Competence coverage matrix			General Courses				Courses Related to the Main Subject						Maste r's Disser				
GHENT UNIVERSITY Master of Science in Electromechanical Engineering					Compressors and IC			ng and Control	Mechanical Design	nechanical Constructions	ital Quality Assurance	rement Systems	Aodelling		nes		tation
Mechanical Construction	on		ectrical D	es	t Pumps,	hatronics	ibrations	g Plannir	ection in	Electron	g and To	d Measur	1aterial N	hanics	Techniqu	ign	ertation
Academic year 2021-20	22		Controlled Ele	Turbomachin	Displacemeni ndamentals	CT and Mech	/lechanical V	Janufacturin	/aterials Sel	Aechanics of Elements	Aanufacturin	Sensor Base	dechanical N	racture Mec	Construction	Aachine Des	/aster's Diss
Legend: T=teaching methods E=evaluation methods			E036130 (E037321 ⁻	E037121 [Engine Fu	E019331	E0406701	E0762211	E0430701	E041200 I and Finite	E0601221	E032322 (E042910	E042730 F	E056600 (E061322 I	E0911031
Competences in one/more scientific	Master and apply advanced knowledge in the own engineering discipline in solving complex problems.	T 11 E 11			E	E	E	E	E		E		E	E	E	E	E
discipline(s)	Apply Computer Aided Engineering (CAE) tools and advanced communication instruments in a creative and purposeful way.	T 2 E 2				Е				т					E		
	Have a thorough insight in the interactions between different electromechanical parts and energy conversions of complex systems.	Т4 Е4	T E		E	E											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	т					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		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
	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	T		T	T				T			T
	Consult the scientific literature as part of the own research.	T 4				_	-		т	-	Т		Т				T
	Select and apply the appropriate models, methods and	E 4 T 12	T			T	Т	Т	Т	т	T	T	T	Т	Т		T
	Develop and validate mathematical models and methods.	E 11 T 5	E			T	T	T	E	т	E	E	E	T	E		E
	Interpret research findings in an objective and critical manner.	E 4 T 5				E	E	E	т		т		т	E	т		Т
Intellectual competences	Independently form an opinion on complex situations and problems, and defend this point of view.	E 4 T 9 E 8	T E			E		т	T E	T E	E T E		E	T E	T E	T E	E T E
	Apply knowledge in a creative, purposeful and innovative way to research, conceptual design and production.	T 3 E 4				E	T E								T E		T E
	Critically reflect on one's own way of thinking and acting, and understand the limits of one's competences.	T 3 E 3				T										T E	TE
	Stay uptodate with the evolutions in the discipline to elevate the own competences to expert level.	T 7	T			т			т		T		T	T			T
	Readily adapt to changing professional circumstances.	T 3	-			т					-	Т	-	-			T
Competences in cooperation and	Have the ability to communicate in English about the own field of specialisation.	E 2 T 12 E 12	T E		T E	T E	T E			T E	T E	E T E	T E	T E	T E	T E	T E
communication	Project management: have the ability to formulate objectives, report efficiently, keep track of targets, follow the progress of the project,	T 4 E 4			E	E						T E					T E
	Have the ability to work as a member of a team in a multi disciplinary workingenvironment, as well as being capable of taking on supervisory responsibilities.	T 2 E 2				T E						T E					
	Report on technical or scientific subjects verbally, in writing and using graphics.	T 8 E 7	T E		T E	E	T E		т		T E	T E			т		T E
Societal competences	Act in an ethical, professional and social way.	T 5 E 4	T E		т									T E	T E		T E
	Recognize the most important business and legal aspects of the own engineering discipline.	T 2 E 1						т	T E								
	Understand the historical evolution of the own engineering discipline and its social relevance.	T 5 E 3				т			T E		т			T E			TE
Profession-specific	Master the complexity of technical systems by using system and process models.	T 7 E 6	T F		T	T	T	T	-	Т				-			T
competence	Reconcile conflicting specifications and prior conditions in a high quality and innovative concept or process	T 5	-			T	_		T			T			T		T
	Synthesize incomplete, contradictory or redundant data into useful	T 3				T			T			E			E		T
	Possess sufficient ready knowledge and understanding to evaluate the results of complex calculations, or make approximate	E 2 T 8 E 6	T E	T E		E T E	т		T E					Т	T E		E T E
	Pay attention to entire life cycles of systems, machines, and processes.	T 6 E 2	т			т			T E		т			T E		т	

GHENT UNIVERSITY Master of Science in Electromechanical Engineering Mechanical Construction Academic year 2021-2022 Legend: T=teaching methods E=evaluation methods			E036130 Controlled Electrical Drives	E037321 Turbomachines	E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	E019331 ICT and Mechatronics	E040670 Mechanical Vibrations	E076221 Manufacturing Planning and Control	E043070 Materials Selection in Mechanical Design	E041200 Mechanics of Electromechanical Constructions and Finite Elements	E060122 Manufacturing and Total Quality Assurance	E032322 Sensor Based Measurement Systems	E042910 Mechanical Material Modelling	E042730 Fracture Mechanics	E056600 Construction Techniques	E061322 Machine Design	E091103 Master's Dissertation
Profession-specific competence	Pay attention to sustainability, energyefficiency, environmental cost, use of raw materials and labour costs.	T 5 E 3	Т		Т				T E		T E				T E		
	Pay attention to all aspects of reliability, safety, and ergonomics.	T 5 E 4	т			T E			T E					T E	T E		
	Have insight into and understanding of the importance of entrepreneurship.																
	Show perseverance, innovativeness, and an aptitude for creating added value.	T 2 E 2				T E											T E
	Integrate the advanced knowledge of mechanical and electrical systems and ICT in order to design, implement and exploit technological innovations.	T 2 E 2				T E											T E
	Be familiar with the energy efficiency of (electrical, mechanical and thermal) energy conversion systems and distribution systems.	d T 4 E 3	T E	T E	Т												T E
			W 15 E 12	W 3 E 3	W 11 E 8	W 22 E 23	W 10 E 8	W 7 E 5	W 17 E 12	W 7 E 3	W 12 E 10	W 8 E 8	W 6 E 6	W 13 E 12	W 15 E 13	W 6 E 5	W 29 E 29

EMingwALG1.1 Master and apply advanced knowledge in the own engineering discipline in solving complex problems. <<

Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terug	ggevonden in de studiefiche		
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 de 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 according to the needs of the application.
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Calculate the margin to cavitation for a pump installation and if necessary propose the required adaptations. Understanding the reasoning and assumptions behind correct data handling and interpretation, information ex- 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 in 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 end 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.
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 level 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	written examination with open questions open book examination	Obtain understanding into the complex interactions between design, materials selection and related economic Independently defend an opinion regarding the failure behaviour of a construction / machine part ("engineering Know the principal properties of common construction materials. Formulate suggestions to improve material behaviour. Compare different materials in a multidisciplinary framework, often having conflicting boundary conditions.
E060122 Manufacturing and Total Quality Assurance	group work lecture	open book examination assignment oral examination	Understand and use terminology specific to manufacturing and total quality. Be interested in technological evolutions concerning manufacturing processes Be aware of economical, environmental and quality issues related to manufacturing processes Select and implement the most suitable methods for quality evaluation. Calculate quantities as force and power for some conventional manufacturing processes. Present and report on modern developments in manufacturing. Gather, analyse and critically compare scientific literature related to manufacturing. 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. Know and understand methods (and their limitations) for the evaluation of manufacturability. Explain the mechanical material behaviour during manufacturing.
E042910 Mechanical Material Modelling	lecture project	written examination 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
E042730 Fracture Mechanics	lecture	oral examination	Acknowledging the historical background that led to the current state of the art in fracture mechanics, with em resulting possibilities and limitations related to failure prediction.

