Competence coverage matrix

GHENT UNIVERSITY

Master of Science in Sustainable Materials Engineering

Academic year 2021-2022

Legend:
T=teaching methods
E=evaluation methods

			General Courses						Majors																Master's Dissertation
			E042740 Fracture and Deformation Behaviour of Materials	E068900 Structure and Dynamics of Polymers	E064960 Polymer Processing	E065340 Micro-analysis and Structure Determination in Materials Science	E066190 Materials Science Thermodynamics	E900069 Composites	E066230 Microstructure-Property Control of Metals	E066270 Metal Processing and Technology	E065471 Metal Extraction and Recycling	E066170 Physical Materials Science	E066661 Corrosion and Surface Technology	C004112 Ceramic Functional Materials: Design and Applications	E024121 Computational Materials Physics	E043030 Microstructural Material Models	E069040 Fibre Materials	E064220 Process Technology in Textiles	E064921 Finishing and Coating Technology	E064760 Colour and its Applications in Textiles	E064120 Analysis of Products and Processes	E064200 Functional Textile Materials	E091103 Master's Dissertation
Competences in one/more scientific discipline(s)	Master and apply advanced knowledge in the own engineering discipline in solving complex problems.	T 16 E 16	T E	T E	T E		T E		T E	T E	T E	T E	T E		T E	T E	T E	T E	T E			T E	T E
	Apply Computer Aided Engineering (CAE) tools and advanced communication instruments in a creative and purposeful way.	T 4 E 4		T E	T E		T E								T E								
	Apply advanced knowledge of basic sciences (physics, chemistry and mechanics), using an analytical way of thinking.	T 16 E 16	T E		T E		T E	T E	T E		T E	T E	T E		T E	T E	T E	T E	T E	T E		T E	T E
	Advanced knowledge of characteristics and application fields of materials in order to obtain products with specific properties.	T 10 E 10	T E		T E		T E	T E		T E			T E	T E						T E		T E	T E
	Advanced knowledge of and practical experience with the use of techniques and methods to investigate the characteristics of materials.	T 12 E 12			T E	T E	T E	T E				T E			T E	T E	T E		T E	T E		T E	T E
	Advanced knowledge of materials science, ability to use general and physical chemistry in an innovative way.	T 9 E 9	T E			T E	T E					T E			T E	T E		T E				T E	T E
	Specifically for major 'Metal Science and Engineering': Advanced knowledge of the use of chemical, mechanical and thermal process-technological aspects of materials engineering.	T 6 E 6			T E	T E	T E			T E								T E					T E
	Specifically for major 'Metal Science and Engineering': Use advanced knowledge of mathematics and statistics to develop mathematical models for materials phenomena (especially metals and their alloys) and for metallurgical processes.	T 6 E 6					T E					T E			T E	T E		T E					T E
	Specifically for major 'Metal Science and Engineering': Advanced knowledge and utilisation of the interactions between the chemical composition of materials (metals, alloys, polymers) and their production parameters in order to obtain products with optimal properties.	T 7 E 7	T E		T E		T E						T E						T E			T E		T E
	Specifically for major 'Metal Science and Engineering': Advanced knowledge of the processes available for recycling of materials.	T 4 E 4			T E		T E				T E												T E
	Specifically for major 'Polymers and Fibre Structures': Advanced knowledge of the use of chemical and mechanical process technological aspects of materials engineering.	T 6 E 6			T E												T E		T E	T E			T E	T E
	Specifically for major 'Polymers and Fibre Structures': Use advanced knowledge of mathematics and statistics to develop mathematical models for materials phenomena (in fibrous materials and polymers) and for textile-technological processes.	T 3 E 3			T E																	T E	T E
	Specifically for major 'Polymers and Fibre Structures': Advanced knowledge of the use of and the interactions between the selection of raw materials and the process-parameters, keeping in mind the properties of fibrous materials and polymers with specific functionalities.	T 6 E 6			T E												T E		T E	T E			T E	T E
Scientific competences	Analyse complex problems and translate them into concrete research questions.	T 15 E 14	T E	T E	T E		T E				T E	T	T E		T E	T E	T E		T E	T E	T E	T E	T E
	Consult the scientific literature as part of the own research.	T 4 E 4		T E											T E	T E							T E
	Select and apply the appropriate models, methods and techniques.	T 11 E 11		T E	T E		T E				T E	T E	T E		T E	T E					T E	T E	T E
	Develop and validate mathematical models and methods.	T 4 E 4			T E		T E									T E					T E		
	Interpret research findings in an objective and critical manner.	T 7 E 4							T E						T E	T E	T		T		T		T E
	Autonomously and flexibly study in depth complex, multidisciplinary problems in material science, also in case of limited data inputs.	T 7 E 5			T E								T E				T		T E		T	T E	T E
	Design experimental procedures and make use of self-developed models.	T 3 E 1	T																		T		T E
	Perform scientific research in the field of metallurgy, keeping in mind its industrial relevance.	T 4 E 3									T E				T							T E	T E
Intellectual competences	Independently form an opinion on complex situations and problems, and defend this point of view.	T 10 E 8	T	T E					T E				T E		T E				T E	T E	T	T E	T E
	Apply knowledge in a creative, purposeful and innovative way to research, conceptual design and production.	T 13 E 8	T	T E	T E		T E				T	T E	T E		T E	T	T	T				T E	T E
	Critically reflect on one's own way of thinking and acting, and understand the limits of one's competences.	T 10 E 7		T E								T E	T E			T E	T	T	T E		T	T E	T E
	Stay uptodate with the evolutions in the discipline to elevate the own competences to expert level.	T 3 E 3	T E																			T E	T E
	Readily adapt to changing professional circumstances.	T 3 E 2																	T			T E	T E
	Think in a systematic, scientific way that avoids and solves problems to optimise production processes, to develop new materials and to improve existing ones.	T 13 E 11			T E		T E				T E	T E	T E		T E		T E	T	T E	T E	T	T E	T E
	Show technical creativity and use relevant knowledge from other disciplines.	T 7 E 6	T E									T E			T	T E				T E		T E	T E
Competences in cooperation and communication	Have the ability to communicate in English about the own field of specialisation.	T 12 E 10	T E	T E	T E		T E					T E	T E			T E		T	T	T E		T E	T E

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			E042740 Fracture and Deformation Behaviour of Materials	E068900 Structure and Dynamics of Polymers	E064960 Polymer Processing	E065340 Micro-analysis and Structure Determination in Materials Science	E066190 Materials Science Thermodynamics	E900069 Composites	E066230 Microstructure-Property Control of Metals	E066270 Metal Processing and Technology	E065471 Metal Extraction and Recycling	E066170 Physical Materials Science	E066661 Corrosion and Surface Technology	C004112 Ceramic Functional Materials: Design and Applications	E024121 Computational Materials Physics	E043030 Microstructural Material Models	E069040 Fibre Materials	E064220 Process Technology in Textiles	E064921 Finishing and Coating Technology	E064760 Colour and its Applications in Textiles	E064120 Analysis of Products and Processes	E064200 Functional Textile Materials	E091103 Master's Dissertation
Competences in cooperation and communication	Project management: have the ability to formulate objectives, report efficiently, keep track of targets, follow the progress of the project,...	T 9 E 6		T E			T E		T E							T E	T	T			T	T E	T E
	Have the ability to work as a member of a team in a multi disciplinary workingenvironment, as well as being capable of taking on supervisory responsibilities.	T 6 E 4	T E				T E					T E						T	T			T E	
	Report on technical or scientific subjects verbally, in writing and using graphics.	T 13 E 13	T E	T E			T E		T E			T E				T E	T E	T E	T E	T E	T E	T E	T E
	Be integrated in research activities of a department.	T 4 E 2																T	T			T E	T E
	Work in an international group (students, PhD-students and researchers).	T 7 E 3	T				T E					T				T		T				T E	T E
Societal competences	Act in an ethical, professional and social way.	T 5 E 2									T						T		T			T E	T E
	Recognize the most important business and legal aspects of the own engineering discipline.																						
	Understand the historical evolution of the own engineering discipline and its social relevance.	T 5 E 2								T E							T	T	T				T E
	Put research and development in a societal context, taking into account ethical considerations.	T 3 E 1									T								T			T E	
Profession-specific competence	Master the complexity of technical systems by using system and process models.	T 10 E 10		T E	T E		T E					T E					T E	T E	T E		T E	T E	T E
	Reconcile conflicting specifications and prior conditions in a high quality and innovative concept or process.	T 8 E 6		T E	T E		T E						T E					T			T	T E	T E
	Synthesize incomplete, contradictory or redundant data into useful information.	T 6 E 3			T E								T E				T		T		T		T E
	Possess sufficient ready knowledge and understanding to evaluate the results of complex calculations, or make approximate estimates.	T 10 E 9	T	T E	T E		T E		T E			T E				T E	T E				T E		T E
	Pay attention to entire life cycles of systems, machines, and processes.	T 6 E 2			T E		T						T E					T	T			T	
	Pay attention to sustainability, energyefficiency, environmental cost, use of raw materials and labour costs.	T 8 E 2	T		T E		T				T E	T					T	T			T		
	Pay attention to all aspects of reliability, safety, and ergonomics.	T 4 E 1			T E													T				T	T	
	Have insight into and understanding of the importance of entrepreneurship.	T 2																	T				T	
	Show perseverance, innovativeness, and an aptitude for creating added value.	T 8 E 5	T E	T E								T				T E			T	T E		T	T E
			W 18 E 12	W 15 E 15	W 26 E 26	W 3 E 3	W 25 E 23	W 3 E 3	W 7 E 7	W 4 E 4	W 11 E 8	W 19 E 15	W 15 E 15	W 1 E 1	W 15 E 13	W 19 E 17	W 20 E 11	W 21 E 8	W 25 E 13	W 12 E 12	W 18 E 7	W 34 E 30	W 39 E 39

<< **EMingwALG1.1 Master and apply advanced knowledge in the own engineering discipline in solving complex problems.** *Competences in one/more scientific discipline(s)*

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen vooraf gegaan door ** werden niet teruggevonden in de studiefiche*			
E042740 Fracture and Deformation Behaviour of Materials	guided self-study practicum lecture	oral examination report	To designate elements in the material design that affect fracture behavior. Acquiring knowledge regarding solid, scientific description of the fracture behavior of materials. Concept formation and acquiring information concerning the most important experimental set-ups through which the mechanical properties of materials can be tested. Acquiring knowledge about the mechanical behavior of materials in relation to the fundamental deformation mechanisms. Understand the basic deformation mechanisms of materials.
E068900 Structure and Dynamics of Polymers	guided self-study practicum lecture excursion	written examination assignment oral examination	Skills: being capable to relate the polymer microstructure to the polymer properties, understanding the relevance of the Flory-Huggins parameter in describing molecular interactions, understanding the effect of process conditions (such as temperature and pressure) on diffusivity of polymers in melt and solution, being able to relate the polymer structure and polymer dynamics to the basic steps of polymer processing, being capable to describe isothermal polymer flow in basic geometries using the conversation low of mass and momentum, recognizing the relevance of different length scales and molecular interactions. Attitude: being capable to solve independently and in group problems in the field of structure and dynamics of polymers Knowlegde: describing and defining the following concepts: amorphous and semi-crystalline polymers; crystalline state/melting behavior; orientation; structure-property relations; polymers in solution; polymer rheology; multicomponent systems; diffusion of polymer molecules

