

Competence coverage matrix



Mechanical Construction

Academic year 2021-2022

Legend:
T=teaching methods
E=evaluation methods

		General Courses										Courses Related to the Main Subject										Master's Dissertation
		E036130	E037321	E037121	E019331	E040670	E076221	E043070	E041200	E060122	E032322	E042910	E042730	E056600	E061322	E091103						
Competences in one/more scientific discipline(s)	Master and apply advanced knowledge in the own engineering discipline in solving complex problems.	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	T E					
	Apply Computer Aided Engineering (CAE) tools and advanced communication instruments in a creative and purposeful way.	T 2 E 2			E									T E								
	Have a thorough insight in the interactions between different electromechanical parts and energy conversions of complex systems.	T 4 E 4	T E	T E	T E												T E					
	Have a thorough knowledge of measurement techniques, sensors, actuators and ICT and the ability to apply the knowledge.	T 5 E 4		T E	T E	T					T E						T E					
	Be familiar with the management of companies and operations.	T 1 E 1					T E															
	Specifically for main subject 'Mechanical Energy Engineering': Have a thorough insight in mechanical and thermodynamical energy conversions, fluid dynamics, heat transfer and combustion and apply the knowledge to complex problems.	T 3 E 3		T E	T E												T E					
	Specifically for main subject 'Electrical Power Engineering': Have a thorough insight in the production, distribution, conversion and use of electrical power and apply the knowledge to complex problems.	T 2 E 2	T E														T E					
	Specifically for main subject 'Mechanical Construction': Have a thorough insight in the design, behaviour and manufacturing of constructions and machines and apply the knowledge to complex problems.	T 6 E 6						T E		T E			T E	T E	T E	T E	T E					
	Specifically for main subject 'Control Engineering and Automation': Have a thorough insight in the design and behaviour of control loops and of system dynamics and apply the knowledge to complex problems.	T 3 E 3	T E		T E												T E					
	Specifically for main subject 'Maritime Engineering': Have a thorough insight in the design, construction, functioning and exploitation of maritime systems.	T 2 E 2												T E			T E					
Scientific competences	Analyse complex problems and translate them into concrete research questions.	T 6 E 6		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			E		T		T		T					T						
	Select and apply the appropriate models, methods and techniques.	T 12 E 11	T E	T E	T E	T E	T E															
	Develop and validate mathematical models and methods.	T 5 E 4		T E	T E	T E		T				T E										
	Interpret research findings in an objective and critical manner.	T 5 E 4			E			T		T		T		T		T						
Intellectual competences	Independently form an opinion on complex situations and problems, and defend this point of view.	T 9 E 8	T E				T	T	T	T			T	T	T	T						
	Apply knowledge in a creative, purposeful and innovative way to research, conceptual design and production.	T 3 E 4			E	T							T	E		T						
	Critically reflect on one's own way of thinking and acting, and understand the limits of one's competences.	T 3 E 3			T	E									T	T						
	Stay uptodate with the evolutions in the discipline to elevate the own competences to expert level.	T 7 E 5	T E		T			T		T		T	T	E		T						
	Readily adapt to changing professional circumstances.	T 3 E 2			T						T					T						
Competences in cooperation and communication	Have the ability to communicate in English about the own field of specialisation.	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	T E						
	Project management: have the ability to formulate objectives, report efficiently, keep track of targets, follow the progress of the project...	T 4 E 4		T E	T E					T						T						
	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 2 E 2			T	E					T											
	Report on technical or scientific subjects verbally, in writing and using graphics.	T 8 E 7	T E	T E	E	T E		T		T	T			T		T						
Societal competences	Act in an ethical, professional and social way.	T 5 E 4	T E	T										T	T	T						
	Recognize the most important business and legal aspects of the own engineering discipline.	T 2 E 1					T	T								T						
	Understand the historical evolution of the own engineering discipline and its social relevance.	T 5 E 3			T			T		T			T			T						
Profession-specific competence	Master the complexity of technical systems by using system and process models.	T 7 E 6	T E	T E	T E	T E	T E		T							T						
	Reconcile conflicting specifications and prior conditions in a high quality and innovative concept or process.	T 5 E 5			T	E		T			T			T		T						
	Synthesize incomplete, contradictory or redundant data into useful information.	T 3 E 2			T	E		T								T						
	Possess sufficient ready knowledge and understanding to evaluate the results of complex calculations, or make approximate estimates.	T 8 E 6	T E	T E	T E	T		T					T	T		T						
	Pay attention to entire life cycles of systems, machines, and processes.	T 6 E 2	T		T			T		T			T		T							

E056600 Construction Techniques	guided self-study seminar: coached exercises lecture	open book examination oral examination	Understand the physical principles of joining techniques. Calculate the strength of joints. Recognize and remediate defects in joints. Constructive design of joints. Analyse and explain the load transfer in joints. Select the most suited joining technique for a specific application. Critically compare different joining techniques. Know the applications of joining techniques. List the advantages and disadvantages of joining techniques. Describe the technological aspects of joining techniques.