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02-02-2022
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sticity of isotropic steel te of the art in fracture mechanics, with emphasis on the

having conflicting boundary conditions. al quality.

loor control in varying situations n, materials selection and related economical aspects. a construction / machine part ("engineering failure analysis").

namic loads. luction and inventory at strategic, tactical and operational

r continuous and discrete systems.

ask management ns work, especially on the ICT side ns for sensing and actuation in a newly encountered

neir limitations hreads, object oriented cation, choosing information channel and information content

essary propose the required adaptations. handling and interpretation, information extraction and

chinery. on and explain why a specific engine design would be chosen

alculate performance parameters. e type depending on the application and determine its basic

Competences in one/more scientific discipline(s)

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 bounda 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 laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literatur 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.

durability and reliability. ability, taking into account the necessary boundary conditions. esign. ocesses.

ns, present and found them, both to colleagues as to

nt aspects in the execution of research (literature search,

EMingwALG1.2 Apply Computer Aided Engineering (CAE) tools and advanced communication instruments in a creative and purposeful way.

Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terugg	evonden in de studiefiche		
E019331 ICT and Mechatronics	Only evaluation	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data I machine learning Represent simple motion systems with matrix groups and realize the Discriminate between different task organizations: layers, parallel th Understand basic communication techniques: setting up communica Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-ta Understand how basic components of complex mechatronic system Propose, analyze, select and implement hard- and software solution mechatronic system
E041200 Mechanics of Electromechanical Constructions and Finite Elements	seminar: coached exercises		To be able to use a commercial finite element package (ANSYS & A
E056600 Construction Techniques	guided self-study seminar: coached exercises lecture	open book examination	Constructive design of joints. Calculate the strength of joints.

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Competences in one/more scientific discipline(s)

handling and interpretation, information extraction and

heir limitations hreads, object oriented cation, choosing information channel and information content

task management ms work, especially on the ICT side ons for sensing and actuation in a newly encountered

ABAQUS).

EMingwELME1.1 Have a thorough insight in the interactions between different electromechanical parts and energy conversions of complex

systems.			
Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terug	ggevonden in de studiefiche		
E036130 Controlled Electrical Drives	lecture	open book examination	Understanding the differences and similarities between space vectors Gaining insight into the differences and similarities between space vec starting, restraints with classical starting methods, power electronic starting methods, voltage load commutation in VSI and CSI, differences and similarities between controlled drives and set commutator machines versus DC commutator machines, small versus large induction machin power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, s circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), hystereis motor, stepping motors and their characteristics
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	practicum	report	Analyse and interpret measurements on positive displacement machin
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 has machine learning Represent simple motion systems with matrix groups and realize their Discriminate between different task organizations: layers, parallel threa Understand basic communication techniques: setting up communication Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task Understand how basic components of complex mechatronic systems v Propose, analyze, select and implement hard- and software solutions f 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 Self-assessment with adequate and critical self-correction and objectiv Communicate adequately on the research, the results and problems, p laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different as topical study, research and the reflection on the research, experiments, experimentations, designs, sir

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tors and time phasors for sinusoidal and non-sinusoidal supply e vectors and (time) phasors, voltage and temperature limits for

age and speed control, current and torque control, forced and

servo drives, small versus large commutator machines, AC

achines, small versus large synchronous machines, effects of

bly, schemes and modulation principles for inverters, equivalent

trol), servo drives, shaded pole motor, p.m. excitation,

achinery.

a handling and interpretation, information extraction and

heir limitations threads, object oriented cation, choosing information channel and information content

-task management ms work, especially on the ICT side ons for sensing and actuation in a newly encountered

ain. ation and creativity, initiative and perseverance. ectivity.

ms, present and found them, both to colleagues as to

ent aspects in the execution of research (literature search,

, simulations, results, conclusions,...). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teru	ggevonden in de studiefiche		
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	practicum	report	Analyse and interpret measurements on positive displacement mac
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 machine learning Represent simple motion systems with matrix groups and realize the Discriminate between different task organizations: layers, parallel th Understand basic communication techniques: setting up communica Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-ta Understand how basic components of complex mechatronic system Propose, analyze, select and implement hard- and software solution 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 programm Understand and describe the operation of sensors and signal condi Dealing with inaccurate measurement data in a judicious way; elimi
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domai Give proof of independency, motivation, dedication, drive to innovat Self-assessment with adequate and critical self-correction and objec Communicate adequately on the research, the results and problems laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process differen topical study, research and the reflection on the research, experiments, experimentations, designs, Find an appropriate methodology, in accordance with the applicable

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chinery.

handling and interpretation, information extraction and

neir limitations

hreads, object oriented cation, choosing information content

ask management ns work, especially on the ICT side

ns for sensing and actuation in a newly encountered

ning in Python to process measurement data. itioners

ninate or take into account interferences and digitizing artifacts.

tion and creativity, initiative and perseverance. ectivity.

ns, present and found them, both to colleagues as to

nt aspects in the execution of research (literature search,

EMingwELME1.3 Be familiar with the management of companies and operations.

Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet	teruggevonden in de studiefiche		
E076221 Manufacturing Planning and Control	lecture seminar: coached exercises practicum	written examination	indicate the strategic importance of production planning and control f assess the usefulness of the different methods and tools for shop flo distinguish and correctly apply methods and tools for planning produ level quantify the impact of variability on the performance of a production analyse and control complex production systems by using mathematic

Competences in one/more scientific discipline(s)

ol for a company floor control in varying situations duction and inventory at strategic, tactical and operational

system atical models

<<	EMingwELME1.4 Specifically for a energy conversions, fluid dynami	main subject 'Mechanical	Energy Engineering': Have a bustion and apply the know	a thorough insight in mechanical and thermodynamical /ledge to complex problems.
Course		Teaching methods	Evaluation methods	Course learning outcome
Noot: leer-	en evaluatievormen voorafgegaan door ** werden niet terug	ggevonden in de studiefiche		
E037321	Turbomachines	guided self-study lecture	oral examination	Derive parameter choice and layout of fans, steam turbines, pumps, Derive basic functioning of turbomachines and the flow in their comp
E037121	Displacement Pumps, Compressors and IC Engine Fundamentals	lecture seminar practicum	report	Execute thermodynamic analyses of displacement machines and cal Choose a suitable pump, compressor or internal combustion engine dimensions. Analyse and interpret measurements on positive displacement mach Explain trends in engine design, fuel choice and emission legislation according to the needs of the application. Calculate the margin to cavitation for a pump installation and if neces
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 Self-assessment with adequate and critical self-correction and object Communicate adequately on the research, the results and problems, laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different topical study, research and the reflection on the research, experiments, experimentations, designs, s Find an appropriate methodology, in accordance with the applicable

, hydraulic turbines and wind turbines

aponents alculate performance parameters. e type depending on the application and determine its basic

chinery. In and explain why a specific engine design would be chosen

essary propose the required adaptations.

in. tion and creativity, initiative and perseverance. ectivity.

is, present and found them, both to colleagues as to

t aspects in the execution of research (literature search,

<< EMingwELME1.5 Specific conversion and use of ele	ally for main subject 'Electrical Pow ectrical power and apply the knowle	er Engineering': Have a th dge to complex problems.	orough insight in the production, distribution,
Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werd	len niet teruggevonden in de studiefiche		
E036130 Controlled Electrical Drives	lecture seminar: coached exercises practicum	open book examination	Understanding the differences and similarities between space vectors a Gaining insight into the differences and similarities between space vec starting, restraints with classical starting methods, power electronic starting methods, voltage a load commutation in VSI and CSI, differences and similarities between controlled drives and ser commutator machines versus DC commutator machines, small versus large induction machin power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, s circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), hystereis 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 Self-assessment with adequate and critical self-correction and objectiv Communicate adequately on the research, the results and problems, p laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different as topical study, research and the reflection on the research, experiments, experimentations, designs, sin Find an appropriate methodology, in accordance with the applicable sc

Competences in one/more scientific discipline(s)

- ors and time phasors for sinusoidal and non-sinusoidal supply vectors and (time) phasors, voltage and temperature limits for
- age and speed control, current and torque control, forced and
- servo drives, small versus large commutator machines, AC
- chines, small versus large synchronous machines, effects of
- ly, schemes and modulation principles for inverters, equivalent
- rol), servo drives, shaded pole motor, p.m. excitation,

in. tion and creativity, initiative and perseverance.

