, Academic Press (2004).

Other lecture materials.

Examination

- SEM1 - Projektuppgift/Laboration, 3,0 hp, betygsskala: P, F
- TEN1 - Skriftlig tentamen, 4,5 hp, betygsskala: A, B, C, D, E, FX, F

Examinator beslutar, baserat på rekommendation från KTH:s handläggare av stöd till studenter med funktionsnedsättning, om eventuell anpassad examination för studenter med dokumenterad, varaktig funktionsnedsättning.

Examinator får medge annan examinationsform vid omexamination av enstaka studenter.

Övriga krav för slutbetyg

Written examination, 4,5 credits,
Lab (report + seminar), 3 credits

Etiskt förhållningssätt

- Vid grupparbete har alla i gruppen ansvar för gruppens arbete.
- Vid examination ska varje student ärligt redovisa hjälp som erhållits och källor som använts.
- Vid muntlig examination ska varje student kunna redogöra för hela uppgiften och hela lösningen.