E061322 Machine Design	lecture	open book examination	Analysis of mechanical components and systems with respect to durability and reliability. Selecting machine elements critical for lifetime, reliability and durability, taking into account the necessary boundary conditions. Defining and documenting design specifications for mechanical design. Making of motivated choices and decision in mechanical design 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
E019331 ICT and Mechatronics	Only evaluation	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E041200 Mechanics of Electromechanical Constructions and Finite Elements	seminar: coached exercises		To be able to use a commercial finite element package (ANSYS & ABAQUS).
E056600 Construction Techniques	guided self-study seminar: coached exercises lecture	open book examination	Constructive design of joints. Calculate the strength of joints.

Course	Teaching methods	Evaluation methods	Course learning outcome
<i>Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche</i>			
E036130 Controlled Electrical Drives	lecture	open book examination	Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivalent circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hysteresis motor, stepping motors and their characteristics
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	practicum	report	Analyse and interpret measurements on positive displacement machinery.
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
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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E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	practicum	report	Analyse and interpret measurements on positive displacement machinery.
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E040670 Mechanical Vibrations	seminar: coached exercises		Identify modal parameters from an experiment
E032322 Sensor Based Measurement Systems	lecture project	oral examination report assignment	Programming of microcontrollers for data acquisition and programming in Python to process measurement data. Understand and describe the operation of sensors and signal conditioners Dealing with inaccurate measurement data in a judicious way; eliminate or take into account interferences and digitizing artifacts.
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
E076221 Manufacturing Planning and Control	lecture seminar: coached exercises practicum	written examination	indicate the strategic importance of production planning and control for a company assess the usefulness of the different methods and tools for shop floor control in varying situations distinguish and correctly apply methods and tools for planning production and inventory at strategic, tactical and operational level quantify the impact of variability on the performance of a production system analyse and control complex production systems by using mathematical models

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Course	Teaching methods	Evaluation methods	Course learning outcome
E037321 Turbomachines	guided self-study lecture	oral examination	Derive parameter choice and layout of fans, steam turbines, pumps, hydraulic turbines and wind turbines Derive basic functioning of turbomachines and the flow in their components
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	lecture seminar practicum	report	Execute thermodynamic analyses of displacement machines and calculate performance parameters. Choose a suitable pump, compressor or internal combustion engine type depending on the application and determine its basic dimensions. Analyse and interpret measurements on positive displacement machinery. Explain trends in engine design, fuel choice and emission legislation and explain why a specific engine design would be chosen according to the needs of the application. Calculate the margin to cavitation for a pump installation and if necessary propose the required adaptations.
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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<i>Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche</i>			
E036130 Controlled Electrical Drives	lecture seminar: coached exercises practicum	open book examination	Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivalent circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hysteresis motor, stepping motors and their characteristics
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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E043070 Materials Selection in Mechanical Design	lecture self-reliant study activities	written examination with open questions open book examination	Formulate suggestions to improve the lifetime of a construction / machine part. Understand the importance of standardization in materials selection (juridical aspect). Independently defend an opinion regarding the failure behaviour of a construction / machine part ("engineering failure analysis"). Know the principal properties of common construction materials. Systematically identify suitable candidate materials. Formulate suggestions to improve material behaviour. Compare different materials in a multidisciplinary framework, often having conflicting boundary conditions. Show attention to ecological aspects of design. Obtain understanding into the complex interactions between design, materials selection and related economical aspects. Find and critically analyze scientific literature. Understand the importance of reliability and robustness in mechanical design.