- ectivity. ns, present and found them, both to colleagues as to
- nt aspects in the execution of research (literature search,

<<	EMingwELME1.6 Specifically for of constructions and machines a	nain subject 'Mechanical Co nd apply the knowledge to c	onstruction': Have a thorougl complex problems.	h insight in the design, behaviour and manufacturing
Course		Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- e	en evaluatievormen voorafgegaan door ** werden niet terug	gevonden in de studiefiche		
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 / m Understand the importance of standardization in materials selection Independently defend an opinion regarding the failure behaviour of 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 Show attention to ecological aspects of design. Obtain understanding into the complex interactions between desig Find and critically analyze scientific literature. Understand the importance of reliability and robustness in mechan
E060122	Manufacturing and Total Quality Assurance	lecture	open book examination oral examination	Explain the working principles and process parameters of manuface Select and implement the most suitable methods for quality evalua Calculate quantities as force and power for some conventional manufacturing Make a documented selection of the optimal combination of manufacturing Understand the interaction of material properties, process character 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 staresulting 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 d Mastering the principles of advanced mechanical design and mach lubrication Proper dimensioning and integrating components into mechanical Selecting machine elements critical for lifetime, reliability and dural Selecting appropriate/optimal materials for various tribological syst
E091103	Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific doma Give proof of independency, motivation, dedication, drive to innova Self-assessment with adequate and critical self-correction and obje Communicate adequately on the research, the results and problem laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different topical study, research and the reflection on the research, experiments, experimentations, designs Find an appropriate methodology, in accordance with the applicable

machine part. ion (juridical aspect). of a construction / machine part ("engineering failure analysis").

having conflicting boundary conditions.

gn, materials selection and related economical aspects.

nical design.

cturing processes.

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anufacturing processes. ufacturing processes for a specific application. cteristics and properties of the final product.

ate of the art in fracture mechanics, with emphasis on the

durability and reliability. chine elements with focus on fatigue, friction, wear and

l systems.

bility, taking into account the necessary boundary conditions. stems. nain.

ation and creativity, initiative and perseverance.

jectivity. ms, present and found them, both to colleagues as to

ent aspects in the execution of research (literature search,

<<	EMingwELME1.7 Specifical	ly for main subject 'Control Engine n dynamics and apply the knowled	eering and Automation': H	ave a thorough insight in the design and behaviour of
Course	control loops and or system	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- e	en evaluatievormen voorafgegaan door ** werder	niet teruggevonden in de studiefiche		
E036130	Controlled Electrical Drives	lecture seminar: coached exercises	open book examination	Understanding the differences and similarities between space vectors a Gaining insight into the differences and similarities between space vec starting, restraints with classical starting methods, power electronic starting methods, voltage a load commutation in VSI and CSI, differences and similarities between controlled drives and ser commutator machines versus DC commutator machines, small versus large induction machin power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, s circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), 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 har machine learning Represent simple motion systems with matrix groups and realize their Discriminate between different task organizations: layers, parallel threa Understand basic communication techniques: setting up communication Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task Understand how basic components of complex mechatronic systems w Propose, analyze, select and implement hard- and software solutions f 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 Self-assessment with adequate and critical self-correction and objectiv Communicate adequately on the research, the results and problems, p laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different as topical study, research and the reflection on the research, experiments, experimentations, designs, sin

tors and time phasors for sinusoidal and non-sinusoidal supply e vectors and (time) phasors, voltage and temperature limits for

age and speed control, current and torque control, forced and

servo drives, small versus large commutator machines, AC

achines, small versus large synchronous machines, effects of

ply, schemes and modulation principles for inverters, equivalent

trol), servo drives, shaded pole motor, p.m. excitation,

a handling and interpretation, information extraction and

their limitations threads, object oriented ication, choosing information channel and information content

-task management ms work, especially on the ICT side ons for sensing and actuation in a newly encountered

ain. ation and creativity, initiative and perseverance. ectivity.

ms, present and found them, both to colleagues as to

ent aspects in the execution of research (literature search,

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.

<<	EMingwELME1.8 Specifical exploitation of maritime sys	ly for main subject 'Maritime Enginatems.	neering': Have a thorough	insight in the design, construction, functioning and
Course		Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- e	en evaluatievormen voorafgegaan door ** werden	niet teruggevonden in de studiefiche		
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 Self-assessment with adequate and critical self-correction and objectiv Communicate adequately on the research, the results and problems, p laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different as topical study, research and the reflection on the research, experiments, experimentations, designs, sin Find an appropriate methodology, in accordance with the applicable so

vation and creativity, initiative and perseverance.

jectivity. ms, present and found them, both to colleagues as to

ent aspects in the execution of research (literature search,

EMingwALG2.1 Analyse complex problems and translate them into concrete research questions.

Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teru	ggevonden in de studiefiche		
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 ha machine learning Represent simple motion systems with matrix groups and realize their Discriminate between different task organizations: layers, parallel threa Understand basic communication techniques: setting up communication Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task Understand how basic components of complex mechatronic systems w Propose, analyze, select and implement hard- and software solutions to mechatronic system
E040670 Mechanical Vibrations	guided self-study seminar: coached exercises lecture	oral examination	Modelling of rotating and non-rotating mechanical systems based on I 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 co Calculate vibration levels of mechanical structures subjected to dynam
E043070 Materials Selection in Mechanical Design	lecture self-reliant study activities	open book examination	Formulate suggestions to improve the lifetime of a construction / mach Independently defend an opinion regarding the failure behaviour of a c Formulate suggestions to improve material behaviour. Compare different materials in a multidisciplinary framework, often hav Obtain understanding into the complex interactions between design, m Find and critically analyze scientific literature.
E041200 Mechanics of Electromechanical Construction and Finite Elements	s lecture seminar: coached exercises	written examination open book examination	To be familiar with the basic notions of the analytical solution of curved
E042730 Fracture Mechanics	lecture	oral examination	Acknowledging the historical background that led to the current state or 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 Self-assessment with adequate and critical self-correction and objectiv Communicate adequately on the research, the results and problems, p laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different as topical study, research and the reflection on the research, experiments, experimentations, designs, sin Find on experiments.

handling and interpretation, information extraction and

neir limitations hreads, object oriented cation, choosing information channel and information content

ask management ns work, especially on the ICT side ns for sensing and actuation in a newly encountered

on Langrange's technique.

r continuous and discrete systems.

namic loads. achine part.

a construction / machine part ("engineering failure analysis").

having conflicting boundary conditions. n, materials selection and related economical aspects.

rved beams, shells, plates and pressure vessels.

te of the art in fracture mechanics, with emphasis on the

tion and creativity, initiative and perseverance.

ctivity.

ns, present and found them, both to colleagues as to

nt aspects in the execution of research (literature search,

, simulations, results, conclusions,...). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study. <<

EMingwALG2.2 Consult the scientific literature as part of the own research.

Course	Teaching methods	Evaluation methods	Course learning outcome	
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terug	ggevonden in de studiefiche			
E019331 ICT and Mechatronics	331 ICT and Mechatronics Only evaluation		Understanding the reasoning and assumptions behind correct data has machine learning Represent simple motion systems with matrix groups and realize their Discriminate between different task organizations: layers, parallel threa Understand basic communication techniques: setting up communication Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task Understand how basic components of complex mechatronic systems v Propose, analyze, select and implement hard- and software solutions f 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 ma	
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 d be able to judge the relevance and applicability of the standard method be able to apply the visco-elastic models of Maxwell and Kelvin-Voigt t recognize the different types of distributed damage in brittle materials be able to apply the vielding criteria of von Mises and Tresca to plastic	
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 Self-assessment with adequate and critical self-correction and objectiv Communicate adequately on the research, the results and problems, p laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different as topical study, research and the reflection on the research, experiments, experimentations, designs, sir Find an appropriate methodology, in accordance with the applicable sc	

handling and interpretation, information extraction and

neir limitations hreads, object oriented cation, choosing information channel and information content

task management ns work, especially on the ICT side ons for sensing and actuation in a newly encountered

o manufacturing.

he design phase he design visco-elasticity and plasticity higt to simple cases of creep and relaxation

sticity of isotropic steel

tion and creativity, initiative and perseverance.

s, present and found them, both to colleagues as to

aspects in the execution of research (literature search,

EMingwALG2.3 Select and apply the appropriate models, methods and techniques.