E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E066190 Materials Science Thermodynamics	lecture seminar: practical PC room classes seminar	written examination report skills test	Application of the concepts of thermodynamics, phase equilibria and electrochemical processes Understanding of the concepts of thermodynamics, phase equilibria and electrochemical processes Use and interpretation of thermodynamic software and knowledge of itslimitations
E066230 Microstructure-Property Control of Metals	lecture practicum	oral examination	Understanding principles and methods for control of microstructure and properties of metals and alloys
E066270 Metal Processing and Technology	lecture practicum	oral examination	Understanding principles and methods for control of metal forming processes-casting, rolling, forging, extrusion, deep drawing
E065471 Metal Extraction and Recycling	excursion lecture: plenary exercises seminar lecture	written examination report oral examination	
E066170 Physical Materials Science	guided self-study seminar: coached exercises lecture	oral examination participation	Acquiring physical insight in the structure and properties of interfaces. Mastering the basic concepts of quantitative texture analysis. Acquiring knowledge concerning the crystallographic structure and properties of (mechanical) twins. Being able to establish a link between the typical characteristics of the (sub-)structure of a plastically deformed metal and the properties of the recrystallized structure after recovery annealing. Gain a deeper insight in the relationship between thermodynamic laws and the formation of microstructures of materials. To gain insight in the process of martensitic phase transformation.
E066661 Corrosion and Surface Technology	lecture seminar	written examination oral examination	Fundamental understanding of corrosion and corrosion control. Insights in the enormous possible applications of surface techniques with special emphasis on their properties To be able to make a justified material choice taking into account the environment in which the material is used and being able to interpret corrosion case studies. Choosing the most appropriate surface treatment technique.
E024121 Computational Materials Physics	guided self-study lecture: response lecture project	written examination report peer assessment skills test participation oral examination open book examination	Using a general-purpose density-functional theory code to calculate basic properties of a given solid. Being able to understand and to critically evaluate research literature in which density-functional theory results are reported. Being able to explain the concepts behind density-functional theory. Evaluating the precision and accuracy of a density-functional theory prediction for a given solid and given property. Formulating a strategy to use density-functional theory to address a materials problem.
E043030 Microstructural Material Models	guided self-study lecture	open book examination report	Apply physical materials science concepts in numerical models Having acquired knowledge from various modeling techniques with emphasis on the microstructural scale Making connections between macroscopic plastic behavior and microscopic mechanisms of crystal plasticity Program a (simple) microstructural model Applying of microstructural material models to gain insight into the evolution of the microstructure during solid-state transformation processes
E069040 Fibre Materials	guided self-study practicum lecture	oral examination report job performance assessment participation	Know the topics : fibres, textile raw materials. Obtain a good knowledge of fibres : types, production, properties and applications.
E064220 Process Technology in Textiles	guided self-study practicum lecture	oral examination report	Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E064921 Finishing and Coating Technology	guided self-study practicum lecture	oral examination assignment participation	Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E068900 Structure and Dynamics of Polymers	guided self-study practicum lecture excursion	written examination assignment oral examination	Skills: being capable to relate the polymer microstructure to the polymer properties, understanding the relevance of the Flory-Huggins parameter in describing molecular interactions, understanding the effect of process conditions (such as temperature and pressure) on diffusivity of polymers in melt and solution, being able to relate the polymer structure and polymer dynamics to the basic steps of polymer processing, being capable to describe isothermal polymer flow in basic geometries using the conversation low of mass and momentum, recognizing the relevance of different length scales and molecular interactions. Attitude: being capable to solve independently and in group problems in the field of structure and dynamics of polymers Knowlegde: describing and defining the following concepts: amorphous and semi-crystalline polymers; crystalline state/melting behavior; orientation; structure-property relations; polymers in solution; polymer rheology; multicomponent systems; diffusion of polymer molecules
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E066190 Materials Science Thermodynamics	lecture seminar: practical PC room classes	skills test	Use and interpretation of thermodynamic software and knowledge of itslimitations
E024121 Computational Materials Physics	guided self-study lecture: response lecture project	written examination report peer assessment skills test participation oral examination open book examination	Using a general-purpose density-functional theory code to calculate basic properties of a given solid. Being able to understand and to critically evaluate research literature in which density-functional theory results are reported. Being able to explain the concepts behind density-functional theory. Evaluating the precision and accuracy of a density-functional theory prediction for a given solid and given property. Formulating a strategy to use density-functional theory to address a materials problem.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E042740 Fracture and Deformation Behaviour of Materials	guided self-study practicum lecture	oral examination report	To designate elements in the material design that affect fracture behavior. Acquiring knowledge regarding solid, scientific description of the fracture behavior of materials. Concept formation and acquiring information concerning the most important experimental set-ups through which the mechanical properties of materials can be tested. Acquiring knowledge about the mechanical behavior of materials in relation to the fundamental deformation mechanisms. Understand the basic deformation mechanisms of materials.
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E066190 Materials Science Thermodynamics	lecture seminar: practical PC room classes seminar	written examination skills test	Application of the concepts of thermodynamics, phase equilibria and electrochemical processes Understanding of the concepts of thermodynamics, phase equilibria and electrochemical processes Use and interpretation of thermodynamic software and knowledge of itslimitations
E900069 Composites	lecture	written examination	To be able to calculate the stiffness and strength of laminates under simple load situations To be able to handle in a judicious way orders of magnitude and estimations of material properties To understand and to know basic terminology of the technology and the manufacturing of composite materials To be able to make a founded choice of a candidate material (class) for a specific application To be able to deal with the mechanics and the design of layered, orthotropic materials
E066230 Microstructure-Property Control of Metals	lecture practicum	oral examination	Understanding principles and methods for control of microstructure and properties of metals and alloys
E065471 Metal Extraction and Recycling	excursion lecture: plenary exercises seminar lecture	written examination report oral examination	
E066170 Physical Materials Science	guided self-study seminar: coached exercises lecture	oral examination report participation	Acquiring physical insight in the structure and properties of interfaces. Mastering the basic concepts of quantitative texture analysis. Acquiring knowledge concerning the crystallographic structure and properties of (mechanical) twins. Being able to establish a link between the typical characteristics of the (sub-)structure of a plastically deformed metal and the properties of the recrystallized structure after recovery annealing. Gain a deeper insight in the relationship between thermodynamic laws and the formation of microstructures of materials. To gain insight in the process of martensitic phase transformation.
E066661 Corrosion and Surface Technology	lecture seminar	written examination oral examination	Fundamental understanding of corrosion and corrosion control. Insights in the enormous possible applications of surface techniques with special emphasis on their properties To be able to make a justified material choice taking into account the environment in which the material is used and being able to interpret corrosion case studies. Choosing the most appropriate surface treatment technique.
E024121 Computational Materials Physics	guided self-study lecture: response lecture project	written examination report peer assessment skills test participation oral examination open book examination	Using a general-purpose density-functional theory code to calculate basic properties of a given solid. Being able to understand and to critically evaluate research literature in which density-functional theory results are reported. Being able to explain the concepts behind density-functional theory. Evaluating the precision and accuracy of a density-functional theory prediction for a given solid and given property. Formulating a strategy to use density-functional theory to address a materials problem.
E043030 Microstructural Material Models	guided self-study lecture	open book examination report	Apply physical materials science concepts in numerical models Having acquired knowledge from various modeling techniques with emphasis on the microstructural scale Making connections between macroscopic plastic behavior and microscopic mechanisms of crystal plasticity Program a (simple) microstructural model Applying of microstructural material models to gain insight into the evolution of the microstructure during solid-state transformation processes
E069040 Fibre Materials	guided self-study practicum lecture	oral examination report job performance assessment participation	Know the topics : fibres, textile raw materials. Obtain a good knowledge of fibres : types, production, properties and applications.
E064220 Process Technology in Textiles	guided self-study practicum lecture	oral examination report	Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E064921 Finishing and Coating Technology	guided self-study practicum lecture	oral examination assignment participation	Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.