E060122 Manufacturing and Total Quality Assurance	lecture	open book examination oral examination	Explain the working principles and process parameters of manufacturing processes. Select and implement the most suitable methods for quality evaluation. Calculate quantities as force and power for some conventional manufacturing processes. Make a documented selection of the optimal combination of manufacturing processes for a specific application. Understand the interaction of material properties, process characteristics and properties of the final product. Critically compare and evaluate manufacturing processes. Explain the mechanical material behaviour during manufacturing.
E042730 Fracture Mechanics	lecture	oral examination	Acknowledging the historical background that led to the current state of the art in fracture mechanics, with emphasis on the resulting possibilities and limitations related to failure prediction.
E056600 Construction Techniques	guided self-study seminar: coached exercises microteaching lecture excursion	open book examination oral examination	Understand the physical principles of joining techniques. Calculate the strength of joints. Recognize and remediate defects in joints. Constructive design of joints. Analyse and explain the load transfer in joints. Select the most suited joining technique for a specific application. Critically compare different joining techniques. Know the applications of joining techniques. List the advantages and disadvantages of joining techniques. Describe the technological aspects of joining techniques.
E061322 Machine Design	lecture	open book examination	Analysis of mechanical components and systems with respect to durability and reliability. Mastering the principles of advanced mechanical design and machine elements with focus on fatigue, friction, wear and lubrication Proper dimensioning and integrating components into mechanical systems. Selecting machine elements critical for lifetime, reliability and durability, taking into account the necessary boundary conditions. Selecting appropriate/optimal materials for various tribological systems.
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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E036130 Controlled Electrical Drives	lecture seminar: coached exercises	open book examination	Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivalent circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hysteresis motor, stepping motors and their characteristics
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
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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E056600 Construction Techniques	guided self-study seminar: coached exercises lecture	open book examination oral examination	Understand the physical principles of joining techniques. Calculate the strength of joints. Recognize and remediate defects in joints. Constructive design of joints. Analyse and explain the load transfer in joints. Select the most suited joining technique for a specific application. Critically compare different joining techniques. Know the applications of joining techniques. List the advantages and disadvantages of joining techniques. Describe the technological aspects of joining techniques.
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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E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E040670 Mechanical Vibrations	guided self-study seminar: coached exercises lecture	oral examination	Modelling of rotating and non-rotating mechanical systems based on Langrange's technique. Apply model structure preserving reduction techniques. Identify modal parameters from an experiment Design of vibration isolation and vibration absorption devices. Perform a modal analysis and formulate structural modifications for continuous and discrete systems. Calculate vibration levels of mechanical structures subjected to dynamic loads.
E043070 Materials Selection in Mechanical Design	lecture self-reliant study activities	open book examination	Formulate suggestions to improve the lifetime of a construction / machine part. Independently defend an opinion regarding the failure behaviour of a construction / machine part ("engineering failure analysis"). Formulate suggestions to improve material behaviour. Compare different materials in a multidisciplinary framework, often having conflicting boundary conditions. Obtain understanding into the complex interactions between design, materials selection and related economical aspects. Find and critically analyze scientific literature.
E041200 Mechanics of Electromechanical Constructions and Finite Elements	lecture seminar: coached exercises	written examination open book examination	To be familiar with the basic notions of the analytical solution of curved beams, shells, plates and pressure vessels.
E042730 Fracture Mechanics	lecture	oral examination	Acknowledging the historical background that led to the current state of the art in fracture mechanics, with emphasis on the resulting possibilities and limitations related to failure prediction.
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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E019331 ICT and Mechatronics	Only evaluation	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E043070 Materials Selection in Mechanical Design	self-reliant study activities		Find and critically analyze scientific literature.
E060122 Manufacturing and Total Quality Assurance	group work	assignment	Gather, analyse and critically compare scientific literature related to manufacturing.