Course		Tooching mothods	Evaluation mothods	Course learning outcome
Noot: leer- en eva	aluatievormen voorafgegaan door ** werden niet terugg	evonden in de studiefiche		
E036130 Con	ntrolled Electrical Drives	lecture seminar: coached exercises practicum	open book examination	Understanding the differences and similarities between space vector Gaining insight into the differences and similarities between space starting, restraints with classical starting methods, power electronic starting methods, volta load commutation in VSI and CSI, differences and similarities between controlled drives and commutator machines versus DC commutator machines, small versus large induction mack power electronic supply on the machine and vice-versa, stepping motors versus classical motor Understanding the principle of current supply versus voltage supply circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control 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 machine learning Represent simple motion systems with matrix groups and realize th Discriminate between different task organizations: layers, parallel th Understand basic communication techniques: setting up communic Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-t Understand how basic components of complex mechatronic system Propose, analyze, select and implement hard- and software solution
				mechatronic system
E040670 Mec	chanical Vibrations	guided self-study seminar: coached exercises lecture	oral examination	Modelling of rotating and non-rotating mechanical systems based of 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 fo Calculate vibration levels of mechanical structures subjected to dyn
E076221 Mar	nufacturing Planning and Control	lecture seminar: coached exercises practicum	written examination	distinguish and correctly apply methods and tools for planning prod level assess the usefulness of the different methods and tools for shop fl
E043070 Mate	erials Selection in Mechanical Design	lecture	open book examination	Compare different materials in a multidisciplinary framework, often Systematically identify suitable candidate materials.
E041200 Mec and	chanics of Electromechanical Constructions Finite Elements	lecture seminar: coached exercises		To be familiar with the basic notions of the Finite Element Method.
E060122 Mar	nufacturing and Total Quality Assurance	lecture	open book examination oral examination	Know and understand methods (and their limitations) for the evaluat Select and implement the most suitable methods for quality evaluat Calculate quantities as force and power for some conventional mar Make a documented selection of the optimal combination of manufa
E032322 Sen	sor Based Measurement Systems	project	assignment report	Dealing with inaccurate measurement data in a judicious way; elimi
E042910 Mec	chanical 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 th be able to judge the relevance and applicability of the standard met be able to apply the visco-elastic models of Maxwell and Kelvin-Voi recognize the different types of distributed damage in brittle materia be able to apply the vielding criteria of yon Mises and Tresca to pla
E042730 Frac	cture Mechanics	lecture	oral examination	Acknowledging the historical background that led to the current stat resulting possibilities and limitations related to failure prediction.
E056600 Con	struction 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 Mas	ster's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific doma Give proof of independency, motivation, dedication, drive to innova Self-assessment with adequate and critical self-correction and obje Communicate adequately on the research, the results and problem laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different topical study, research and the reflection on the research experiments, experimentations, designs.

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.

Scientific competences

ors and time phasors for sinusoidal and non-sinusoidal supply vectors and (time) phasors, voltage and temperature limits for

age and speed control, current and torque control, forced and

servo drives, small versus large commutator machines, AC

chines, small versus large synchronous machines, effects of

ors y, schemes and modulation principles for inverters, equivalent

rol), servo drives, shaded pole motor, p.m. excitation,

handling and interpretation, information extraction and

neir limitations hreads, object oriented

cation, choosing information channel and information content

ask management ns work, especially on the ICT side ns for sensing and actuation in a newly encountered

on Langrange's technique.

r continuous and discrete systems. namic loads.

luction and inventory at strategic, tactical and operational

loor control in varying situations having conflicting boundary conditions.

ation of manufacturability.

tion. nufacturing processes.

acturing processes for a specific application. inate or take into account interferences and digitizing artifacts.

ne design phase thods for visco-elasticity and plasticity igt to simple cases of creep and relaxation

als sticity of isotropic steel

te of the art in fracture mechanics, with emphasis on the

in. tion and creativity, initiative and perseverance. ectivity. ns, present and found them, both to colleagues as to

nt aspects in the execution of research (literature search,

EMingwALG2.4 Develop and validate mathematical models and methods.

Course		Teaching methods	Evaluation methods	Course learning outcome
Noot: leer-	en evaluatievormen voorafgegaan door ** werden niet terugge	evonden in de studiefiche		
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 machine learning Represent simple motion systems with matrix groups and realize th Discriminate between different task organizations: layers, parallel th Understand basic communication techniques: setting up communic Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-t Understand how basic components of complex mechatronic system Propose, analyze, select and implement hard- and software solutio mechatronic system
E040670	Mechanical Vibrations	guided self-study seminar: coached exercises lecture	oral examination	Modelling of rotating and non-rotating mechanical systems based of 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 fo Calculate vibration levels of mechanical structures subjected to dyr
E076221	Manufacturing Planning and Control	lecture seminar: coached exercises	written examination	analyse and control complex production systems by using mathem quantify the impact of variability on the performance of a productior
E041200	Mechanics of Electromechanical Constructions and Finite Elements	seminar: coached exercises		To be able to use a commercial finite element package (ANSYS &
E042730	Fracture Mechanics	lecture	oral examination	Acknowledging the historical background that led to the current sta resulting possibilities and limitations related to failure prediction.

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Scientific competences

a handling and interpretation, information extraction and

their limitations threads, object oriented ication, choosing information channel and information content

e-task management ems work, especially on the ICT side ions for sensing and actuation in a newly encountered

d on Langrange's technique.

for continuous and discrete systems.

namic loads.

natical models on system

ABAQUS).

ate of the art in fracture mechanics, with emphasis on the

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EMingwALG2.5 Interpret research findings in an objective and critical manner.

Course	Teaching methods Evaluation methods		Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terug	gevonden in de studiefiche		
E019331 ICT and Mechatronics Only evaluation		written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data has machine learning Represent simple motion systems with matrix groups and realize their Discriminate between different task organizations: layers, parallel threa Understand basic communication techniques: setting up communication Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task Understand how basic components of complex mechatronic systems v Propose, analyze, select and implement hard- and software solutions f 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 ma
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 d recognize the different types of distributed damage in brittle materials
E056600 Construction Techniques	microteaching		Analyse, summarize and present scientific literature related to joining to
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 Self-assessment with adequate and critical self-correction and objectiv Communicate adequately on the research, the results and problems, p laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different as topical study, research and the reflection on the research, experiments, experimentations, designs, sir Find an appropriate methodology, in accordance with the applicable so

handling and interpretation, information extraction and

neir limitations hreads, object oriented cation, choosing information channel and information content

task management ns work, especially on the ICT side ons for sensing and actuation in a newly encountered

o manufacturing.

ne design phase

ing techniques (only for the engineering programmes).

tion and creativity, initiative and perseverance.

ectivity. is, present and found them, both to colleagues as to

t aspects in the execution of research (literature search,

EMingwALG3.1 Independently form an opinion on complex situations and problems, and defend this point of view.