E064760 Colour and its Applications in Textiles	guided self-study practicum lecture excursion	oral examination report job performance assessment participation	Concepts: basic concepts of colour; chemical structure of dyes; colour spaces; kinetics and thermodynamics of dyeing, diffusion, dye adsorption, dye affinity, dye substantivity; reactive dyes; direct dyes; acid dyes; disperse dyes; vat dyes; cationic dyes; pigments; melt dyeing; printing; dyeing machinery. Insights: understanding the basics of colour; relation between chromofores and colour; the methodology of the colour index; the function of the light source, the eye and the sample for the perceived colour; evolution in the quantification of colour; the kinetics of the different steps in a dyeing process; the thermodynamics of the different steps in a dyeing process; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; printing of textiles, advantages and disadvantages compred to dyeing; melt dyeing; the mechanisms and application of dyeing machinery. Skills: measuring and interpreting a spectrum; measuring and interpreting colour; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; measuring and interpreting colour fastness.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E042740 Fracture and Deformation Behaviour of Materials	guided self-study practicum lecture	oral examination report	To designate elements in the material design that affect fracture behavior. Acquiring knowledge regarding solid, scientific description of the fracture behavior of materials. Concept formation and acquiring information concerning the most important experimental set-ups through which the mechanical properties of materials can be tested. Acquiring knowledge about the mechanical behavior of materials in relation to the fundamental deformation mechanisms. Understand the basic deformation mechanisms of materials.
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E066190 Materials Science Thermodynamics	lecture seminar: practical PC room classes seminar practicum	written examination report skills test	Application of the concepts of thermodynamics, phase equilibria and electrochemical processes Experimental skills on electrochemical processes Experimental skills on pyrometallurgical processes Understanding of the concepts of thermodynamics, phase equilibria and electrochemical processes Use and interpretation of thermodynamic software and knowledge of itslimitations
E900069 Composites	lecture	written examination	To be able to calculate the stiffness and strength of laminates under simple load situations To be able to handle in a judicious way orders of magnitude and estimations of material properties To understand and to know basic terminology of the technology and the manufacturing of composite materials To be able to make a founded choice of a candidate material (class) for a specific application To be able to deal with the mechanics and the design of layered, orthotropic materials
E066270 Metal Processing and Technology	lecture practicum	oral examination	Understanding the basic principles of the heat treatment and thermo-chemical treatment
E066661 Corrosion and Surface Technology	lecture seminar	written examination oral examination	Fundamental understanding of corrosion and corrosion control. Insights in the enormous possible applications of surface techniques with special emphasis on their properties To be able to make a justified material choice taking into account the environment in which the material is used and being able to interpret corrosion case studies. Choosing the most appropriate surface treatment technique.
C004112 Ceramic Functional Materials: Design and Applications	lecture seminar: coached exercises	oral examination	Be able to describe the electric and magnetic properties of ceramic materials and metals and to correlate this with each other. Be able to list label the different classes and their interconnections.
E064760 Colour and its Applications in Textiles	guided self-study practicum lecture excursion	oral examination report job performance assessment participation	Concepts: basic concepts of colour; chemical structure of dyes; colour spaces; kinetics and thermodynamics of dyeing, diffusion, dye adsorption, dye affinity, dye substantivity; reactive dyes; direct dyes; acid dyes; disperse dyes; vat dyes; cationic dyes; pigments; melt dyeing; printing; dyeing machinery. Insights: understanding the basics of colour; relation between chromofores and colour; the methodology of the colour index; the function of the light source, the eye and the sample for the perceived colour; evolution in the quantification of colour; the kinetics of the different steps in a dyeing process; the thermodynamics of the different steps in a dyeing process; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; printing of textiles, advantages and disadvantages compred to dyeing; melt dyeing; the mechanisms and application of dyeing machinery. Skills: measuring and interpreting a spectrum; measuring and interpreting colour; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; measuring and interpreting colour fastness.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen vooraf gegaan door ** werden niet teruggevonden in de studiefiche*			
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E065340 Micro-analysis and Structure Determination in Materials Science	guided self-study practicum lecture	written examination oral examination	Understanding the operational principles of optical microscopy, scanning and transmission electron microscopy, X-ray diffraction, electron backscatter diffraction, atom probe tomography and others. Practical skill to use the studied methods and to analyse the results independently. Understanding principles and methods for sample preparation. Understanding and applying the principles of compositional and microstructural analyses of materials.
E066190 Materials Science Thermodynamics	lecture seminar: practical PC room classes practicum	written examination report skills test participation	Application of the concepts of thermodynamics, phase equilibria and electrochemical processes Experimental skills on electrochemical processes Experimental skills on pyrometallurgical processes Understanding of the concepts of thermodynamics, phase equilibria and electrochemical processes Use and interpretation of thermodynamic software and knowledge of itslimitations
E900069 Composites	lecture	written examination	To be able to calculate the stiffness and strength of laminates under simple load situations
E066170 Physical Materials Science	guided self-study seminar: coached exercises lecture	oral examination report participation	Acquiring physical insight in the structure and properties of interfaces. Mastering the basic concepts of quantitative texture analysis. Acquiring knowledge concerning the crystallographic structure and properties of (mechanical) twins. Being able to establish a link between the typical characteristics of the (sub-)structure of a plastically deformed metal and the properties of the recrystallized structure after recovery annealing. Gain a deeper insight in the relationship between thermodynamic laws and the formation of microstructures of materials. To gain insight in the process of martensitic phase transformation.
E024121 Computational Materials Physics	guided self-study lecture: response lecture project	written examination report peer assessment skills test participation oral examination open book examination	Using a general-purpose density-functional theory code to calculate basic properties of a given solid. Being able to understand and to critically evaluate research literature in which density-functional theory results are reported. Being able to explain the concepts behind density-functional theory. Evaluating the precision and accuracy of a density-functional theory prediction for a given solid and given property. Formulating a strategy to use density-functional theory to address a materials problem.
E043030 Microstructural Material Models	guided self-study lecture	open book examination report	Apply physical materials science concepts in numerical models Having acquired knowledge from various modeling techniques with emphasis on the microstructural scale Making connections between macroscopic plastic behavior and microscopic mechanisms of crystal plasticity Program a (simple) microstructural model Applying of microstructural material models to gain insight into the evolution of the microstructure during solid-state transformation processes
E069040 Fibre Materials	guided self-study practicum lecture	oral examination report job performance assessment participation	Know the topics : fibres, textile raw materials. Obtain a good knowledge of fibres : types, production, properties and applications.
E064921 Finishing and Coating Technology	guided self-study practicum lecture	oral examination assignment participation	Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064760 Colour and its Applications in Textiles	guided self-study practicum lecture excursion	oral examination report job performance assessment participation	Concepts: basic concepts of colour; chemical structure of dyes; colour spaces; kinetics and thermodynamics of dyeing, diffusion, dye adsorption, dye affinity, dye substantivity; reactive dyes; direct dyes; acid dyes; disperse dyes; vat dyes; cationic dyes; pigments; melt dyeing; printing; dyeing machinery. Insights: understanding the basics of colour; relation between chromofores and colour; the methodology of the colour index; the function of the light source, the eye and the sample for the perceived colour; evolution in the quantification of colour; the kinetics of the different steps in a dyeing process; the thermodynamics of the different steps in a dyeing process; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; printing of textiles, advantages and disadvantages compred to dyeing; melt dyeing; the mechanisms and application of dyeing machinery. Skills: measuring and interpreting a spectrum; measuring and interpreting colour; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; measuring and interpreting colour fastness.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
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E042740 Fracture and Deformation Behaviour of Materials	guided self-study practicum lecture	oral examination report	To designate elements in the material design that affect fracture behavior. Acquiring knowledge regarding solid, scientific description of the fracture behavior of materials. Concept formation and acquiring information concerning the most important experimental set-ups through which the mechanical properties of materials can be tested. Acquiring knowledge about the mechanical behavior of materials in relation to the fundamental deformation mechanisms. Understand the basic deformation mechanisms of materials.
E065340 Micro-analysis and Structure Determination in Materials Science	guided self-study practicum lecture	written examination oral examination	Understanding the operational principles of optical microscopy, scanning and transmission electron microscopy, X-ray diffraction, electron backscatter diffraction, atom probe tomography and others. Practical skill to use the studied methods and to analyse the results independently. Understanding principles and methods for sample preparation. Understanding and applying the principles of compositional and microstructural analyses of materials.
E066190 Materials Science Thermodynamics	lecture seminar: practical PC room classes seminar practicum	written examination skills test	Application of the concepts of thermodynamics, phase equilibria and electrochemical processes Experimental skills on electrochemical processes Experimental skills on pyrometallurgical processes Understanding of the concepts of thermodynamics, phase equilibria and electrochemical processes Use and interpretation of thermodynamic software and knowledge of itslimitations
E066170 Physical Materials Science	guided self-study seminar: coached exercises lecture	oral examination report participation	Acquiring physical insight in the structure and properties of interfaces. Mastering the basic concepts of quantitative texture analysis. Acquiring knowledge concerning the crystallographic structure and properties of (mechanical) twins. Being able to establish a link between the typical characteristics of the (sub-)structure of a plastically deformed metal and the properties of the recrystallized structure after recovery annealing. Gain a deeper insight in the relationship between thermodynamic laws and the formation of microstructures of materials. To gain insight in the process of martensitic phase transformation.
E024121 Computational Materials Physics	guided self-study lecture: response lecture project	written examination report peer assessment skills test participation oral examination open book examination	Using a general-purpose density-functional theory code to calculate basic properties of a given solid. Being able to understand and to critically evaluate research literature in which density-functional theory results are reported. Being able to explain the concepts behind density-functional theory. Evaluating the precision and accuracy of a density-functional theory prediction for a given solid and given property. Formulating a strategy to use density-functional theory to address a materials problem.
E043030 Microstructural Material Models	guided self-study lecture	open book examination report	Apply physical materials science concepts in numerical models Having acquired knowledge from various modeling techniques with emphasis on the microstructural scale Making connections between macroscopic plastic behavior and microscopic mechanisms of crystal plasticity Program a (simple) microstructural model Applying of microstructural material models to gain insight into the evolution of the microstructure during solid-state transformation processes
E064220 Process Technology in Textiles	guided self-study practicum lecture	oral examination report	Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E065340 Micro-analysis and Structure Determination in Materials Science	guided self-study practicum	written examination skills test oral examination	Understanding the operational principles of optical microscopy, scanning and transmission electron microscopy, X-ray diffraction, electron backscatter diffraction, atom probe tomography and others. Practical skill to use the studied methods and to analyse the results independently. Understanding principles and methods for sample preparation. Understanding and applying the principles of compositional and microstructural analyses of materials.
E066190 Materials Science Thermodynamics	lecture seminar: practical PC room classes seminar practicum	written examination report skills test participation	Application of the concepts of thermodynamics, phase equilibria and electrochemical processes Experimental skills on electrochemical processes Experimental skills on pyrometallurgical processes Understanding of the concepts of thermodynamics, phase equilibria and electrochemical processes Use and interpretation of thermodynamic software and knowledge of itslimitations
E066270 Metal Processing and Technology	lecture practicum	oral examination	Understanding the basic principles of the heat treatment and thermo-chemical treatment Understanding the criteria for selection of appropriate technology for different type of products and gaining a fundamental knowledge for application of the technology
E064220 Process Technology in Textiles	guided self-study practicum lecture	oral examination report	Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E066190 Materials Science Thermodynamics	lecture seminar: practical PC room classes seminar	written examination skills test	Application of the concepts of thermodynamics, phase equilibria and electrochemical processes Understanding of the concepts of thermodynamics, phase equilibria and electrochemical processes Use and interpretation of thermodynamic software and knowledge of itslimitations
E066170 Physical Materials Science	guided self-study seminar: coached exercises lecture	oral examination report participation	Acquiring physical insight in the structure and properties of interfaces. Mastering the basic concepts of quantitative texture analysis. Acquiring knowledge concerning the crystallographic structure and properties of (mechanical) twins. Being able to establish a link between the typical characteristics of the (sub-)structure of a plastically deformed metal and the properties of the recrystallized structure after recovery annealing. Gain a deeper insight in the relationship between thermodynamic laws and the formation of microstructures of materials. To gain insight in the process of martensitic phase transformation.
E024121 Computational Materials Physics	guided self-study lecture: response lecture project	written examination report peer assessment skills test participation oral examination open book examination	Using a general-purpose density-functional theory code to calculate basic properties of a given solid. Being able to understand and to critically evaluate research literature in which density-functional theory results are reported. Being able to explain the concepts behind density-functional theory. Evaluating the precision and accuracy of a density-functional theory prediction for a given solid and given property. Formulating a strategy to use density-functional theory to address a materials problem.
E043030 Microstructural Material Models	guided self-study lecture	open book examination report	Apply physical materials science concepts in numerical models Having acquired knowledge from various modeling techniques with emphasis on the microstructural scale Making connections between macroscopic plastic behavior and microscopic mechanisms of crystal plasticity Program a (simple) microstructural model Applying of microstructural material models to gain insight into the evolution of the microstructure during solid-state transformation processes
E064220 Process Technology in Textiles	guided self-study practicum lecture	oral examination report	Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
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E042740 Fracture and Deformation Behaviour of Materials	guided self-study practicum lecture	oral examination report	To designate elements in the material design that affect fracture behavior. Acquiring knowledge regarding solid, scientific description of the fracture behavior of materials. Concept formation and acquiring information concerning the most important experimental set-ups through which the mechanical properties of materials can be tested. Acquiring knowledge about the mechanical behavior of materials in relation to the fundamental deformation mechanisms. Understand the basic deformation mechanisms of materials.
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E066190 Materials Science Thermodynamics	lecture seminar: practical PC room classes seminar practicum	written examination report skills test	Application of the concepts of thermodynamics, phase equilibria and electrochemical processes Experimental skills on electrochemical processes Experimental skills on pyrometallurgical processes Understanding of the concepts of thermodynamics, phase equilibria and electrochemical processes Use and interpretation of thermodynamic software and knowledge of itslimitations
E066661 Corrosion and Surface Technology	lecture seminar	written examination oral examination	Fundamental understanding of corrosion and corrosion control. Insights in the enormous possible applications of surface techniques with special emphasis on their properties To be able to make a justified material choice taking into account the environment in which the material is used and being able to interpret corrosion case studies. Choosing the most appropriate surface treatment technique.
E064220 Process Technology in Textiles	guided self-study practicum lecture	oral examination report	Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E064120 Analysis of Products and Processes	guided self-study seminar: coached exercises lecture	open book examination	Obtain insight in how to obtain a maximum of reliable information based on a minimum number of data (process/product). Know the concepts: test setup, dataprocessing, decision-making, quality.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
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E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E066190 Materials Science Thermodynamics	lecture seminar: practical PC room classes seminar	written examination report skills test	Application of the concepts of thermodynamics, phase equilibria and electrochemical processes Understanding of the concepts of thermodynamics, phase equilibria and electrochemical processes Use and interpretation of thermodynamic software and knowledge of itslimitations
E065471 Metal Extraction and Recycling	excursion lecture: plenary exercises seminar lecture	written examination report oral examination	
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
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E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E069040 Fibre Materials	guided self-study practicum lecture	oral examination report job performance assessment participation	Know the topics : fibres, textile raw materials. Obtain a good knowledge of fibres : types, production, properties and applications.
E064921 Finishing and Coating Technology	guided self-study practicum lecture	oral examination assignment participation	Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
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E064921 Finishing and Coating Technology	guided self-study practicum lecture	oral examination assignment participation	Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064760 Colour and its Applications in Textiles	guided self-study practicum lecture excursion	oral examination report job performance assessment participation	Concepts: basic concepts of colour; chemical structure of dyes; colour spaces; kinetics and thermodynamics of dyeing, diffusion, dye adsorption, dye affinity, dye substantivity; reactive dyes; direct dyes; acid dyes; disperse dyes; vat dyes; cationic dyes; pigments; melt dyeing; printing; dyeing machinery. Insights: understanding the basics of colour; relation between chromofores and colour; the methodology of the colour index; the function of the light source, the eye and the sample for the perceived colour; evolution in the quantification of colour; the kinetics of the different steps in a dyeing process; the thermodynamics of the different steps in a dyeing process; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; printing of textiles, advantages and disadvantages compred to dyeing; melt dyeing; the mechanisms and application of dyeing machinery. Skills: measuring and interpreting a spectrum; measuring and interpreting colour; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; measuring and interpreting colour fastness.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E069040 Fibre Materials	guided self-study practicum lecture	oral examination report job performance assessment participation	Know the topics : fibres, textile raw materials. Obtain a good knowledge of fibres : types, production, properties and applications.
E064921 Finishing and Coating Technology	guided self-study practicum lecture	oral examination assignment participation	Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064760 Colour and its Applications in Textiles	guided self-study practicum lecture excursion	oral examination report job performance assessment participation	Concepts: basic concepts of colour; chemical structure of dyes; colour spaces; kinetics and thermodynamics of dyeing, diffusion, dye adsorption, dye affinity, dye substantivity; reactive dyes; direct dyes; acid dyes; disperse dyes; vat dyes; cationic dyes; pigments; melt dyeing; printing; dyeing machinery. Insights: understanding the basics of colour; relation between chromofores and colour; the methodology of the colour index; the function of the light source, the eye and the sample for the perceived colour; evolution in the quantification of colour; the kinetics of the different steps in a dyeing process; the thermodynamics of the different steps in a dyeing process; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; printing of textiles, advantages and disadvantages compred to dyeing; melt dyeing; the mechanisms and application of dyeing machinery. Skills: measuring and interpreting a spectrum; measuring and interpreting colour; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; measuring and interpreting colour fastness.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E042740 Fracture and Deformation Behaviour of Materials	guided self-study practicum lecture	oral examination report	To designate elements in the material design that affect fracture behavior. Acquiring knowledge regarding solid, scientific description of the fracture behavior of materials. Concept formation and acquiring information concerning the most important experimental set-ups through which the mechanical properties of materials can be tested. Acquiring knowledge about the mechanical behavior of materials in relation to the fundamental deformation mechanisms. Understand the basic deformation mechanisms of materials.
E068900 Structure and Dynamics of Polymers	guided self-study practicum lecture excursion	written examination assignment oral examination	Skills: being capable to relate the polymer microstructure to the polymer properties, understanding the relevance of the Flory-Huggins parameter in describing molecular interactions, understanding the effect of process conditions (such as temperature and pressure) on diffusivity of polymers in melt and solution, being able to relate the polymer structure and polymer dynamics to the basic steps of polymer processing, being capable to describe isothermal polymer flow in basic geometries using the conversation low of mass and momentum, recognizing the relevance of different length scales and molecular interactions. Attitude: being capable to solve independently and in group problems in the field of structure and dynamics of polymers Knowlegde: describing and defining the following concepts: amorphous and semi-crystalline polymers; crystalline state/melting behavior; orientation; structure-property relations; polymers in solution; polymer rheology; multicomponent systems; diffusion of polymer molecules
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E066190 Materials Science Thermodynamics	practicum seminar: practical PC room classes seminar	written examination report skills test participation	Application of the concepts of thermodynamics, phase equilibria and electrochemical processes Experimental skills on electrochemical processes Experimental skills on pyrometallurgical processes Use and interpretation of thermodynamic software and knowledge of itslimitations
E065471 Metal Extraction and Recycling	excursion lecture: plenary exercises seminar lecture	written examination report oral examination	
E066170 Physical Materials Science	guided self-study seminar: coached exercises lecture		Acquiring physical insight in the structure and properties of interfaces. Mastering the basic concepts of quantitative texture analysis. Acquiring knowledge concerning the crystallographic structure and properties of (mechanical) twins. Being able to establish a link between the typical characteristics of the (sub-)structure of a plastically deformed metal and the properties of the recrystallized structure after recovery annealing. Gain a deeper insight in the relationship between thermodynamic laws and the formation of microstructures of materials. To gain insight in the process of martensitic phase transformation.
E066661 Corrosion and Surface Technology	lecture seminar	written examination oral examination	Fundamental understanding of corrosion and corrosion control. Insights in the enormous possible applications of surface techniques with special emphasis on their properties To be able to make a justified material choice taking into account the environment in which the material is used and being able to interpret corrosion case studies. Choosing the most appropriate surface treatment technique.
E024121 Computational Materials Physics	guided self-study lecture: response lecture project	written examination report peer assessment skills test participation oral examination open book examination	Using a general-purpose density-functional theory code to calculate basic properties of a given solid. Being able to understand and to critically evaluate research literature in which density-functional theory results are reported. Being able to explain the concepts behind density-functional theory. Evaluating the precision and accuracy of a density-functional theory prediction for a given solid and given property. Formulating a strategy to use density-functional theory to address a materials problem.
E043030 Microstructural Material Models	guided self-study lecture	open book examination report	Apply physical materials science concepts in numerical models Having acquired knowledge from various modeling techniques with emphasis on the microstructural scale Making connections between macroscopic plastic behavior and microscopic mechanisms of crystal plasticity Program a (simple) microstructural model Applying of microstructural material models to gain insight into the evolution of the microstructure during solid-state transformation processes
E069040 Fibre Materials	guided self-study practicum lecture	oral examination report job performance assessment participation	Know the topics : fibres, textile raw materials. Obtain a good knowledge of fibres : types, production, properties and applications.
E064921 Finishing and Coating Technology	guided self-study practicum lecture	oral examination assignment participation	Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.