E042910 Mechanical Material Modelling	project	report	be able to discuss the three major categories of damage modelling be able to discuss the different methods of damage evaluation in the design phase be able to judge the relevance and applicability of the standard methods for visco-elasticity and plasticity be able to apply the visco-elastic models of Maxwell and Kelvin-Voigt to simple cases of creep and relaxation recognize the different types of distributed damage in brittle materials be able to apply the yielding criteria of von Mises and Tresca to plasticity of isotropic steel
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
E036130 Controlled Electrical Drives	lecture seminar: coached exercises practicum	open book examination	Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivalent circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hysteresis motor, stepping motors and their characteristics
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E040670 Mechanical Vibrations	guided self-study seminar: coached exercises lecture	oral examination	Modelling of rotating and non-rotating mechanical systems based on Lagrange's technique. Apply model structure preserving reduction techniques. Identify modal parameters from an experiment Design of vibration isolation and vibration absorption devices. Perform a modal analysis and formulate structural modifications for continuous and discrete systems. Calculate vibration levels of mechanical structures subjected to dynamic loads.
E076221 Manufacturing Planning and Control	lecture seminar: coached exercises practicum	written examination	distinguish and correctly apply methods and tools for planning production and inventory at strategic, tactical and operational level assess the usefulness of the different methods and tools for shop floor control in varying situations
E043070 Materials Selection in Mechanical Design	lecture	open book examination	Compare different materials in a multidisciplinary framework, often having conflicting boundary conditions. Systematically identify suitable candidate materials.
E041200 Mechanics of Electromechanical Constructions and Finite Elements	lecture seminar: coached exercises		To be familiar with the basic notions of the Finite Element Method.
E060122 Manufacturing and Total Quality Assurance	lecture	open book examination oral examination	Know and understand methods (and their limitations) for the evaluation of manufacturability. Select and implement the most suitable methods for quality evaluation. Calculate quantities as force and power for some conventional manufacturing processes. Make a documented selection of the optimal combination of manufacturing processes for a specific application.
E032322 Sensor Based Measurement Systems	project	assignment report	Dealing with inaccurate measurement data in a judicious way; eliminate or take into account interferences and digitizing artifacts.
E042910 Mechanical Material Modelling	lecture	written examination	be able to discuss the three major categories of damage modelling be able to discuss the different methods of damage evaluation in the design phase be able to judge the relevance and applicability of the standard methods for visco-elasticity and plasticity be able to apply the visco-elastic models of Maxwell and Kelvin-Voigt to simple cases of creep and relaxation recognize the different types of distributed damage in brittle materials be able to apply the yielding criteria of von Mises and Tresca to plasticity of isotropic steel
E042730 Fracture Mechanics	lecture	oral examination	Acknowledging the historical background that led to the current state of the art in fracture mechanics, with emphasis on the resulting possibilities and limitations related to failure prediction.
E056600 Construction Techniques	guided self-study lecture	oral examination	Know the applications of joining techniques. Select the most suited joining technique for a specific application. Critically compare different joining techniques.
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
<i>Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche</i>			
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E040670 Mechanical Vibrations	guided self-study seminar: coached exercises lecture	oral examination	Modelling of rotating and non-rotating mechanical systems based on Langrange's technique. Apply model structure preserving reduction techniques. Identify modal parameters from an experiment Design of vibration isolation and vibration absorption devices. Perform a modal analysis and formulate structural modifications for continuous and discrete systems. Calculate vibration levels of mechanical structures subjected to dynamic loads.
E076221 Manufacturing Planning and Control	lecture seminar: coached exercises	written examination	analyse and control complex production systems by using mathematical models quantify the impact of variability on the performance of a production system
E041200 Mechanics of Electromechanical Constructions and Finite Elements	seminar: coached exercises		To be able to use a commercial finite element package (ANSYS & ABAQUS).
E042730 Fracture Mechanics	lecture	oral examination	Acknowledging the historical background that led to the current state of the art in fracture mechanics, with emphasis on the resulting possibilities and limitations related to failure prediction.

Course	Teaching methods	Evaluation methods	Course learning outcome
<i>Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche</i>			
E019331 ICT and Mechatronics	Only evaluation	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E043070 Materials Selection in Mechanical Design	self-reliant study activities		Find and critically analyze scientific literature.