Course	Teaching methods	Evaluation methods	Course learning outcome	
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terugg	evonden in de studiefiche			
E036130 Controlled Electrical Drives	lecture seminar: coached exercises	open book examination	Understanding the differences and similarities between space vector Gaining insight into the differences and similarities between space starting, restraints with classical starting methods, power electronic starting methods, volta load commutation in VSI and CSI, differences and similarities between controlled drives and commutator machines versus DC commutator machines, small versus large induction mac power electronic supply on the machine and vice-versa, stepping motors versus classical moto Understanding the principle of current supply versus voltage supply circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control hystereis motor, stepping motors and their characteristics	
E076221 Manufacturing Planning and Control	lecture		assess the usefulness of the different methods and tools for shop fl	
E043070 Materials Selection in Mechanical Design	lecture self-reliant study activities	open book examination	Formulate suggestions to improve the lifetime of a construction / ma Independently defend an opinion regarding the failure behaviour of Formulate suggestions to improve material behaviour. Find and critically analyze scientific literature.	
E041200 Mechanics of Electromechanical Constructions	lecture	written 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 evaluat Make a documented selection of the optimal combination of manufa Understand the interaction of material properties, process characte	
E042730 Fracture Mechanics	lecture	oral examination	Acknowledging the historical background that led to the current star 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 du Selecting machine elements critical for lifetime, reliability and durab Being able to adequately collect, analyse and summarize relevant s systems and processes. Selecting appropriate/optimal materials for various tribological syste Making of motivated choices and decision in mechanical design pro	
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domai Give proof of independency, motivation, dedication, drive to innoval Self-assessment with adequate and critical self-correction and obje Communicate adequately on the research, the results and problem laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process differer topical study, research and the reflection on the research, experiments, experimentations, designs Find an appropriate methodology, in accordance with the applicable	

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Intellectual competences

ors and time phasors for sinusoidal and non-sinusoidal supply vectors and (time) phasors, voltage and temperature limits for

age and speed control, current and torque control, forced and

servo drives, small versus large commutator machines, AC

chines, small versus large synchronous machines, effects of

ors ly, schemes and modulation principles for inverters, equivalent

rol), servo drives, shaded pole motor, p.m. excitation,

loor control in varying situations

achine part.

f a construction / machine part ("engineering failure analysis").

tion.

acturing processes for a specific application.

ristics and properties of the final product. te of the art in fracture mechanics, with emphasis on the

urability and reliability.

bility, taking into account the necessary boundary conditions. scientific and technical information related to mechanical

ems. ocesses.

in.

tion and creativity, initiative and perseverance.

ectivity. ns, present and found them, both to colleagues as to

nt aspects in the execution of research (literature search,

Course	Teaching methods	Evaluation methods	Course learning outcome		
Noot: leer- en evaluatievormen voorafgegaan door ** werde	n niet teruggevonden in de studiefiche				
E019331 ICT and Mechatronics	Only evaluation	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data machine learning Represent simple motion systems with matrix groups and realize th Discriminate between different task organizations: layers, parallel th Understand basic communication techniques: setting up communic Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-t Understand how basic components of complex mechatronic system Propose, analyze, select and implement hard- and software solutio mechatronic system		
E040670 Mechanical Vibrations	seminar: coached exercises	oral examination	Perform a modal analysis and formulate structural modifications fo 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 doma Give proof of independency, motivation, dedication, drive to innova Self-assessment with adequate and critical self-correction and obje Communicate adequately on the research, the results and problem laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process differen topical study, research and the reflection on the research, experiments, experimentations, designs. Find an appropriate methodology, in accordance with the applicable		

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Intellectual competences

handling and interpretation, information extraction and

heir limitations hreads, object oriented cation, choosing information channel and information content

task management ms work, especially on the ICT side ons for sensing and actuation in a newly encountered

or continuous and discrete systems.

ain. ation and creativity, initiative and perseverance. ectivity. ns, present and found them, both to colleagues as to

nt aspects in the execution of research (literature search,

EMingwALG3.3 Critically reflect on one's own way of thinking and acting, and understand the limits of one's competences.

Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** we	rden niet teruggevonden in de studiefiche		
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 extract 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 inform 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 encour 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 m 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 laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literatu 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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handling and interpretation, information extraction and

neir limitations hreads, object oriented cation, choosing information channel and information content

task management ms work, especially on the ICT side ns for sensing and actuation in a newly encountered

nterpretation and reporting scientific and technical information related to mechanical

tion and creativity, initiative and perseverance. ectivity. ns, present and found them, both to colleagues as to

nt aspects in the execution of research (literature search,

EMingwALG3.4 Stay uptodate with the evolutions in the discipline to elevate the own competences to expert level.

Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terug	ggevonden in de studiefiche		
E036130 Controlled Electrical Drives	lecture seminar: coached exercises	open book examination	Understanding the differences and similarities between space vectors Gaining insight into the differences and similarities between space vectors starting, restraints with classical starting methods, power electronic starting methods, voltage load commutation in VSI and CSI, differences and similarities between controlled drives and set commutator machines versus DC commutator machines, small versus large induction machin power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, s circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), hystereis motor, stepping motors and their characteristics
E019331 ICT and Mechatronics	guided self-study seminar project lecture		Understanding the reasoning and assumptions behind correct data har machine learning Represent simple motion systems with matrix groups and realize their Discriminate between different task organizations: layers, parallel threat Understand basic communication techniques: setting up communication Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task Understand how basic components of complex mechatronic systems we Propose, analyze, select and implement hard- and software solutions to 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 pro
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 d 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 c 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 Self-assessment with adequate and critical self-correction and objectiv Communicate adequately on the research, the results and problems, p laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different as topical study, research and the reflection on the research, experiments, experimentations, designs, sir Find an appropriate methodology, in accordance with the applicable so

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Intellectual competences

ors and time phasors for sinusoidal and non-sinusoidal supply vectors and (time) phasors, voltage and temperature limits for

age and speed control, current and torque control, forced and

servo drives, small versus large commutator machines, AC

chines, small versus large synchronous machines, effects of

y, schemes and modulation principles for inverters, equivalent

rol), servo drives, shaded pole motor, p.m. excitation,

handling and interpretation, information extraction and

neir limitations hreads, object oriented

cation, choosing information channel and information content

ask management ns work, especially on the ICT side ns for sensing and actuation in a newly encountered

processes

ne design phase

te of the art in fracture mechanics, with emphasis on the

tion and creativity, initiative and perseverance.

is, present and found them, both to colleagues as to

nt aspects in the execution of research (literature search,

EMingwALG3.5 Readily adapt to changing professional circumstances.

Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet te	eruggevonden in de studiefiche		
E019331 ICT and Mechatronics	guided self-study seminar project lecture		Understanding the reasoning and assumptions behind correct data machine learning Represent simple motion systems with matrix groups and realize th Discriminate between different task organizations: layers, parallel th Understand basic communication techniques: setting up communic Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-t Understand how basic components of complex mechatronic system Propose, analyze, select and implement hard- and software solutio mechatronic system
E032322 Sensor Based Measurement Systems	project	assignment report	Collaborate in a small group on a project to design and realize a pro
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific doma Give proof of independency, motivation, dedication, drive to innova Self-assessment with adequate and critical self-correction and obje Communicate adequately on the research, the results and problem laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process differen topical study, research and the reflection on the research, experiments, experimentations, designs, Find an appropriate methodology, in accordance with the applicable

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handling and interpretation, information extraction and

heir limitations hreads, object oriented cation, choosing information channel and information content

task management ms work, especially on the ICT side ons for sensing and actuation in a newly encountered

actical sensor based measurement system.

in. tion and creativity, initiative and perseverance.

ectivity. ns, present and found them, both to colleagues as to

nt aspects in the execution of research (literature search,

EMingwALG4.1 Have the ability to communicate in English about the own field of specialisation.

Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terugg	evonden in de studiefiche		
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-s Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temp starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque con load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous mach 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 inve circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. ex
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	lecture seminar practicum	report	and their characteristics 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 deter 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 w 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 extra 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 infor 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 encour mechatronic system
E040670 Mechanical Vibrations	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.
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 vesse. 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 empharesulting 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 progra
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 r 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 laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literate 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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Competences in cooperation and communication

ors and time phasors for sinusoidal and non-sinusoidal supply vectors and (time) phasors, voltage and temperature limits for

age and speed control, current and torque control, forced and

servo drives, small versus large commutator machines, AC

chines, small versus large synchronous machines, effects of

y, schemes and modulation principles for inverters, equivalent

rol), servo drives, shaded pole motor, p.m. excitation,

essary propose the required adaptations. e type depending on the application and determine its basic

chinery. n and explain why a specific engine design would be chosen

handling and interpretation, information extraction and

neir limitations hreads, object oriented cation, choosing information channel and information content

ask management ns work, especially on the ICT side ns for sensing and actuation in a newly encountered

rved beams, shells, plates and pressure vessels.

te of the art in fracture mechanics, with emphasis on the

ng techniques (only for the engineering programmes).

terpretation and reporting scientific and technical information related to mechanical

in. tion and creativity, initiative and perseverance. ectivity.

is, present and found them, both to colleagues as to

nt aspects in the execution of research (literature search,

, simulations, results, conclusions,...).

EMingwALG4.2 Project management: have the ability to formulate objectives, report efficiently, keep track of targets, follow the progress of the Competences in cooperation and communication nroioot

project,			
Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teru	ggevonden in de studiefiche		
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	practicum	report	Analyse and interpret measurements on positive displacement mac
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 machine learning Represent simple motion systems with matrix groups and realize the Discriminate between different task organizations: layers, parallel th Understand basic communication techniques: setting up communica Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-ta Understand how basic components of complex mechatronic system Propose, analyze, select and implement hard- and software solution mechatronic system
E032322 Sensor Based Measurement Systems	project	assignment report	Programming of microcontrollers for data acquisition and programm Collaborate in a small group on a project to design and realize a pra
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 innovat Self-assessment with adequate and critical self-correction and object Communicate adequately on the research, the results and problems laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different topical study, research and the reflection on the research, experiments, experimentations, designs, Find an appropriate methodology, in accordance with the applicable

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chinery.

handling and interpretation, information extraction and

neir limitations hreads, object oriented cation, choosing information channel and information content

ask management ns work, especially on the ICT side ns for sensing and actuation in a newly encountered

ning in Python to process measurement data. actical sensor based measurement system.

in. tion and creativity, initiative and perseverance. ectivity.

is, present and found them, both to colleagues as to

t aspects in the execution of research (literature search,

EMingwALG4.3 Have the ability to work as a member of a team in a multidisciplinary workingenvironment, as well as being capable of taking on Competences in cooperation and communication << supervisory responsibilities. Course learning outcome Course Teaching methods **Evaluation methods** Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche E019331 ICT and Mechatronics guided self-study written examination Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and seminar report machine learning skills test Represent simple motion systems with matrix groups and realize their limitations project Discriminate between different task organizations: layers, parallel threads, object oriented oral examination lecture 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 Collaborate in a small group on a project to design and realize a practical sensor based measurement system. project assignment report

EMingwALG4.4 Report on technical or scientific subjects verbally, in writing and using graphics.

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Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terug	ggevonden in de studiefiche		
E036130 Controlled Electrical Drives	practicum	skills test	Understanding the differences and similarities between space vectors and Gaining insight into the differences and similarities between space vectors starting, restraints with classical starting methods, power electronic starting methods, voltage and load commutation in VSI and CSI, differences and similarities between controlled drives and serve of commutator machines versus DC commutator machines, small versus large induction machines, power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, sche circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), ser hystereis 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 handlir machine learning Represent simple motion systems with matrix groups and realize their limit Discriminate between different task organizations: layers, parallel threads, Understand basic communication techniques: setting up communication, or Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task ma Understand how basic components of complex mechatronic systems work Propose, analyze, select and implement hard- and software solutions for s mechatronic system
E040670 Mechanical Vibrations	lecture seminar: coached exercises	report	Modelling of rotating and non-rotating mechanical systems based on Lang Perform a modal analysis and formulate structural modifications for contin
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
E056600 Construction Techniques	microteaching	· ·	Analyse, summarize and present scientific literature related to joining tech
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 Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, prese laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspec topical study, research and the reflection on the research, experiments, experimentations, designs, simula Find an appropriate methodology, in accordance with the applicable scient

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Competences in cooperation and communication

tors and time phasors for sinusoidal and non-sinusoidal supply vectors and (time) phasors, voltage and temperature limits for

age and speed control, current and torque control, forced and

servo drives, small versus large commutator machines, AC

achines, small versus large synchronous machines, effects of

ors ly, schemes and modulation principles for inverters, equivalent

rol), servo drives, shaded pole motor, p.m. excitation,

handling and interpretation, information extraction and

neir limitations

hreads, object oriented cation, choosing information channel and information content

task management ms work, especially on the ICT side ons for sensing and actuation in a newly encountered

on Langrange's technique. or continuous and discrete systems.

ractical sensor based measurement system.

ng techniques (only for the engineering programmes).

ation and creativity, initiative and perseverance.

ns, present and found them, both to colleagues as to

nt aspects in the execution of research (literature search,

EMingwALG5.1 Act in an ethical, professional and social way.

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Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teru	ggevonden in de studiefiche		
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-si Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temper starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque cont load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator in commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machin 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 inve circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. exc 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 we 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 empha 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 laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literatu 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.

Societal competences

ctors and time phasors for sinusoidal and non-sinusoidal supply e vectors and (time) phasors, voltage and temperature limits for

tage and speed control, current and torque control, forced and

servo drives, small versus large commutator machines, AC

achines, small versus large synchronous machines, effects of

ply, schemes and modulation principles for inverters, equivalent

ntrol), servo drives, shaded pole motor, p.m. excitation,

ion and explain why a specific engine design would be chosen

ate of the art in fracture mechanics, with emphasis on the

ain. ation and creativity, initiative and perseverance.

jectivity. ms, present and found them, both to colleagues as to

ent aspects in the execution of research (literature search,

s, simulations, results, conclusions,...).

Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terug	ggevonden in de studiefiche		
E076221 Manufacturing Planning and Control	lecture		indicate the strategic importance of production planning and control
E043070 Materials Selection in Mechanical Design	lecture	written examination with open questions	Understand the importance of standardization in materials selection

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Societal competences

for a company

n (juridical aspect).

Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terug	ggevonden in de studiefiche		
E019331 ICT and Mechatronics	guided self-study seminar project lecture		Understanding the reasoning and assumptions behind correct data machine learning Represent simple motion systems with matrix groups and realize th Discriminate between different task organizations: layers, parallel th Understand basic communication techniques: setting up communic Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-t Understand how basic components of complex mechatronic system Propose, analyze, select and implement hard- and software solution 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 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
E042730 Fracture Mechanics	lecture	oral examination	Acknowledging the historical background that led to the current stat 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 domat Give proof of independency, motivation, dedication, drive to innovat Self-assessment with adequate and critical self-correction and obje Communicate adequately on the research, the results and problem laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different topical study, research and the reflection on the research, experiments, experimentations, designs, Find an appropriate methodology, in accordance with the applicable

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handling and interpretation, information extraction and

heir limitations hreads, object oriented cation, choosing information channel and information content

task management ms work, especially on the ICT side ons for sensing and actuation in a newly encountered

n (juridical aspect).

g processes ate of the art in fracture mechanics, with emphasis on the

ain. ation and creativity, initiative and perseverance. ectivity. ns, present and found them, both to colleagues as to

nt aspects in the execution of research (literature search,

EMingwALG6.1 Master the complexity of technical systems by using system and process models.

Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teru	ggevonden in de studiefiche		
E036130 Controlled Electrical Drives	lecture seminar: coached exercises	open book examination	Understanding the differences and similarities between space vectors Gaining insight into the differences and similarities between space starting, restraints with classical starting methods, power electronic starting methods, volta load commutation in VSI and CSI, differences and similarities between controlled drives and commutator machines versus DC commutator machines, small versus large induction mach power electronic supply on the machine and vice-versa, stepping motors versus classical motor Understanding the principle of current supply versus voltage suppl circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control hystereis motor, stepping motors and their characteristics
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	practicum seminar	report	Execute thermodynamic analyses of displacement machines and c Choose a suitable pump, compressor or internal combustion engine dimensions. Analyse and interpret measurements on positive displacement mac Calculate the margin to cavitation for a pump installation and if pec
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 machine learning Represent simple motion systems with matrix groups and realize th Discriminate between different task organizations: layers, parallel th Understand basic communication techniques: setting up communic Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-t Understand how basic components of complex mechatronic system Propose, analyze, select and implement hard- and software solutio mechatronic system
E040670 Mechanical Vibrations	guided self-study seminar: coached exercises lecture	oral examination	Modelling of rotating and non-rotating mechanical systems based 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 fo Calculate vibration levels of mechanical structures subjected to dyr
E076221 Manufacturing Planning and Control	lecture seminar: coached exercises	written examination	analyse and control complex production systems by using mathem quantify the impact of variability on the performance of a production
E041200 Mechanics of Electromechanical Construction and Finite Elements	s seminar: coached exercises		To be able to use a commercial finite element package (ANSYS & 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 doma Give proof of independency, motivation, dedication, drive to innova Self-assessment with adequate and critical self-correction and obje Communicate adequately on the research, the results and problem laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process differer topical study, research and the reflection on the research, experiments, experimentations, designs Find an appropriate methodology, in accordance with the applicable

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Profession-specific competence

tors and time phasors for sinusoidal and non-sinusoidal supply evectors and (time) phasors, voltage and temperature limits for

age and speed control, current and torque control, forced and

servo drives, small versus large commutator machines, AC

achines, small versus large synchronous machines, effects of

tors bly, schemes and modulation principles for inverters, equivalent

rol), servo drives, shaded pole motor, p.m. excitation,

calculate performance parameters. ne type depending on the application and determine its basic

chinery. cessary propose the required adaptations. a handling and interpretation, information extraction and

heir limitations hreads, object oriented cation, choosing information channel and information content

task management ms work, especially on the ICT side ons for sensing and actuation in a newly encountered

on Langrange's technique.

or continuous and discrete systems. namic loads. natical models on system ABAQUS).

ain. ation and creativity, initiative and perseverance.

ectivity. ns, present and found them, both to colleagues as to

nt aspects in the execution of research (literature search,

EMingwALG6.2 Reconcile conflicting specifications and prior conditions in a highquality and innovative concept or process.

Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet ter	uggevonden in de studiefiche		
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 machine learning Represent simple motion systems with matrix groups and realize th Discriminate between different task organizations: layers, parallel th Understand basic communication techniques: setting up communic Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-t Understand how basic components of complex mechatronic system Propose, analyze, select and implement hard- and software solution 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 Understand the importance of standardization in materials selection Compare different materials in a multidisciplinary framework, often
E032322 Sensor Based Measurement Systems	project	assignment report	Programming of microcontrollers for data acquisition and programm Collaborate in a small group on a project to design and realize a pro-
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 Self-assessment with adequate and critical self-correction and obje Communicate adequately on the research, the results and problem laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different topical study, research and the reflection on the research, experiments, experimentations, designs, Find an appropriate methodology, in accordance with the applicable

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handling and interpretation, information extraction and

neir limitations hreads, object oriented cation, choosing information channel and information content

ask management ns work, especially on the ICT side ns for sensing and actuation in a newly encountered

n, materials selection and related economical aspects. n (juridical aspect).

having conflicting boundary conditions.

ning in Python to process measurement data. ractical sensor based measurement system.

ain. ation and creativity, initiative and perseverance. ectivity.

ns, present and found them, both to colleagues as to

nt aspects in the execution of research (literature search,

EMingwALG6.3 Synthesize incomplete, contradictory or redundant data into useful information.

Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teru	uggevonden in de studiefiche		
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 machine learning Represent simple motion systems with matrix groups and realize th Discriminate between different task organizations: layers, parallel th Understand basic communication techniques: setting up communic Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-ta Understand how basic components of complex mechatronic system Propose, analyze, select and implement hard- and software solution 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 domai Give proof of independency, motivation, dedication, drive to innoval Self-assessment with adequate and critical self-correction and obje Communicate adequately on the research, the results and problem laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process differen topical study, research and the reflection on the research, experiments, experimentations, designs, Find an appropriate methodology, in accordance with the applicable

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handling and interpretation, information extraction and

neir limitations hreads, object oriented cation, choosing information channel and information content

task management ns work, especially on the ICT side ons for sensing and actuation in a newly encountered

ain. ation and creativity, initiative and perseverance. ectivity.

ns, present and found them, both to colleagues as to

nt aspects in the execution of research (literature search,

<<	estimates.	in ready knowledge and unde	erstanding to evaluate the re	suits of complex calculations, or make approximate
Course		Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en	evaluatievormen voorafgegaan door ** werden niet teru	ggevonden in de studiefiche		
E036130 C	Controlled Electrical Drives	lecture seminar: coached exercises practicum	open book examination skills test	Understanding the differences and similarities between space vectors Gaining insight into the differences and similarities between space vectors starting, restraints with classical starting methods, power electronic starting methods, voltage load commutation in VSI and CSI, differences and similarities between controlled drives and ser commutator machines versus DC commutator machines, small versus large induction machine power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, s circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), hystereis motor, stepping motors and their characteristics
E037321 T	urbomachines	practicum seminar: coached exercises	written examination	Calculate the flow in a turbomachine using one-dimensional analysis
E019331 I	CT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data have machine learning Represent simple motion systems with matrix groups and realize their Discriminate between different task organizations: layers, parallel threat Understand basic communication techniques: setting up communication Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task Understand how basic components of complex mechatronic systems v Propose, analyze, select and implement hard- and software solutions f mechatronic system
E040670 N	lechanical Vibrations	seminar: coached exercises		Perform a modal analysis and formulate structural modifications for co Apply model structure preserving reduction techniques. Identify modal parameters from an experiment Design of vibration isolation and vibration absorption devices.
E043070 N	Aterials Selection in Mechanical Design	lecture	written examination with open questions	Obtain understanding into the complex interactions between design, m Know the principal properties of common construction materials.
E042730 F	racture Mechanics	lecture		Acknowledging the historical background that led to the current state or resulting possibilities and limitations related to failure prediction.
E056600 C	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 N	laster'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 Self-assessment with adequate and critical self-correction and objectiv Communicate adequately on the research, the results and problems, p laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different as topical study, research and the reflection on the research, experiments, experimentations, designs, sin

igns, simulations, results, conclusions,...). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Profession-specific competence

ctors and time phasors for sinusoidal and non-sinusoidal supply e vectors and (time) phasors, voltage and temperature limits for

tage and speed control, current and torque control, forced and

servo drives, small versus large commutator machines, AC

achines, small versus large synchronous machines, effects of

ply, schemes and modulation principles for inverters, equivalent

ntrol), servo drives, shaded pole motor, p.m. excitation,

a handling and interpretation, information extraction and

their limitations threads, object oriented ication, choosing information channel and information content

-task management ems work, especially on the ICT side ions for sensing and actuation in a newly encountered

for continuous and discrete systems.

gn, materials selection and related economical aspects.

ate of the art in fracture mechanics, with emphasis on the

ain. ation and creativity, initiative and perseverance.

jectivity.

ms, present and found them, both to colleagues as to

ent aspects in the execution of research (literature search,

EMingwALG6.5 Pay attention to entire life cycles of systems, machines, and processes.