E064760 Colour and its Applications in Textiles	guided self-study practicum lecture excursion	oral examination report job performance assessment participation	Concepts: basic concepts of colour; chemical structure of dyes; colour spaces; kinetics and thermodynamics of dyeing, diffusion, dye adsorption, dye affinity, dye substantivity; reactive dyes; direct dyes; acid dyes; disperse dyes; vat dyes; cationic dyes; pigments; melt dyeing; printing; dyeing machinery. Insights: understanding the basics of colour; relation between chromofores and colour; the methodology of the colour index; the function of the light source, the eye and the sample for the perceived colour; evolution in the quantification of colour; the kinetics of the different steps in a dyeing process; the thermodynamics of the different steps in a dyeing process; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; printing of textiles, advantages and disadvantages compred to dyeing; melt dyeing; the mechanisms and application of dyeing machinery. Skills: measuring and interpreting a spectrum; measuring and interpreting colour; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; measuring and interpreting colour fastness.
E064120 Analysis of Products and Processes	guided self-study seminar: coached exercises lecture	open book examination	Obtain insight in how to obtain a maximum of reliable information based on a minimum number of data (process/product). Know the concepts: test setup, dataprocessing, decision-making, quality.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E068900 Structure and Dynamics of Polymers	guided self-study practicum lecture excursion	written examination assignment oral examination	Skills: being capable to relate the polymer microstructure to the polymer properties, understanding the relevance of the Flory-Huggins parameter in describing molecular interactions, understanding the effect of process conditions (such as temperature and pressure) on diffusivity of polymers in melt and solution, being able to relate the polymer structure and polymer dynamics to the basic steps of polymer processing, being capable to describe isothermal polymer flow in basic geometries using the conversation low of mass and momentum, recognizing the relevance of different length scales and molecular interactions. Attitude: being capable to solve independently and in group problems in the field of structure and dynamics of polymers Knowlegde: describing and defining the following concepts: amorphous and semi-crystalline polymers; crystalline state/melting behavior; orientation; structure-property relations; polymers in solution; polymer rheology; multicomponent systems; diffusion of polymer molecules
E024121 Computational Materials Physics	guided self-study lecture: response lecture project	written examination report peer assessment skills test participation oral examination open book examination	Using a general-purpose density-functional theory code to calculate basic properties of a given solid. Being able to understand and to critically evaluate research literature in which density-functional theory results are reported. Being able to explain the concepts behind density-functional theory. Evaluating the precision and accuracy of a density-functional theory prediction for a given solid and given property. Formulating a strategy to use density-functional theory to address a materials problem.
E043030 Microstructural Material Models	guided self-study lecture	open book examination report	Apply physical materials science concepts in numerical models Having acquired knowledge from various modeling techniques with emphasis on the microstructural scale Making connections between macroscopic plastic behavior and microscopic mechanisms of crystal plasticity Program a (simple) microstructural model Applying of microstructural material models to gain insight into the evolution of the microstructure during solid-state transformation processes
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E068900 Structure and Dynamics of Polymers	guided self-study practicum lecture excursion	written examination assignment oral examination	Skills: being capable to relate the polymer microstructure to the polymer properties, understanding the relevance of the Flory-Huggins parameter in describing molecular interactions, understanding the effect of process conditions (such as temperature and pressure) on diffusivity of polymers in melt and solution, being able to relate the polymer structure and polymer dynamics to the basic steps of polymer processing, being capable to describe isothermal polymer flow in basic geometries using the conversation low of mass and momentum, recognizing the relevance of different length scales and molecular interactions. Attitude: being capable to solve independently and in group problems in the field of structure and dynamics of polymers Knowlegde: describing and defining the following concepts: amorphous and semi-crystalline polymers; crystalline state/melting behavior; orientation; structure-property relations; polymers in solution; polymer rheology; multicomponent systems; diffusion of polymer molecules
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E066190 Materials Science Thermodynamics	lecture seminar: practical PC room classes seminar	written examination skills test	Application of the concepts of thermodynamics, phase equilibria and electrochemical processes Understanding of the concepts of thermodynamics, phase equilibria and electrochemical processes Use and interpretation of thermodynamic software and knowledge of itslimitations
E065471 Metal Extraction and Recycling	excursion lecture: plenary exercises seminar lecture	written examination report oral examination	
E066170 Physical Materials Science	guided self-study seminar: coached exercises lecture	oral examination report participation	Acquiring physical insight in the structure and properties of interfaces. Mastering the basic concepts of quantitative texture analysis. Acquiring knowledge concerning the crystallographic structure and properties of (mechanical) twins. Being able to establish a link between the typical characteristics of the (sub-)structure of a plastically deformed metal and the properties of the recrystallized structure after recovery annealing. Gain a deeper insight in the relationship between thermodynamic laws and the formation of microstructures of materials. To gain insight in the process of martensitic phase transformation.
E066661 Corrosion and Surface Technology	lecture seminar	written examination oral examination	Fundamental understanding of corrosion and corrosion control. Insights in the enormous possible applications of surface techniques with special emphasis on their properties To be able to make a justified material choice taking into account the environment in which the material is used and being able to interpret corrosion case studies. Choosing the most appropriate surface treatment technique.
E024121 Computational Materials Physics	guided self-study lecture: response lecture project	written examination report peer assessment skills test participation oral examination open book examination	Using a general-purpose density-functional theory code to calculate basic properties of a given solid. Being able to understand and to critically evaluate research literature in which density-functional theory results are reported. Being able to explain the concepts behind density-functional theory. Evaluating the precision and accuracy of a density-functional theory prediction for a given solid and given property. Formulating a strategy to use density-functional theory to address a materials problem.
E043030 Microstructural Material Models	guided self-study lecture	open book examination report	Apply physical materials science concepts in numerical models Having acquired knowledge from various modeling techniques with emphasis on the microstructural scale Making connections between macroscopic plastic behavior and microscopic mechanisms of crystal plasticity Program a (simple) microstructural model Applying of microstructural material models to gain insight into the evolution of the microstructure during solid-state transformation processes
E064120 Analysis of Products and Processes	guided self-study seminar: coached exercises lecture	open book examination	Obtain insight in how to obtain a maximum of reliable information based on a minimum number of data (process/product). Know the concepts: test setup, dataprocessing, decision-making, quality.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
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E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E066190 Materials Science Thermodynamics	seminar: practical PC room classes	skills test	Use and interpretation of thermodynamic software and knowledge of itslimitations
E043030 Microstructural Material Models	guided self-study lecture	open book examination report	Apply physical materials science concepts in numerical models Having acquired knowledge from various modeling techniques with emphasis on the microstructural scale Making connections between macroscopic plastic behavior and microscopic mechanisms of crystal plasticity Program a (simple) microstructural model Applying of microstructural material models to gain insight into the evolution of the microstructure during solid-state transformation processes
E064120 Analysis of Products and Processes	guided self-study seminar: coached exercises lecture	open book examination	Obtain insight in how to obtain a maximum of reliable information based on a minimum number of data (process/product). Know the concepts: test setup, dataprocessing, decision-making, quality.