E060122 Manufacturing and Total Quality Assurance	group work	assignment	Gather, analyse and critically compare scientific literature related to manufacturing.
E042910 Mechanical Material Modelling	project	report	be able to discuss the three major categories of damage modelling be able to discuss the different methods of damage evaluation in the design phase recognize the different types of distributed damage in brittle materials
E056600 Construction Techniques	microteaching		Analyse, summarize and present scientific literature related to joining techniques (only for the engineering programmes).
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
<i>Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche</i>			
E036130 Controlled Electrical Drives	lecture seminar: coached exercises	open book examination	Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivalent circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hystereis motor, stepping motors and their characteristics
E076221 Manufacturing Planning and Control	lecture		assess the usefulness of the different methods and tools for shop floor control in varying situations
E043070 Materials Selection in Mechanical Design	lecture self-reliant study activities	open book examination	Formulate suggestions to improve the lifetime of a construction / machine part. Independently defend an opinion regarding the failure behaviour of a construction / machine part ("engineering failure analysis"). Formulate suggestions to improve material behaviour. Find and critically analyze scientific literature.
E041200 Mechanics of Electromechanical Constructions and Finite Elements	lecture seminar: coached exercises	written examination open book examination	To be familiar with the basic notions of the Finite Element Method.
E060122 Manufacturing and Total Quality Assurance	lecture	oral examination	Critically compare and evaluate manufacturing processes. Select and implement the most suitable methods for quality evaluation. Make a documented selection of the optimal combination of manufacturing processes for a specific application. Understand the interaction of material properties, process characteristics and properties of the final product.
E042730 Fracture Mechanics	lecture	oral examination	Acknowledging the historical background that led to the current state of the art in fracture mechanics, with emphasis on the resulting possibilities and limitations related to failure prediction.
E056600 Construction Techniques	guided self-study lecture	oral examination	Know the applications of joining techniques. Select the most suited joining technique for a specific application. Critically compare different joining techniques.
E061322 Machine Design	lecture	open book examination report	Analysis of mechanical components and systems with respect to durability and reliability. Selecting machine elements critical for lifetime, reliability and durability, taking into account the necessary boundary conditions. Being able to adequately collect, analyse and summarize relevant scientific and technical information related to mechanical systems and processes. Selecting appropriate/optimal materials for various tribological systems. Making of motivated choices and decision in mechanical design 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
E019331 ICT and Mechatronics	Only evaluation	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E040670 Mechanical Vibrations	seminar: coached exercises	oral examination	Perform a modal analysis and formulate structural modifications for continuous and discrete systems. Apply model structure preserving reduction techniques. Design of vibration isolation and vibration absorption devices.
E056600 Construction Techniques	guided self-study seminar: coached exercises lecture	open book examination oral examination	Select the most suited joining technique for a specific application. Calculate the strength of joints. Recognize and remediate defects in joints. Constructive design of joints. Analyse and explain the load transfer in joints.
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
<i>Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche</i>			
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E061322 Machine Design	lecture	open book examination report	Conducting experimental and/or numerical simulations, including interpretation and reporting Being able to adequately collect, analyse and summarize relevant scientific and technical information related to mechanical systems and processes. Defining and documenting design specifications for mechanical design. Selecting appropriate/optimal materials for various tribological systems. Making of motivated choices and decision in mechanical design processes. Analysis of mechanical components and systems with respect to durability and reliability.
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
E036130 Controlled Electrical Drives	lecture seminar: coached exercises	open book examination	Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivalent circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hysteresis motor, stepping motors and their characteristics
E019331 ICT and Mechatronics	guided self-study seminar project lecture		Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E043070 Materials Selection in Mechanical Design	self-reliant study activities		Find and critically analyze scientific literature.
E060122 Manufacturing and Total Quality Assurance	group work lecture	assignment	Be interested in technological evolutions concerning manufacturing processes
E042910 Mechanical Material Modelling	project	report	be able to discuss the three major categories of damage modelling be able to discuss the different methods of damage evaluation in the design phase recognize the different types of distributed damage in brittle materials
E042730 Fracture Mechanics	lecture	oral examination	Acknowledging the historical background that led to the current state of the art in fracture mechanics, with emphasis on the resulting possibilities and limitations related to failure prediction.
