KURSPLAN
Polymer och komposit teknologi, 7,5 högskolepoäng

Polymer and Composite Technology, 7.5 credits

Kurskod:	TPKR21	**Utbildningsnivå:**	Avancerad nivå
Fastställd av:	VD 2021-03-01	**Utbildningsområde:**	Tekniska området
Gäller fr.o.m.:	2021-08-01	**Ämnesgrupp:**	MA2
Version:	1	**Fördjupning:**	A1N
		Huvudområde:	Produktutveckling

Lärandemål

After a successful course, the student shall:

Kunskap och förståelse
- show familiarity with the structure of polymeric materials and their relationship with physical, chemical, and mechanical properties
- display knowledge in the processing of polymers, product design, and quality control
- display knowledge of the relationship between man, material, and environment
- display knowledge on applications of materials
- display knowledge on the selection and application of materials and material solutions pertaining to everyday rudimentary engineering challenges.

Färdighet och förmåga
- demonstrate the ability to analyze, characterize, and develop the scientific research methodology to deal with the product development challenges.

Värderingsförmåga och förhållningssätt
- demonstrate the ability to independently and critically analyze the engineering problems related to material selection, product design, manufacturing, and environmental concerns.
- demonstrate an understanding of trade-offs or compromises made during product design to meet the conflicting constraints that arise from four building blocks of plastic-part design, i.e. material, product design, mold design, and process.

Innehåll

The course includes the following elements:
• The study of polymeric structures and their relationship with the physical, mechanical, chemical, and processing properties of the polymer. The structural properties of polymer play a fundamental role in ascertaining many physical and chemical properties. Properties such as density, stiffness, ductility, strength, melting points, glass-transition temperature, etc. are related to the molecular structure, degree of crystallinity, and cross-linking. The course includes a thorough understanding of molecular architecture and how by harnessing molecular structure the physical, mechanical, and chemical properties can be tailored.

• Composite materials are replacing traditional materials in many structural applications. Primarily automotive and aerospace applications of polymer-based composite materials have drastically surge research and development activities. In this part, we will learn polymer-based composites, their types, mechanics, manufacturing, and applications.
• Polymeric materials are touching our everyday life. Besides their outstanding properties, ease of manufacturing is one of the qualities which makes their widespread use possible. In this course we will discuss the four building blocks of manufacturing which are given below:

Materials: the significance of material selection and its role in terms of cost, processing, performance, and environment.
Product Design: In this part, we will study how a designer must design a product to satisfy the functional, structural, processing, environmental, cost, and aesthetic requirements.
Mold Design and Machining: The mold design is perhaps the most critical part of manufacturing. In this part, we will learn the fundamentals of mold design and the ways to minimize manufacturing cost by redesigning the products to optimize the time, material, energy, and functionality of the product.
Process: The mechanical properties are significantly affected by the process variable, such as temperature, pressure, viscosity, additives, and molding conditions. In this part, we will learn the correlation between different processing parameters and their effects on properties.

Undervisningsformer

Classroom lessons, video lessons, case studies, guest lectures, quizzes, laboratory sessions, industrial visits, assignments, and presentations.

Undervisningen bedrivs på engelska.

Förkunskapskrav

Passed courses at least 90 credits within the major subject Mechanical Engineering, 15 credits Mathematics, and completed course in Materials and Manufacturing, 7,5 credits, proof of English proficiency is required (or the equivalent).

Examination och betyg

Kursen bedöms med betygen 5, 4, 3 eller Underkänd.

Poängregistrering av examinationen för kursen sker enligt följande system:

Examinationsmoment	Omfattning	Betyg
Skriftlig tentamen[I]	4 hp	5/4/3/U
Inlämningsuppgifter	2 hp	U/G
Laborationsrapporter	1,5 hp	U/G

[I] Bestämmer kursens slutbetyg vilket utfärdas först när samtliga moment godkänts.

Övrigt

Passing the written exam is necessary, to get the grades from the assignments and lab reports.

Kurslitteratur

The literature list for the course will be provided one month before the course starts.

Principles of Polymer Engineering, N.G. McCrum, C.p. Buckley and C.B. Bucknall, second edition 1997 Oxford University press.