Course	Teaching methods	Evaluation methods	Course learning outcome
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E066230 Microstructure-Property Control of Metals	lecture practicum	oral examination	Selection of appropriate composition and treatment to obtain the best combination of properties for specific applications Scientific and practical approach to an appropriate microstructure-properties design and solving practical problems with steels, non-ferrous alloys, superalloys, shape memory alloys and metallic glasses. Recognition of the microstructures of the alloys discussed in the course
E024121 Computational Materials Physics	guided self-study lecture: response lecture project	written examination report peer assessment skills test participation oral examination open book examination	Using a general-purpose density-functional theory code to calculate basic properties of a given solid. Being able to understand and to critically evaluate research literature in which density-functional theory results are reported. Being able to explain the concepts behind density-functional theory. Evaluating the precision and accuracy of a density-functional theory prediction for a given solid and given property. Formulating a strategy to use density-functional theory to address a materials problem.
E043030 Microstructural Material Models	guided self-study lecture	open book examination report	Apply physical materials science concepts in numerical models Having acquired knowledge from various modeling techniques with emphasis on the microstructural scale Making connections between macroscopic plastic behavior and microscopic mechanisms of crystal plasticity Program a (simple) microstructural model Applying of microstructural material models to gain insight into the evolution of the microstructure during solid-state transformation processes
E069040 Fibre Materials	guided self-study practicum lecture		Know the topics : fibres, textile raw materials. Obtain a good knowledge of fibres : types, production, properties and applications.
E064921 Finishing and Coating Technology	guided self-study practicum lecture		Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064120 Analysis of Products and Processes	guided self-study seminar: coached exercises lecture		Obtain insight in how to obtain a maximum of reliable information based on a minimum number of data (process/product). Know the concepts: test setup, dataprocessing, decision-making, quality.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E066661 Corrosion and Surface Technology	lecture seminar	written examination oral examination	Choosing the most appropriate surface treatment technique. To be able to make a justified material choice taking into account the environment in which the material is used and being able to interpret corrosion case studies.
E069040 Fibre Materials	guided self-study practicum lecture		Know the topics : fibres, textile raw materials. Obtain a good knowledge of fibres : types, production, properties and applications.
E064921 Finishing and Coating Technology	guided self-study practicum lecture	oral examination assignment participation	Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064120 Analysis of Products and Processes	guided self-study seminar: coached exercises lecture		Obtain insight in how to obtain a maximum of reliable information based on a minimum number of data (process/product). Know the concepts: test setup, dataprocessing, decision-making, quality.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E042740 Fracture and Deformation Behaviour of Materials	guided self-study practicum lecture		To designate elements in the material design that affect fracture behavior. Acquiring knowledge regarding solid, scientific description of the fracture behavior of materials. Concept formation and acquiring information concerning the most important experimental set-ups through which the mechanical properties of materials can be tested. Acquiring knowledge about the mechanical behavior of materials in relation to the fundamental deformation mechanisms. Understand the basic deformation mechanisms of materials.
E064120 Analysis of Products and Processes	guided self-study seminar: coached exercises lecture		Obtain insight in how to obtain a maximum of reliable information based on a minimum number of data (process/product). Know the concepts: test setup, dataprocessing, decision-making, quality.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E065471 Metal Extraction and Recycling	excursion lecture: plenary exercises seminar lecture	written examination report oral examination	
E024121 Computational Materials Physics	guided self-study lecture: response lecture project		Using a general-purpose density-functional theory code to calculate basic properties of a given solid. Being able to understand and to critically evaluate research literature in which density-functional theory results are reported. Being able to explain the concepts behind density-functional theory. Evaluating the precision and accuracy of a density-functional theory prediction for a given solid and given property. Formulating a strategy to use density-functional theory to address a materials problem.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E042740 Fracture and Deformation Behaviour of Materials	guided self-study practicum lecture		To designate elements in the material design that affect fracture behavior. Acquiring knowledge regarding solid, scientific description of the fracture behavior of materials. Concept formation and acquiring information concerning the most important experimental set-ups through which the mechanical properties of materials can be tested. Acquiring knowledge about the mechanical behavior of materials in relation to the fundamental deformation mechanisms. Understand the basic deformation mechanisms of materials.
E068900 Structure and Dynamics of Polymers	guided self-study practicum lecture excursion	written examination assignment oral examination	Skills: being capable to relate the polymer microstructure to the polymer properties, understanding the relevance of the Flory-Huggins parameter in describing molecular interactions, understanding the effect of process conditions (such as temperature and pressure) on diffusivity of polymers in melt and solution, being able to relate the polymer structure and polymer dynamics to the basic steps of polymer processing, being capable to describe isothermal polymer flow in basic geometries using the conversation low of mass and momentum, recognizing the relevance of different length scales and molecular interactions. Attitude: being capable to solve independently and in group problems in the field of structure and dynamics of polymers Knowlegde: describing and defining the following concepts: amorphous and semi-crystalline polymers; crystalline state/melting behavior; orientation; structure-property relations; polymers in solution; polymer rheology; multicomponent systems; diffusion of polymer molecules
E066230 Microstructure-Property Control of Metals	lecture practicum	oral examination	Understanding the various types of treatments and their ability to change the properties of metals
E066661 Corrosion and Surface Technology	lecture seminar	written examination oral examination	Fundamental understanding of corrosion and corrosion control. Insights in the enormous possible applications of surface techniques with special emphasis on their properties To be able to make a justified material choice taking into account the environment in which the material is used and being able to interpret corrosion case studies. Choosing the most appropriate surface treatment technique.
E024121 Computational Materials Physics	guided self-study lecture: response lecture project	written examination report peer assessment skills test participation oral examination open book examination	Using a general-purpose density-functional theory code to calculate basic properties of a given solid. Being able to understand and to critically evaluate research literature in which density-functional theory results are reported. Being able to explain the concepts behind density-functional theory. Evaluating the precision and accuracy of a density-functional theory prediction for a given solid and given property. Formulating a strategy to use density-functional theory to address a materials problem.
E064921 Finishing and Coating Technology	guided self-study practicum lecture	oral examination assignment participation	Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064760 Colour and its Applications in Textiles	guided self-study practicum lecture excursion	oral examination report job performance assessment participation	Concepts: basic concepts of colour; chemical structure of dyes; colour spaces; kinetics and thermodynamics of dyeing, diffusion, dye adsorption, dye affinity, dye substantivity; reactive dyes; direct dyes; acid dyes; disperse dyes; vat dyes; cationic dyes; pigments; melt dyeing; printing; dyeing machinery. Insights: understanding the basics of colour; relation between chromofores and colour; the methodology of the colour index; the function of the light source, the eye and the sample for the perceived colour; evolution in the quantification of colour; the kinetics of the different steps in a dyeing process; the thermodynamics of the different steps in a dyeing process; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; printing of textiles, advantages and disadvantages compred to dyeing; melt dyeing; the mechanisms and application of dyeing machinery. Skills: measuring and interpreting a spectrum; measuring and interpreting colour; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; measuring and interpreting colour fastness.
E064120 Analysis of Products and Processes	guided self-study seminar: coached exercises lecture		Obtain insight in how to obtain a maximum of reliable information based on a minimum number of data (process/product). Know the concepts: test setup, dataprocessing, decision-making, quality.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E042740 Fracture and Deformation Behaviour of Materials	guided self-study practicum lecture		To designate elements in the material design that affect fracture behavior. Acquiring knowledge regarding solid, scientific description of the fracture behavior of materials. Concept formation and acquiring information concerning the most important experimental set-ups through which the mechanical properties of materials can be tested. Acquiring knowledge about the mechanical behavior of materials in relation to the fundamental deformation mechanisms. Understand the basic deformation mechanisms of materials.
E068900 Structure and Dynamics of Polymers	guided self-study practicum lecture excursion	written examination assignment oral examination	Skills: being capable to relate the polymer microstructure to the polymer properties, understanding the relevance of the Flory-Huggins parameter in describing molecular interactions, understanding the effect of process conditions (such as temperature and pressure) on diffusivity of polymers in melt and solution, being able to relate the polymer structure and polymer dynamics to the basic steps of polymer processing, being capable to describe isothermal polymer flow in basic geometries using the conversation low of mass and momentum, recognizing the relevance of different length scales and molecular interactions. Attitude: being capable to solve independently and in group problems in the field of structure and dynamics of polymers Knowlegde: describing and defining the following concepts: amorphous and semi-crystalline polymers; crystalline state/melting behavior; orientation; structure-property relations; polymers in solution; polymer rheology; multicomponent systems; diffusion of polymer molecules
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E066190 Materials Science Thermodynamics	practicum seminar: practical PC room classes seminar	participation report skills test	Application of the concepts of thermodynamics, phase equilibria and electrochemical processes Experimental skills on electrochemical processes Experimental skills on pyrometallurgical processes Use and interpretation of thermodynamic software and knowledge of itslimitations
E065471 Metal Extraction and Recycling	excursion lecture: plenary exercises seminar lecture		
E066170 Physical Materials Science	guided self-study seminar: coached exercises lecture	oral examination report participation	Acquiring physical insight in the structure and properties of interfaces. Mastering the basic concepts of quantitative texture analysis. Acquiring knowledge concerning the crystallographic structure and properties of (mechanical) twins. Being able to establish a link between the typical characteristics of the (sub-)structure of a plastically deformed metal and the properties of the recrystallized structure after recovery annealing. Gain a deeper insight in the relationship between thermodynamic laws and the formation of microstructures of materials. To gain insight in the process of martensitic phase transformation.
E066661 Corrosion and Surface Technology	lecture seminar	written examination oral examination	Choosing the most appropriate surface treatment technique. To be able to make a justified material choice taking into account the environment in which the material is used and being able to interpret corrosion case studies.
E024121 Computational Materials Physics	guided self-study lecture: response lecture project	written examination report peer assessment skills test participation oral examination open book examination	Using a general-purpose density-functional theory code to calculate basic properties of a given solid. Being able to understand and to critically evaluate research literature in which density-functional theory results are reported. Being able to explain the concepts behind density-functional theory. Evaluating the precision and accuracy of a density-functional theory prediction for a given solid and given property. Formulating a strategy to use density-functional theory to address a materials problem.
E043030 Microstructural Material Models	guided self-study lecture		Apply physical materials science concepts in numerical models Having acquired knowledge from various modeling techniques with emphasis on the microstructural scale Making connections between macroscopic plastic behavior and microscopic mechanisms of crystal plasticity Program a (simple) microstructural model Applying of microstructural material models to gain insight into the evolution of the microstructure during solid-state transformation processes
E069040 Fibre Materials	guided self-study practicum lecture		Know the topics : fibres, textile raw materials. Obtain a good knowledge of fibres : types, production, properties and applications.
E064220 Process Technology in Textiles	guided self-study practicum lecture		Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.

E091103	Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E068900 Structure and Dynamics of Polymers	guided self-study practicum lecture excursion	written examination assignment oral examination	Skills: being capable to relate the polymer microstructure to the polymer properties, understanding the relevance of the Flory-Huggins parameter in describing molecular interactions, understanding the effect of process conditions (such as temperature and pressure) on diffusivity of polymers in melt and solution, being able to relate the polymer structure and polymer dynamics to the basic steps of polymer processing, being capable to describe isothermal polymer flow in basic geometries using the conversation low of mass and momentum, recognizing the relevance of different length scales and molecular interactions. Attitude: being capable to solve independently and in group problems in the field of structure and dynamics of polymers Knowlegde: describing and defining the following concepts: amorphous and semi-crystalline polymers; crystalline state/melting behavior; orientation; structure-property relations; polymers in solution; polymer rheology; multicomponent systems; diffusion of polymer molecules
E066170 Physical Materials Science	guided self-study seminar: coached exercises lecture	oral examination report participation	Acquiring physical insight in the structure and properties of interfaces. Mastering the basic concepts of quantitative texture analysis. Acquiring knowledge concerning the crystallographic structure and properties of (mechanical) twins. Being able to establish a link between the typical characteristics of the (sub-)structure of a plastically deformed metal and the properties of the recrystallized structure after recovery annealing. Gain a deeper insight in the relationship between thermodynamic laws and the formation of microstructures of materials. To gain insight in the process of martensitic phase transformation.
E066661 Corrosion and Surface Technology	lecture seminar	written examination oral examination	Choosing the most appropriate surface treatment technique. To be able to make a justified material choice taking into account the environment in which the material is used and being able to interpret corrosion case studies.
E043030 Microstructural Material Models	guided self-study lecture	open book examination report	Apply physical materials science concepts in numerical models Having acquired knowledge from various modeling techniques with emphasis on the microstructural scale Making connections between macroscopic plastic behavior and microscopic mechanisms of crystal plasticity Program a (simple) microstructural model Applying of microstructural material models to gain insight into the evolution of the microstructure during solid-state transformation processes
E069040 Fibre Materials	guided self-study practicum lecture		Know the topics : fibres, textile raw materials. Obtain a good knowledge of fibres : types, production, properties and applications.
E064220 Process Technology in Textiles	guided self-study practicum lecture		Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E064921 Finishing and Coating Technology	guided self-study practicum lecture	oral examination assignment participation	Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064120 Analysis of Products and Processes	guided self-study seminar: coached exercises lecture		Obtain insight in how to obtain a maximum of reliable information based on a minimum number of data (process/product). Know the concepts: test setup, dataprocessing, decision-making, quality.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E042740 Fracture and Deformation Behaviour of Materials	guided self-study practicum lecture	oral examination report	To designate elements in the material design that affect fracture behavior. Acquiring knowledge regarding solid, scientific description of the fracture behavior of materials. Concept formation and acquiring information concerning the most important experimental set-ups through which the mechanical properties of materials can be tested. Acquiring knowledge about the mechanical behavior of materials in relation to the fundamental deformation mechanisms. Understand the basic deformation mechanisms of materials.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E064921 Finishing and Coating Technology	guided self-study practicum lecture		Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E066190 Materials Science Thermodynamics	lecture seminar: practical PC room classes seminar practicum	written examination report skills test	Application of the concepts of thermodynamics, phase equilibria and electrochemical processes Experimental skills on electrochemical processes Experimental skills on pyrometallurgical processes Understanding of the concepts of thermodynamics, phase equilibria and electrochemical processes Use and interpretation of thermodynamic software and knowledge of itslimitations
E065471 Metal Extraction and Recycling	excursion lecture: plenary exercises seminar lecture	written examination report oral examination	
E066170 Physical Materials Science	guided self-study seminar: coached exercises lecture	oral examination report participation	Acquiring physical insight in the structure and properties of interfaces. Mastering the basic concepts of quantitative texture analysis. Acquiring knowledge concerning the crystallographic structure and properties of (mechanical) twins. Being able to establish a link between the typical characteristics of the (sub-)structure of a plastically deformed metal and the properties of the recrystallized structure after recovery annealing. Gain a deeper insight in the relationship between thermodynamic laws and the formation of microstructures of materials. To gain insight in the process of martensitic phase transformation.
E066661 Corrosion and Surface Technology	lecture seminar	written examination oral examination	Fundamental understanding of corrosion and corrosion control. Insights in the enormous possible applications of surface techniques with special emphasis on their properties To be able to make a justified material choice taking into account the environment in which the material is used and being able to interpret corrosion case studies. Choosing the most appropriate surface treatment technique.
E024121 Computational Materials Physics	guided self-study lecture: response lecture project	written examination report peer assessment skills test participation oral examination open book examination	Using a general-purpose density-functional theory code to calculate basic properties of a given solid. Being able to understand and to critically evaluate research literature in which density-functional theory results are reported. Being able to explain the concepts behind density-functional theory. Evaluating the precision and accuracy of a density-functional theory prediction for a given solid and given property. Formulating a strategy to use density-functional theory to address a materials problem.
E069040 Fibre Materials	guided self-study practicum lecture	oral examination report job performance assessment participation	Know the topics : fibres, textile raw materials. Obtain a good knowledge of fibres : types, production, properties and applications.
E064220 Process Technology in Textiles	guided self-study practicum lecture		Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E064921 Finishing and Coating Technology	guided self-study practicum lecture	oral examination assignment participation	Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064760 Colour and its Applications in Textiles	guided self-study practicum lecture excursion	oral examination report job performance assessment participation	Concepts: basic concepts of colour; chemical structure of dyes; colour spaces; kinetics and thermodynamics of dyeing, diffusion, dye adsorption, dye affinity, dye substantivity; reactive dyes; direct dyes; acid dyes; disperse dyes; vat dyes; cationic dyes; pigments; melt dyeing; printing; dyeing machinery. Insights: understanding the basics of colour; relation between chromofores and colour; the methodology of the colour index; the function of the light source, the eye and the sample for the perceived colour; evolution in the quantification of colour; the kinetics of the different steps in a dyeing process; the thermodynamics of the different steps in a dyeing process; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; printing of textiles, advantages and disadvantages compred to dyeing; melt dyeing; the mechanisms and application of dyeing machinery. Skills: measuring and interpreting a spectrum; measuring and interpreting colour; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; measuring and interpreting colour fastness.
E064120 Analysis of Products and Processes	guided self-study seminar: coached exercises lecture		Obtain insight in how to obtain a maximum of reliable information based on a minimum number of data (process/product). Know the concepts: test setup, dataprocessing, decision-making, quality.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.