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
<i>Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche</i>			
E019331 ICT and Mechatronics	guided self-study seminar project lecture		Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E032322 Sensor Based Measurement Systems	project	assignment report	Collaborate in a small group on a project to design and realize a practical sensor based measurement system.
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
E036130 Controlled Electrical Drives	lecture seminar: coached exercises practicum	open book examination	Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivalent circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hysteresis motor, stepping motors and their characteristics
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	lecture seminar practicum	report	Calculate the margin to cavitation for a pump installation and if necessary propose the required adaptations. Choose a suitable pump, compressor or internal combustion engine type depending on the application and determine its basic dimensions. Analyse and interpret measurements on positive displacement machinery. Explain trends in engine design, fuel choice and emission legislation and explain why a specific engine design would be chosen according to the needs of the application.
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E040670 Mechanical Vibrations	lecture	oral examination	Modelling of rotating and non-rotating mechanical systems based on Lagrange's technique. Apply model structure preserving reduction techniques. Identify modal parameters from an experiment Design of vibration isolation and vibration absorption devices. Perform a modal analysis and formulate structural modifications for continuous and discrete systems. Calculate vibration levels of mechanical structures subjected to dynamic loads.
E041200 Mechanics of Electromechanical Constructions and Finite Elements	lecture seminar: coached exercises	written examination open book examination	To be familiar with the basic notions of the analytical solution of curved beams, shells, plates and pressure vessels. To be familiar with the basic notions of the Finite Element Method. To be able to use a commercial finite element package (ANSYS & ABAQUS).
E060122 Manufacturing and Total Quality Assurance	group work	oral examination assignment	Understand and use terminology specific to manufacturing and total quality. Present and report on modern developments in manufacturing.
E032322 Sensor Based Measurement Systems	project	oral examination report	Collaborate in a small group on a project to design and realize a practical sensor based measurement system. Understand and describe the operation of sensors and signal conditioners
E042910 Mechanical Material Modelling	project	report	be able to discuss the three major categories of damage modelling be able to discuss the different methods of damage evaluation in the design phase recognize the different types of distributed damage in brittle materials
E042730 Fracture Mechanics	lecture	oral examination	Acknowledging the historical background that led to the current state of the art in fracture mechanics, with emphasis on the resulting possibilities and limitations related to failure prediction.
E056600 Construction Techniques	guided self-study microteaching lecture	oral examination	Understand terminology specific to joining techniques. Analyse, summarize and present scientific literature related to joining techniques (only for the engineering programmes).
E061322 Machine Design	lecture	open book examination report	Conducting experimental and/or numerical simulations, including interpretation and reporting Being able to adequately collect, analyse and summarize relevant scientific and technical information related to mechanical systems and processes. Presentation and dissemination of results.
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
<i>Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche</i>			
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	practicum	report	Analyse and interpret measurements on positive displacement machinery.
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E032322 Sensor Based Measurement Systems	project	assignment report	Programming of microcontrollers for data acquisition and programming in Python to process measurement data. Collaborate in a small group on a project to design and realize a practical sensor based measurement system.
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
<i>Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche</i>			
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E032322 Sensor Based Measurement Systems	project	assignment report	Collaborate in a small group on a project to design and realize a practical sensor based measurement system.

Course	Teaching methods	Evaluation methods	Course learning outcome
E036130 Controlled Electrical Drives	practicum	skills test	Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivalent circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hysteresis motor, stepping motors and their characteristics
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	practicum	report	Analyse and interpret measurements on positive displacement machinery.
E019331 ICT and Mechatronics	Only evaluation	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E040670 Mechanical Vibrations	lecture seminar: coached exercises	report	Modelling of rotating and non-rotating mechanical systems based on Lagrange's technique. Perform a modal analysis and formulate structural modifications for continuous and discrete systems.
E043070 Materials Selection in Mechanical Design	self-reliant study activities		Find and critically analyze scientific literature.
E060122 Manufacturing and Total Quality Assurance	group work	assignment	Present and report on modern developments in manufacturing.
E032322 Sensor Based Measurement Systems	project	oral examination report	Collaborate in a small group on a project to design and realize a practical sensor based measurement system.