Course Noot: leer- en evaluatievormen voorafgegaan door ** werden niet ter	Teaching methods uggevonden in de studiefiche	Evaluation methods	Course learning outcome
E036130 Controlled Electrical Drives	lecture		Understanding the differences and similarities between space vector Gaining insight into the differences and similarities between space vector starting, restraints with classical starting methods, power electronic starting methods, voltage load commutation in VSI and CSI, differences and similarities between controlled drives and commutator machines versus DC commutator machines, small versus large induction mach power electronic supply on the machine and vice-versa, stepping motors versus classical motor Understanding the principle of current supply versus voltage supply circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control hystereis motor, stepping motors and their characteristics
E019331 ICT and Mechatronics	guided self-study seminar project lecture		Understanding the reasoning and assumptions behind correct data machine learning Represent simple motion systems with matrix groups and realize the Discriminate between different task organizations: layers, parallel the Understand basic communication techniques: setting up communication Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-tat Understand how basic components of complex mechatronic system Propose, analyze, select and implement hard- and software solution 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 manufact Make a documented selection of the optimal combination of manufact Understand the interaction of material properties, process character
E042730 Fracture Mechanics	lecture	oral examination	Acknowledging the historical background that led to the current state resulting possibilities and limitations related to failure prediction.
E061322 Machine Design	lecture		Analysis of mechanical components and systems with respect to du Mastering the principles of advanced mechanical design and machi lubrication Selecting machine elements critical for lifetime, reliability and durability

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Profession-specific competence

ors and time phasors for sinusoidal and non-sinusoidal supply vectors and (time) phasors, voltage and temperature limits for

age and speed control, current and torque control, forced and

servo drives, small versus large commutator machines, AC

chines, small versus large synchronous machines, effects of

brs y, schemes and modulation principles for inverters, equivalent

rol), servo drives, shaded pole motor, p.m. excitation,

handling and interpretation, information extraction and

heir limitations hreads, object oriented

cation, choosing information channel and information content

ask management ns work, especially on the ICT side ons for sensing and actuation in a newly encountered

turing processes.

facturing processes for a specific application. Fristics and properties of the final product.

te of the art in fracture mechanics, with emphasis on the

urability and reliability. ine elements with focus on fatigue, friction, wear and

bility, taking into account the necessary boundary conditions.

EMingwALG6.6 Pay attention to sustainability, energyefficiency, environmental cost, use of raw materials and labour costs.

Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet te	ruggevonden in de studiefiche		
E036130 Controlled Electrical Drives	lecture seminar: coached exercises		Understanding the differences and similarities between space vectors Gaining insight into the differences and similarities between space vectors starting, restraints with classical starting methods, power electronic starting methods, voltage load commutation in VSI and CSI, differences and similarities between controlled drives and set commutator machines versus DC commutator machines, small versus large induction machin power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, s circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), 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 a according to the needs of the application. Choose a suitable pump, compressor or internal combustion engine ty 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 quaility issues related to r
E056600 Construction Techniques	guided self-study lecture	oral examination	Be aware of societal aspects (safety, economy, sustainability) specific

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ors and time phasors for sinusoidal and non-sinusoidal supply vectors and (time) phasors, voltage and temperature limits for

age and speed control, current and torque control, forced and

servo drives, small versus large commutator machines, AC

chines, small versus large synchronous machines, effects of

ly, schemes and modulation principles for inverters, equivalent

rol), servo drives, shaded pole motor, p.m. excitation,

on and explain why a specific engine design would be chosen

ne type depending on the application and determine its basic

to manufacturing processes

cific to joining techniques.

EMingwALG6.7 Pay attention to all aspects of reliability, safety, and ergonomics.

Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet ter	uggevonden in de studiefiche		
E036130 Controlled Electrical Drives	lecture		Understanding the differences and similarities between space vector Gaining insight into the differences and similarities between space starting, restraints with classical starting methods, power electronic starting methods, volta load commutation in VSI and CSI, differences and similarities between controlled drives and commutator machines versus DC commutator machines, small versus large induction mac power electronic supply on the machine and vice-versa, stepping motors versus classical motor Understanding the principle of current supply versus voltage suppl circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control 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 machine learning Represent simple motion systems with matrix groups and realize th Discriminate between different task organizations: layers, parallel th Understand basic communication techniques: setting up communic Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-t Understand how basic components of complex mechatronic system Propose, analyze, select and implement hard- and software solutio 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 / main independently defend an opinion regarding the failure behaviour of Formulate suggestions to improve material behaviour. Understand the importance of reliability and robustness in mechanical suggestions in the suggestions is suggestions in the suggestions in the suggestions is suggestions in the suggestions in the suggestions in the suggestions in the suggestions is suggestions in the suggestions in the suggestions is suggestions.
E042730 Fracture Mechanics	lecture	oral examination	Acknowledging the historical background that led to the current star 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) spec

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Profession-specific competence

ors and time phasors for sinusoidal and non-sinusoidal supply vectors and (time) phasors, voltage and temperature limits for

age and speed control, current and torque control, forced and

servo drives, small versus large commutator machines, AC

chines, small versus large synchronous machines, effects of

brs ly, schemes and modulation principles for inverters, equivalent

trol), servo drives, shaded pole motor, p.m. excitation,

handling and interpretation, information extraction and

neir limitations

hreads, object oriented cation, choosing information content

task management ns work, especially on the ICT side ons for sensing and actuation in a newly encountered

achine part. f a construction / machine part ("engineering failure analysis").

ical design. te of the art in fracture mechanics, with emphasis on the

cific to joining techniques.

Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggev	onden in de studiefiche		

Profession-specific competence

EMingwALG6.9 Show perseverance, innovativeness, and an aptitude for creating added value.

Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet ter	uggevonden in de studiefiche		
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 machine learning Represent simple motion systems with matrix groups and realize th Discriminate between different task organizations: layers, parallel th Understand basic communication techniques: setting up communica Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-ta Understand how basic components of complex mechatronic system Propose, analyze, select and implement hard- and software solution mechatronic system
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domai Give proof of independency, motivation, dedication, drive to innovat Self-assessment with adequate and critical self-correction and objec Communicate adequately on the research, the results and problems laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process differen topical study, research and the reflection on the research, experiments, experimentations, designs, Find an appropriate methodology, in accordance with the applicable

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handling and interpretation, information extraction and

neir limitations hreads, object oriented cation, choosing information channel and information content

task management ns work, especially on the ICT side ons for sensing and actuation in a newly encountered

in. tion and creativity, initiative and perseverance. ectivity.

is, present and found them, both to colleagues as to

nt aspects in the execution of research (literature search,

<<	EMingwELME6.1 Integrate technological innovations	e the advanced knowledge of mee	chanical and electrical syste	ms and ICT in order to design, implement and exploit
Course		Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en	evaluatievormen voorafgegaan door ** werd	den niet teruggevonden in de studiefiche		
E019331 I	CT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data machine learning Represent simple motion systems with matrix groups and realize th Discriminate between different task organizations: layers, parallel th Understand basic communication techniques: setting up communic Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-ta Understand how basic components of complex mechatronic system Propose, analyze, select and implement hard- and software solution mechatronic system
E091103 N	Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domat Give proof of independency, motivation, dedication, drive to innovat Self-assessment with adequate and critical self-correction and obje Communicate adequately on the research, the results and problem laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process differen topical study, research and the reflection on the research, experiments, experimentations, designs, Find an appropriate methodology, in accordance with the applicable

handling and interpretation, information extraction and

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task management ns work, especially on the ICT side ons for sensing and actuation in a newly encountered

ain. ation and creativity, initiative and perseverance. ectivity.

ns, present and found them, both to colleagues as to

nt aspects in the execution of research (literature search,

EMingwELME6.2 Be familiar with the energy efficiency of (electrical, mechanical and thermal) energy conversion systems and distribution

systems. Course Teaching methods Evaluation methods Course learning outcome Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche E036130 Controlled Electrical Drives Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply open book examination lecture seminar: coached exercises 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 Derive parameter choice and layout of fans, steam turbines, pumps, hydraulic turbines and wind turbines E037321 Turbomachines guided self-study oral examination lecture E037121 Displacement Pumps, Compressors and IC Explain trends in engine design, fuel choice and emission legislation and explain why a specific engine design would be chosen lecture Engine Fundamentals 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 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. assignment 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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Profession-specific competence