E091103	Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E042740 Fracture and Deformation Behaviour of Materials	guided self-study practicum lecture	oral examination report	To designate elements in the material design that affect fracture behavior. Acquiring knowledge regarding solid, scientific description of the fracture behavior of materials. Concept formation and acquiring information concerning the most important experimental set-ups through which the mechanical properties of materials can be tested. Acquiring knowledge about the mechanical behavior of materials in relation to the fundamental deformation mechanisms. Understand the basic deformation mechanisms of materials.
E066170 Physical Materials Science	guided self-study seminar: coached exercises lecture	oral examination report participation	Acquiring physical insight in the structure and properties of interfaces. Mastering the basic concepts of quantitative texture analysis. Acquiring knowledge concerning the crystallographic structure and properties of (mechanical) twins. Being able to establish a link between the typical characteristics of the (sub-)structure of a plastically deformed metal and the properties of the recrystallized structure after recovery annealing. Gain a deeper insight in the relationship between thermodynamic laws and the formation of microstructures of materials. To gain insight in the process of martensitic phase transformation.
E024121 Computational Materials Physics	guided self-study lecture: response lecture project		Using a general-purpose density-functional theory code to calculate basic properties of a given solid. Being able to understand and to critically evaluate research literature in which density-functional theory results are reported. Being able to explain the concepts behind density-functional theory. Evaluating the precision and accuracy of a density-functional theory prediction for a given solid and given property. Formulating a strategy to use density-functional theory to address a materials problem.
E043030 Microstructural Material Models	guided self-study lecture	open book examination report	Apply physical materials science concepts in numerical models Having acquired knowledge from various modeling techniques with emphasis on the microstructural scale Making connections between macroscopic plastic behavior and microscopic mechanisms of crystal plasticity Program a (simple) microstructural model Applying of microstructural material models to gain insight into the evolution of the microstructure during solid-state transformation processes
E064760 Colour and its Applications in Textiles	guided self-study practicum lecture excursion	oral examination report job performance assessment participation	Concepts: basic concepts of colour; chemical structure of dyes; colour spaces; kinetics and thermodynamics of dyeing, diffusion, dye adsorption, dye affinity, dye substantivity; reactive dyes; direct dyes; acid dyes; disperse dyes; vat dyes; cationic dyes; pigments; melt dyeing; printing; dyeing machinery. Insights: understanding the basics of colour; relation between chromofores and colour; the methodology of the colour index; the function of the light source, the eye and the sample for the perceived colour; evolution in the quantification of colour; the kinetics of the different steps in a dyeing process; the thermodynamics of the different steps in a dyeing process; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; printing of textiles, advantages and disadvantages compred to dyeing; melt dyeing; the mechanisms and application of dyeing machinery. Skills: measuring and interpreting a spectrum; measuring and interpreting colour; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; measuring and interpreting colour fastness.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E042740 Fracture and Deformation Behaviour of Materials	guided self-study practicum lecture	oral examination report	To designate elements in the material design that affect fracture behavior. Acquiring knowledge regarding solid, scientific description of the fracture behavior of materials. Concept formation and acquiring information concerning the most important experimental set-ups through which the mechanical properties of materials can be tested. Acquiring knowledge about the mechanical behavior of materials in relation to the fundamental deformation mechanisms. Understand the basic deformation mechanisms of materials.
E068900 Structure and Dynamics of Polymers	guided self-study practicum lecture excursion	written examination assignment oral examination	Skills: being capable to relate the polymer microstructure to the polymer properties, understanding the relevance of the Flory-Huggins parameter in describing molecular interactions, understanding the effect of process conditions (such as temperature and pressure) on diffusivity of polymers in melt and solution, being able to relate the polymer structure and polymer dynamics to the basic steps of polymer processing, being capable to describe isothermal polymer flow in basic geometries using the conversation low of mass and momentum, recognizing the relevance of different length scales and molecular interactions. Attitude: being capable to solve independently and in group problems in the field of structure and dynamics of polymers Knowlegde: describing and defining the following concepts: amorphous and semi-crystalline polymers; crystalline state/melting behavior; orientation; structure-property relations; polymers in solution; polymer rheology; multicomponent systems; diffusion of polymer molecules
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E066190 Materials Science Thermodynamics	practicum seminar: practical PC room classes	skills test report	Use and interpretation of thermodynamic software and knowledge of itslimitations Experimental skills on electrochemical processes Experimental skills on pyrometallurgical processes
E066170 Physical Materials Science	guided self-study seminar: coached exercises lecture	oral examination report participation	Acquiring physical insight in the structure and properties of interfaces. Mastering the basic concepts of quantitative texture analysis. Acquiring knowledge concerning the crystallographic structure and properties of (mechanical) twins. Being able to establish a link between the typical characteristics of the (sub-)structure of a plastically deformed metal and the properties of the recrystallized structure after recovery annealing. Gain a deeper insight in the relationship between thermodynamic laws and the formation of microstructures of materials. To gain insight in the process of martensitic phase transformation.
E066661 Corrosion and Surface Technology	lecture seminar	written examination oral examination	Fundamental understanding of corrosion and corrosion control. Insights in the enormous possible applications of surface techniques with special emphasis on their properties To be able to make a justified material choice taking into account the environment in which the material is used and being able to interpret corrosion case studies. Choosing the most appropriate surface treatment technique.
E043030 Microstructural Material Models	guided self-study lecture	open book examination report	Apply physical materials science concepts in numerical models Having acquired knowledge from various modeling techniques with emphasis on the microstructural scale Making connections between macroscopic plastic behavior and microscopic mechanisms of crystal plasticity Program a (simple) microstructural model Applying of microstructural material models to gain insight into the evolution of the microstructure during solid-state transformation processes
E064220 Process Technology in Textiles	guided self-study practicum lecture		Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E064921 Finishing and Coating Technology	guided self-study practicum lecture		Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064760 Colour and its Applications in Textiles	guided self-study practicum lecture excursion	oral examination report job performance assessment participation	Concepts: basic concepts of colour; chemical structure of dyes; colour spaces; kinetics and thermodynamics of dyeing, diffusion, dye adsorption, dye affinity, dye substantivity; reactive dyes; direct dyes; acid dyes; disperse dyes; vat dyes; cationic dyes; pigments; melt dyeing; printing; dyeing machinery. Insights: understanding the basics of colour; relation between chromofores and colour; the methodology of the colour index; the function of the light source, the eye and the sample for the perceived colour; evolution in the quantification of colour; the kinetics of the different steps in a dyeing process; the thermodynamics of the different steps in a dyeing process; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; printing of textiles, advantages and disadvantages compred to dyeing; melt dyeing; the mechanisms and application of dyeing machinery. Skills: measuring and interpreting a spectrum; measuring and interpreting colour; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; measuring and interpreting colour fastness.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.

E091103	Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E068900 Structure and Dynamics of Polymers	guided self-study practicum lecture excursion	written examination assignment oral examination	Skills: being capable to relate the polymer microstructure to the polymer properties, understanding the relevance of the Flory-Huggins parameter in describing molecular interactions, understanding the effect of process conditions (such as temperature and pressure) on diffusivity of polymers in melt and solution, being able to relate the polymer structure and polymer dynamics to the basic steps of polymer processing, being capable to describe isothermal polymer flow in basic geometries using the conversation low of mass and momentum, recognizing the relevance of different length scales and molecular interactions. Attitude: being capable to solve independently and in group problems in the field of structure and dynamics of polymers Knowlegde: describing and defining the following concepts: amorphous and semi-crystalline polymers; crystalline state/melting behavior; orientation; structure-property relations; polymers in solution; polymer rheology; multicomponent systems; diffusion of polymer molecules
E066190 Materials Science Thermodynamics	practicum seminar: practical PC room classes seminar	skills test report	Use and interpretation of thermodynamic software and knowledge of itslimitations Experimental skills on electrochemical processes Experimental skills on pyrometallurgical processes
E066230 Microstructure-Property Control of Metals	practicum	oral examination	Selection of appropriate composition and treatment to obtain the best combination of properties for specific applications Scientific and practical approach to an appropriate microstructure-properties design and solving practical problems with steels, non-ferrous alloys, superalloys, shape memory alloys and metallic glasses.
E043030 Microstructural Material Models	guided self-study lecture	open book examination report	Apply physical materials science concepts in numerical models Having acquired knowledge from various modeling techniques with emphasis on the microstructural scale Making connections between macroscopic plastic behavior and microscopic mechanisms of crystal plasticity Program a (simple) microstructural model Applying of microstructural material models to gain insight into the evolution of the microstructure during solid-state transformation processes
E069040 Fibre Materials	guided self-study practicum lecture		Know the topics : fibres, textile raw materials. Obtain a good knowledge of fibres : types, production, properties and applications.
E064220 Process Technology in Textiles	guided self-study practicum lecture		Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E064120 Analysis of Products and Processes	guided self-study seminar: coached exercises lecture		Obtain insight in how to obtain a maximum of reliable information based on a minimum number of data (process/product). Know the concepts: test setup, dataprocessing, decision-making, quality.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

<< **EMingwALG4.3 Have the ability to work as a member of a team in a multidisciplinary workingenvironment, as well as being capable of taking on supervisory responsibilities.** *Competences in cooperation and communication*