E056600 Construction Techniques	microteaching		Analyse, summarize and present scientific literature related to joining techniques (only for the engineering programmes).
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
<i>Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche</i>			
E036130 Controlled Electrical Drives	lecture seminar: coached exercises	open book examination	Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivalent circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hysteresis motor, stepping motors and their characteristics
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	lecture		Explain trends in engine design, fuel choice and emission legislation and explain why a specific engine design would be chosen according to the needs of the application.
E042730 Fracture Mechanics	lecture	oral examination	Acknowledging the historical background that led to the current state of the art in fracture mechanics, with emphasis on the resulting possibilities and limitations related to failure prediction.
E056600 Construction Techniques	guided self-study lecture	oral examination	Be aware of societal aspects (safety, economy, sustainability) specific to joining techniques.
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
<i>Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche</i>			
E076221 Manufacturing Planning and Control	lecture		indicate the strategic importance of production planning and control for a company
E043070 Materials Selection in Mechanical Design	lecture	written examination with open questions	Understand the importance of standardization in materials selection (juridical aspect).

Course	Teaching methods	Evaluation methods	Course learning outcome
<i>Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche</i>			
E019331 ICT and Mechatronics	guided self-study seminar project lecture		Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E043070 Materials Selection in Mechanical Design	lecture	written examination with open questions	Show attention to ecological aspects of design. Understand the importance of standardization in materials selection (juridical aspect). Know the principal properties of common construction materials.
E060122 Manufacturing and Total Quality Assurance	lecture		Critically compare and evaluate manufacturing processes. Be interested in technological evolutions concerning manufacturing processes
E042730 Fracture Mechanics	lecture	oral examination	Acknowledging the historical background that led to the current state of the art in fracture mechanics, with emphasis on the resulting possibilities and limitations related to failure prediction.
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
<i>Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche</i>			
E036130 Controlled Electrical Drives	lecture seminar: coached exercises	open book examination	Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivalent circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hysteresis motor, stepping motors and their characteristics
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	practicum seminar	report	Execute thermodynamic analyses of displacement machines and calculate performance parameters. Choose a suitable pump, compressor or internal combustion engine type depending on the application and determine its basic dimensions. Analyse and interpret measurements on positive displacement machinery. Calculate the margin to cavitation for a pump installation and if necessary propose the required adaptations.
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E040670 Mechanical Vibrations	guided self-study seminar: coached exercises lecture	oral examination	Modelling of rotating and non-rotating mechanical systems based on Lagrange's technique. Apply model structure preserving reduction techniques. Identify modal parameters from an experiment Design of vibration isolation and vibration absorption devices. Perform a modal analysis and formulate structural modifications for continuous and discrete systems. Calculate vibration levels of mechanical structures subjected to dynamic loads.
E076221 Manufacturing Planning and Control	lecture seminar: coached exercises	written examination	analyse and control complex production systems by using mathematical models quantify the impact of variability on the performance of a production system
E041200 Mechanics of Electromechanical Constructions and Finite Elements	seminar: coached exercises		To be able to use a commercial finite element package (ANSYS & ABAQUS). To be familiar with the basic notions of the Finite Element Method.
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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E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E043070 Materials Selection in Mechanical Design	lecture self-reliant study activities	written examination with open questions open book examination	Obtain understanding into the complex interactions between design, materials selection and related economical aspects. Understand the importance of standardization in materials selection (juridical aspect). Compare different materials in a multidisciplinary framework, often having conflicting boundary conditions.
E032322 Sensor Based Measurement Systems	project	assignment report	Programming of microcontrollers for data acquisition and programming in Python to process measurement data. Collaborate in a small group on a project to design and realize a practical sensor based measurement system.
E056600 Construction Techniques	guided self-study lecture	oral examination	Know the applications of joining techniques. Select the most suited joining technique for a specific application.
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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E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E043070 Materials Selection in Mechanical Design	self-reliant study activities		Find and critically analyze scientific literature.