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E042740 Fracture and Deformation Behaviour of Materials	guided self-study practicum lecture	oral examination report	To designate elements in the material design that affect fracture behavior. Acquiring knowledge regarding solid, scientific description of the fracture behavior of materials. Concept formation and acquiring information concerning the most important experimental set-ups through which the mechanical properties of materials can be tested. Acquiring knowledge about the mechanical behavior of materials in relation to the fundamental deformation mechanisms. Understand the basic deformation mechanisms of materials.
E066190 Materials Science Thermodynamics	practicum	participation	Experimental skills on pyrometallurgical processes Experimental skills on electrochemical processes
E066170 Physical Materials Science	guided self-study seminar: coached exercises lecture	oral examination report participation	Acquiring physical insight in the structure and properties of interfaces. Mastering the basic concepts of quantitative texture analysis. Acquiring knowledge concerning the crystallographic structure and properties of (mechanical) twins. Being able to establish a link between the typical characteristics of the (sub-)structure of a plastically deformed metal and the properties of the recrystallized structure after recovery annealing. Gain a deeper insight in the relationship between thermodynamic laws and the formation of microstructures of materials. To gain insight in the process of martensitic phase transformation.
E064220 Process Technology in Textiles	guided self-study practicum lecture		Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E064921 Finishing and Coating Technology	guided self-study practicum lecture		Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E042740 Fracture and Deformation Behaviour of Materials	guided self-study practicum lecture	oral examination report	To designate elements in the material design that affect fracture behavior. Acquiring knowledge regarding solid, scientific description of the fracture behavior of materials. Concept formation and acquiring information concerning the most important experimental set-ups through which the mechanical properties of materials can be tested. Acquiring knowledge about the mechanical behavior of materials in relation to the fundamental deformation mechanisms. Understand the basic deformation mechanisms of materials.
E068900 Structure and Dynamics of Polymers	guided self-study practicum lecture excursion	written examination assignment oral examination	Skills: being capable to relate the polymer microstructure to the polymer properties, understanding the relevance of the Flory-Huggins parameter in describing molecular interactions, understanding the effect of process conditions (such as temperature and pressure) on diffusivity of polymers in melt and solution, being able to relate the polymer structure and polymer dynamics to the basic steps of polymer processing, being capable to describe isothermal polymer flow in basic geometries using the conversation low of mass and momentum, recognizing the relevance of different length scales and molecular interactions. Attitude: being capable to solve independently and in group problems in the field of structure and dynamics of polymers Knowlegde: describing and defining the following concepts: amorphous and semi-crystalline polymers; crystalline state/melting behavior; orientation; structure-property relations; polymers in solution; polymer rheology; multicomponent systems; diffusion of polymer molecules
E066190 Materials Science Thermodynamics	practicum seminar: practical PC room classes	skills test report	Use and interpretation of thermodynamic software and knowledge of itslimitations Experimental skills on electrochemical processes Experimental skills on pyrometallurgical processes
E066230 Microstructure-Property Control of Metals	practicum	oral examination	Scientific and practical approach to an appropriate microstructure-properties design and solving practical problems with steels, non-ferrous alloys, superalloys, shape memory alloys and metallic glasses.
E066170 Physical Materials Science	guided self-study seminar: coached exercises lecture	oral examination report participation	Acquiring physical insight in the structure and properties of interfaces. Mastering the basic concepts of quantitative texture analysis. Acquiring knowledge concerning the crystallographic structure and properties of (mechanical) twins. Being able to establish a link between the typical characteristics of the (sub-)structure of a plastically deformed metal and the properties of the recrystallized structure after recovery annealing. Gain a deeper insight in the relationship between thermodynamic laws and the formation of microstructures of materials. To gain insight in the process of martensitic phase transformation.
E043030 Microstructural Material Models	guided self-study lecture	open book examination report	Apply physical materials science concepts in numerical models Having acquired knowledge from various modeling techniques with emphasis on the microstructural scale Making connections between macroscopic plastic behavior and microscopic mechanisms of crystal plasticity Program a (simple) microstructural model Applying of microstructural material models to gain insight into the evolution of the microstructure during solid-state transformation processes
E069040 Fibre Materials	guided self-study practicum lecture	oral examination report job performance assessment participation	Know the topics : fibres, textile raw materials. Obtain a good knowledge of fibres : types, production, properties and applications.
E064220 Process Technology in Textiles	guided self-study practicum lecture	oral examination report	Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E064921 Finishing and Coating Technology	guided self-study practicum lecture	oral examination assignment participation	Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064760 Colour and its Applications in Textiles	guided self-study practicum lecture excursion	oral examination report job performance assessment participation	Concepts: basic concepts of colour; chemical structure of dyes; colour spaces; kinetics and thermodynamics of dyeing, diffusion, dye adsorption, dye affinity, dye substantivity; reactive dyes; direct dyes; acid dyes; disperse dyes; vat dyes; cationic dyes; pigments; melt dyeing; printing; dyeing machinery. Insights: understanding the basics of colour; relation between chromofores and colour; the methodology of the colour index; the function of the light source, the eye and the sample for the perceived colour; evolution in the quantification of colour; the kinetics of the different steps in a dyeing process; the thermodynamics of the different steps in a dyeing process; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; printing of textiles, advantages and disadvantages compred to dyeing; melt dyeing; the mechanisms and application of dyeing machinery. Skills: measuring and interpreting a spectrum; measuring and interpreting colour; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; measuring and interpreting colour fastness.
E064120 Analysis of Products and Processes	guided self-study seminar: coached exercises lecture	open book examination	Obtain insight in how to obtain a maximum of reliable information based on a minimum number of data (process/product). Know the concepts: test setup, dataprocessing, decision-making, quality.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E064220 Process Technology in Textiles	guided self-study practicum lecture		Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E064921 Finishing and Coating Technology	guided self-study practicum lecture		Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E042740 Fracture and Deformation Behaviour of Materials	guided self-study practicum lecture		To designate elements in the material design that affect fracture behavior. Acquiring knowledge regarding solid, scientific description of the fracture behavior of materials. Concept formation and acquiring information concerning the most important experimental set-ups through which the mechanical properties of materials can be tested. Acquiring knowledge about the mechanical behavior of materials in relation to the fundamental deformation mechanisms. Understand the basic deformation mechanisms of materials.
E066190 Materials Science Thermodynamics	practicum	participation	Experimental skills on pyrometallurgical processes Experimental skills on electrochemical processes
E066170 Physical Materials Science	guided self-study seminar: coached exercises lecture		Acquiring physical insight in the structure and properties of interfaces. Mastering the basic concepts of quantitative texture analysis. Acquiring knowledge concerning the crystallographic structure and properties of (mechanical) twins. Being able to establish a link between the typical characteristics of the (sub-)structure of a plastically deformed metal and the properties of the recrystallized structure after recovery annealing. Gain a deeper insight in the relationship between thermodynamic laws and the formation of microstructures of materials. To gain insight in the process of martensitic phase transformation.
E043030 Microstructural Material Models	guided self-study lecture		Apply physical materials science concepts in numerical models Having acquired knowledge from various modeling techniques with emphasis on the microstructural scale Making connections between macroscopic plastic behavior and microscopic mechanisms of crystal plasticity Program a (simple) microstructural model Applying of microstructural material models to gain insight into the evolution of the microstructure during solid-state transformation processes
E064220 Process Technology in Textiles	guided self-study practicum lecture		Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E065471 Metal Extraction and Recycling	excursion lecture: plenary exercises seminar lecture		
E069040 Fibre Materials	guided self-study practicum lecture		Know the topics : fibres, textile raw materials. Obtain a good knowledge of fibres : types, production, properties and applications.
E064921 Finishing and Coating Technology	guided self-study practicum lecture		Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

<< **EMingwALG5.2 Recognize the most important business and legal aspects of the own engineering discipline.** *Societal competences*

Course	Teaching methods	Evaluation methods	Course learning outcome

*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E066270 Metal Processing and Technology	lecture	oral examination	Understanding the criteria for selection of appropriate technology for different type of products and gaining a fundamental knowledge for application of the technology
E069040 Fibre Materials	guided self-study practicum lecture		Know the topics : fibres, textile raw materials. Obtain a good knowledge of fibres : types, production, properties and applications.
E064220 Process Technology in Textiles	guided self-study practicum lecture		Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E064921 Finishing and Coating Technology	guided self-study practicum lecture		Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti-flammability, crease resistance, ..., coatings.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E065471 Metal Extraction and Recycling	excursion lecture: plenary exercises seminar lecture		
E064921 Finishing and Coating Technology	guided self-study practicum lecture		Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E068900 Structure and Dynamics of Polymers	guided self-study practicum lecture excursion	written examination assignment oral examination	Skills: being capable to relate the polymer microstructure to the polymer properties, understanding the relevance of the Flory-Huggins parameter in describing molecular interactions, understanding the effect of process conditions (such as temperature and pressure) on diffusivity of polymers in melt and solution, being able to relate the polymer structure and polymer dynamics to the basic steps of polymer processing, being capable to describe isothermal polymer flow in basic geometries using the conversation low of mass and momentum, recognizing the relevance of different length scales and molecular interactions. Attitude: being capable to solve independently and in group problems in the field of structure and dynamics of polymers Knowlegde: describing and defining the following concepts: amorphous and semi-crystalline polymers; crystalline state/melting behavior; orientation; structure-property relations; polymers in solution; polymer rheology; multicomponent systems; diffusion of polymer molecules
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E066190 Materials Science Thermodynamics	seminar: practical PC room classes	skills test report	Use and interpretation of thermodynamic software and knowledge of itslimitations
E066170 Physical Materials Science	guided self-study seminar: coached exercises lecture	oral examination report participation	Acquiring physical insight in the structure and properties of interfaces. Mastering the basic concepts of quantitative texture analysis. Acquiring knowledge concerning the crystallographic structure and properties of (mechanical) twins. Being able to establish a link between the typical characteristics of the (sub-)structure of a plastically deformed metal and the properties of the recrystallized structure after recovery annealing. Gain a deeper insight in the relationship between thermodynamic laws and the formation of microstructures of materials. To gain insight in the process of martensitic phase transformation.
E069040 Fibre Materials	guided self-study practicum lecture	oral examination report job performance assessment participation	Know the topics : fibres, textile raw materials. Obtain a good knowledge of fibres : types, production, properties and applications.
E064220 Process Technology in Textiles	guided self-study practicum lecture	oral examination report	Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E064921 Finishing and Coating Technology	guided self-study practicum lecture	oral examination assignment participation	Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064120 Analysis of Products and Processes	guided self-study seminar: coached exercises lecture	open book examination	Obtain insight in how to obtain a maximum of reliable information based on a minimum number of data (process/product). Know the concepts: test setup, dataprocessing, decision-making, quality.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E068900 Structure and Dynamics of Polymers	guided self-study practicum lecture excursion	written examination assignment oral examination	Skills: being capable to relate the polymer microstructure to the polymer properties, understanding the relevance of the Flory-Huggins parameter in describing molecular interactions, understanding the effect of process conditions (such as temperature and pressure) on diffusivity of polymers in melt and solution, being able to relate the polymer structure and polymer dynamics to the basic steps of polymer processing, being capable to describe isothermal polymer flow in basic geometries using the conversation low of mass and momentum, recognizing the relevance of different length scales and molecular interactions. Attitude: being capable to solve independently and in group problems in the field of structure and dynamics of polymers Knowlegde: describing and defining the following concepts: amorphous and semi-crystalline polymers; crystalline state/melting behavior; orientation; structure-property relations; polymers in solution; polymer rheology; multicomponent systems; diffusion of polymer molecules
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E066190 Materials Science Thermodynamics	seminar: practical PC room classes	skills test report	Use and interpretation of thermodynamic software and knowledge of itslimitations
E066661 Corrosion and Surface Technology	lecture seminar	written examination oral examination	Fundamental understanding of corrosion and corrosion control. Insights in the enormous possible applications of surface techniques with special emphasis on their properties To be able to make a justified material choice taking into account the environment in which the material is used and being able to interpret corrosion case studies. Choosing the most appropriate surface treatment technique.
E064220 Process Technology in Textiles	guided self-study practicum lecture		Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E064120 Analysis of Products and Processes	guided self-study seminar: coached exercises lecture		Obtain insight in how to obtain a maximum of reliable information based on a minimum number of data (process/product). Know the concepts: test setup, dataprocessing, decision-making, quality.
E064200 Functional Textile Materials	guided self-study project lecture	oral examination report	Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E066661 Corrosion and Surface Technology	lecture seminar	written examination oral examination	Fundamental understanding of corrosion and corrosion control. Insights in the enormous possible applications of surface techniques with special emphasis on their properties To be able to make a justified material choice taking into account the environment in which the material is used and being able to interpret corrosion case studies. Choosing the most appropriate surface treatment technique.
E069040 Fibre Materials	guided self-study practicum lecture		Know the topics : fibres, textile raw materials. Obtain a good knowledge of fibres : types, production, properties and applications.
E064921 Finishing and Coating Technology	guided self-study practicum lecture		Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064120 Analysis of Products and Processes	guided self-study seminar: coached exercises lecture		Obtain insight in how to obtain a maximum of reliable information based on a minimum number of data (process/product). Know the concepts: test setup, dataprocessing, decision-making, quality.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E042740 Fracture and Deformation Behaviour of Materials	guided self-study practicum lecture		To designate elements in the material design that affect fracture behavior. Acquiring knowledge regarding solid, scientific description of the fracture behavior of materials. Concept formation and acquiring information concerning the most important experimental set-ups through which the mechanical properties of materials can be tested. Acquiring knowledge about the mechanical behavior of materials in relation to the fundamental deformation mechanisms. Understand the basic deformation mechanisms of materials.
E068900 Structure and Dynamics of Polymers	guided self-study practicum lecture excursion	written examination assignment oral examination	Skills: being capable to relate the polymer microstructure to the polymer properties, understanding the relevance of the Flory-Huggins parameter in describing molecular interactions, understanding the effect of process conditions (such as temperature and pressure) on diffusivity of polymers in melt and solution, being able to relate the polymer structure and polymer dynamics to the basic steps of polymer processing, being capable to describe isothermal polymer flow in basic geometries using the conversation low of mass and momentum, recognizing the relevance of different length scales and molecular interactions. Attitude: being capable to solve independently and in group problems in the field of structure and dynamics of polymers Knowlegde: describing and defining the following concepts: amorphous and semi-crystalline polymers; crystalline state/melting behavior; orientation; structure-property relations; polymers in solution; polymer rheology; multicomponent systems; diffusion of polymer molecules
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E066190 Materials Science Thermodynamics	lecture seminar: practical PC room classes seminar practicum	written examination skills test	Application of the concepts of thermodynamics, phase equilibria and electrochemical processes Understanding of the concepts of thermodynamics, phase equilibria and electrochemical processes Use and interpretation of thermodynamic software and knowledge of itslimitations
E066230 Microstructure-Property Control of Metals	lecture practicum	oral examination	Understanding principles and methods for control of microstructure and properties of metals and alloys Scientific and practical approach to an appropriate microstructure-properties design and solving practical problems with steels, non-ferrous alloys, superalloys, shape memory alloys and metallic glasses.
E066170 Physical Materials Science	guided self-study seminar: coached exercises lecture	oral examination report participation	Acquiring physical insight in the structure and properties of interfaces. Mastering the basic concepts of quantitative texture analysis. Acquiring knowledge concerning the crystallographic structure and properties of (mechanical) twins. Being able to establish a link between the typical characteristics of the (sub-)structure of a plastically deformed metal and the properties of the recrystallized structure after recovery annealing. Gain a deeper insight in the relationship between thermodynamic laws and the formation of microstructures of materials. To gain insight in the process of martensitic phase transformation.
E043030 Microstructural Material Models	guided self-study lecture	open book examination report	Apply physical materials science concepts in numerical models Having acquired knowledge from various modeling techniques with emphasis on the microstructural scale Making connections between macroscopic plastic behavior and microscopic mechanisms of crystal plasticity Program a (simple) microstructural model Applying of microstructural material models to gain insight into the evolution of the microstructure during solid-state transformation processes
E069040 Fibre Materials	guided self-study practicum lecture	oral examination report job performance assessment participation	Know the topics : fibres, textile raw materials. Obtain a good knowledge of fibres : types, production, properties and applications.
E064120 Analysis of Products and Processes	guided self-study seminar: coached exercises lecture	open book examination	Obtain insight in how to obtain a maximum of reliable information based on a minimum number of data (process/product). Know the concepts: test setup, dataprocessing, decision-making, quality.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E066190 Materials Science Thermodynamics	lecture seminar: practical PC room classes seminar		Application of the concepts of thermodynamics, phase equilibria and electrochemical processes Understanding of the concepts of thermodynamics, phase equilibria and electrochemical processes Use and interpretation of thermodynamic software and knowledge of itslimitations
E066661 Corrosion and Surface Technology	lecture seminar	written examination oral examination	Fundamental understanding of corrosion and corrosion control. Insights in the enormous possible applications of surface techniques with special emphasis on their properties To be able to make a justified material choice taking into account the environment in which the material is used and being able to interpret corrosion case studies. Choosing the most appropriate surface treatment technique.
E064220 Process Technology in Textiles	guided self-study practicum lecture		Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E064921 Finishing and Coating Technology	guided self-study practicum lecture		Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064200 Functional Textile Materials	guided self-study project lecture		Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E042740 Fracture and Deformation Behaviour of Materials	guided self-study practicum lecture		To designate elements in the material design that affect fracture behavior. Acquiring knowledge regarding solid, scientific description of the fracture behavior of materials. Concept formation and acquiring information concerning the most important experimental set-ups through which the mechanical properties of materials can be tested. Acquiring knowledge about the mechanical behavior of materials in relation to the fundamental deformation mechanisms. Understand the basic deformation mechanisms of materials.
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E066190 Materials Science Thermodynamics	lecture seminar: practical PC room classes seminar		Application of the concepts of thermodynamics, phase equilibria and electrochemical processes Understanding of the concepts of thermodynamics, phase equilibria and electrochemical processes Use and interpretation of thermodynamic software and knowledge of itslimitations
E065471 Metal Extraction and Recycling	excursion lecture: plenary exercises seminar lecture	written examination report oral examination	
E066170 Physical Materials Science	guided self-study seminar: coached exercises lecture		Acquiring physical insight in the structure and properties of interfaces. Mastering the basic concepts of quantitative texture analysis. Acquiring knowledge concerning the crystallographic structure and properties of (mechanical) twins. Being able to establish a link between the typical characteristics of the (sub-)structure of a plastically deformed metal and the properties of the recrystallized structure after recovery annealing. Gain a deeper insight in the relationship between thermodynamic laws and the formation of microstructures of materials. To gain insight in the process of martensitic phase transformation.
E069040 Fibre Materials	guided self-study practicum lecture		Know the topics : fibres, textile raw materials. Obtain a good knowledge of fibres : types, production, properties and applications.
E064220 Process Technology in Textiles	guided self-study practicum lecture		Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E064120 Analysis of Products and Processes	guided self-study seminar: coached exercises lecture		Obtain insight in how to obtain a maximum of reliable information based on a minimum number of data (process/product). Know the concepts: test setup, dataprocessing, decision-making, quality.

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*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E064960 Polymer Processing	guided self-study seminar: coached exercises practicum lecture	oral examination	Skills: distinguishing and identifying polymer processing techniques for a given final application, applying conservation laws for mass, momentum and energy for industrial polymer processing, evaluating the importance of the polymer microstucture and transport phenomena on various length and time scales, assessing typical order of magnitudes related to the design of polymer processing units, and understanding the relevance and interconnection of mechanical engineering, material science and polymer chemistry for the fundamental understanding and optimization of polymer processing units. Attitude: being able to solve a design problem in het field of polymer processing independently and in group. Knowledge: discussing the relation between process parameters and industrial performance of polymer processing units, the importance of the polymer microstructure during polymer processing, the major production processes for polymer applications and the integration of polymer recycling techniques. Knowledge: describing and defining the following concepts: polymer degradation, extrudor sections, (non-)Newtonian extrusion theory, thermoforming, injection moulding, additive manufacturing, chemical/mechanical recycling, pyrolysis, catalytic cracking, permeability, recovery, tribology, flow stability, pressurization, melting efficiency, reactive extrusion, reactive injection moulding, multi-objective optimization, life cycle analysis, polymer modification during polymer processing.
E064220 Process Technology in Textiles	guided self-study practicum lecture		Obtain insight in 1, 2 and 3-dimensional textile structure principles and their mechanical processing. Understand concepts and principles of textile processes : spinning; weaving; knitting; nonwovens; tufting
E064120 Analysis of Products and Processes	guided self-study seminar: coached exercises lecture		Obtain insight in how to obtain a maximum of reliable information based on a minimum number of data (process/product). Know the concepts: test setup, dataprocessing, decision-making, quality.
E064200 Functional Textile Materials	guided self-study project lecture		Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.

<< **EMingwALG6.8 Have insight into and understanding of the importance of entrepreneurship.** *Profession-specific competence*

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E064921 Finishing and Coating Technology	guided self-study practicum lecture		Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064200 Functional Textile Materials	guided self-study project lecture		Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.

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*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E042740 Fracture and Deformation Behaviour of Materials	guided self-study practicum lecture	oral examination report	To designate elements in the material design that affect fracture behavior. Acquiring knowledge regarding solid, scientific description of the fracture behavior of materials. Concept formation and acquiring information concerning the most important experimental set-ups through which the mechanical properties of materials can be tested. Acquiring knowledge about the mechanical behavior of materials in relation to the fundamental deformation mechanisms. Understand the basic deformation mechanisms of materials.
E068900 Structure and Dynamics of Polymers	guided self-study practicum lecture excursion	written examination assignment oral examination	Skills: being capable to relate the polymer microstructure to the polymer properties, understanding the relevance of the Flory-Huggins parameter in describing molecular interactions, understanding the effect of process conditions (such as temperature and pressure) on diffusivity of polymers in melt and solution, being able to relate the polymer structure and polymer dynamics to the basic steps of polymer processing, being capable to describe isothermal polymer flow in basic geometries using the conversation low of mass and momentum, recognizing the relevance of different length scales and molecular interactions. Attitude: being capable to solve independently and in group problems in the field of structure and dynamics of polymers Knowlegde: describing and defining the following concepts: amorphous and semi-crystalline polymers; crystalline state/melting behavior; orientation; structure-property relations; polymers in solution; polymer rheology; multicomponent systems; diffusion of polymer molecules
E066170 Physical Materials Science	guided self-study seminar: coached exercises lecture		Acquiring physical insight in the structure and properties of interfaces. Mastering the basic concepts of quantitative texture analysis. Acquiring knowledge concerning the crystallographic structure and properties of (mechanical) twins. Being able to establish a link between the typical characteristics of the (sub-)structure of a plastically deformed metal and the properties of the recrystallized structure after recovery annealing. Gain a deeper insight in the relationship between thermodynamic laws and the formation of microstructures of materials. To gain insight in the process of martensitic phase transformation.
E043030 Microstructural Material Models	guided self-study lecture	open book examination report	Apply physical materials science concepts in numerical models Having acquired knowledge from various modeling techniques with emphasis on the microstructural scale Making connections between macroscopic plastic behavior and microscopic mechanisms of crystal plasticity Program a (simple) microstructural model Applying of microstructural material models to gain insight into the evolution of the microstructure during solid-state transformation processes
E064921 Finishing and Coating Technology	guided self-study practicum lecture		Knowing the terms associated with finishing / chemical and physical finishing methods. Obtain insights into the processes which provide specific properties to textile and polymer materials such as repellency, antistatic characteristics, anti- flammability, crease resistance, ..., coatings.
E064760 Colour and its Applications in Textiles	guided self-study practicum lecture excursion	oral examination report job performance assessment participation	Concepts: basic concepts of colour; chemical structure of dyes; colour spaces; kinetics and thermodynamics of dyeing, diffusion, dye adsorption, dye affinity, dye substantivity; reactive dyes; direct dyes; acid dyes; disperse dyes; vat dyes; cationic dyes; pigments; melt dyeing; printing; dyeing machinery. Insights: understanding the basics of colour; relation between chromofores and colour; the methodology of the colour index; the function of the light source, the eye and the sample for the perceived colour; evolution in the quantification of colour; the kinetics of the different steps in a dyeing process; the thermodynamics of the different steps in a dyeing process; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; printing of textiles, advantages and disadvantages compred to dyeing; melt dyeing; the mechanisms and application of dyeing machinery. Skills: measuring and interpreting a spectrum; measuring and interpreting colour; dyeing with direct dyes; dyeing with reactive dyes; dyeing with acid dyes; dyeing with disperse dyes; measuring and interpreting colour fastness.
E064200 Functional Textile Materials	guided self-study project lecture		Obtain insight in the conceptual design of intelligent and functional textile materials and structures and their basic materials. Know the concepts : functional textiles, smart textiles and their components.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.