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
<i>Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche</i>			
E036130 Controlled Electrical Drives	lecture seminar: coached exercises practicum	open book examination skills test	Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivalent circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hysteresis motor, stepping motors and their characteristics
E037321 Turbomachines	practicum seminar: coached exercises	written examination	Calculate the flow in a turbomachine using one-dimensional analysis
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E040670 Mechanical Vibrations	seminar: coached exercises		Perform a modal analysis and formulate structural modifications for continuous and discrete systems. Apply model structure preserving reduction techniques. Identify modal parameters from an experiment Design of vibration isolation and vibration absorption devices.
E043070 Materials Selection in Mechanical Design	lecture	written examination with open questions	Obtain understanding into the complex interactions between design, materials selection and related economical aspects. Know the principal properties of common construction materials.
E042730 Fracture Mechanics	lecture		Acknowledging the historical background that led to the current state of the art in fracture mechanics, with emphasis on the resulting possibilities and limitations related to failure prediction.
E056600 Construction Techniques	lecture seminar: coached exercises	open book examination	Analyse and explain the load transfer in joints. Calculate the strength of joints. Constructive design of joints.
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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E036130 Controlled Electrical Drives	lecture		Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivalent circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hysteresis motor, stepping motors and their characteristics
E019331 ICT and Mechatronics	guided self-study seminar project lecture		Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E043070 Materials Selection in Mechanical Design	lecture	written examination with open questions	Show attention to ecological aspects of design.
E060122 Manufacturing and Total Quality Assurance	lecture		Explain the working principles and process parameters of manufacturing processes. Make a documented selection of the optimal combination of manufacturing processes for a specific application. Understand the interaction of material properties, process characteristics and properties of the final product.
E042730 Fracture Mechanics	lecture	oral examination	Acknowledging the historical background that led to the current state of the art in fracture mechanics, with emphasis on the resulting possibilities and limitations related to failure prediction.
E061322 Machine Design	lecture		Analysis of mechanical components and systems with respect to durability and reliability. Mastering the principles of advanced mechanical design and machine elements with focus on fatigue, friction, wear and lubrication Selecting machine elements critical for lifetime, reliability and durability, taking into account the necessary boundary conditions.

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E036130 Controlled Electrical Drives	lecture seminar: coached exercises		Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivalent circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hystereis motor, stepping motors and their characteristics
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	lecture		Explain trends in engine design, fuel choice and emission legislation and explain why a specific engine design would be chosen according to the needs of the application. Choose a suitable pump, compressor or internal combustion engine type depending on the application and determine its basic dimensions.
E043070 Materials Selection in Mechanical Design	lecture	written examination with open questions	Show attention to ecological aspects of design.
E060122 Manufacturing and Total Quality Assurance	lecture	oral examination	Be aware of economical, environmental and quality issues related to manufacturing processes
E056600 Construction Techniques	guided self-study lecture	oral examination	Be aware of societal aspects (safety, economy, sustainability) specific to joining techniques.

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E036130 Controlled Electrical Drives	lecture		Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivalent circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hystereis motor, stepping motors and their characteristics
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E043070 Materials Selection in Mechanical Design	lecture self-reliant study activities	written examination with open questions open book examination	Formulate suggestions to improve the lifetime of a construction / machine part. Independently defend an opinion regarding the failure behaviour of a construction / machine part ("engineering failure analysis"). Formulate suggestions to improve material behaviour. Understand the importance of reliability and robustness in mechanical design.
E042730 Fracture Mechanics	lecture	oral examination	Acknowledging the historical background that led to the current state of the art in fracture mechanics, with emphasis on the resulting possibilities and limitations related to failure prediction.
E056600 Construction Techniques	guided self-study lecture	oral examination	Be aware of societal aspects (safety, economy, sustainability) specific to joining techniques.

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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
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
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E036130 Controlled Electrical Drives	lecture seminar: coached exercises	open book examination	Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivalent circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hysteresis motor, stepping motors and their characteristics
E037321 Turbomachines	guided self-study lecture	oral examination	Derive parameter choice and layout of fans, steam turbines, pumps, hydraulic turbines and wind turbines
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	lecture		Explain trends in engine design, fuel choice and emission legislation and explain why a specific engine design would be chosen according to the needs of the application. Choose a suitable pump, compressor or internal combustion engine type depending on the application and determine its basic dimensions.
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.

