Competence coverage	matrix			G	eneral	Cours	es			С	ourses	Relate	ed to th	ne Mair	n Subje	ect		Maste r's Disser
																tems		tation
CUENT					and IC					"				and Drives		Electrical Power Systems		
GHENT UNIVERSITY					Compressors and IC			ontrol	sis	ystems			ations	es and		al Pow		
	ectromechanical Engineering		/es		ompre			and Co	Analy	ment S	: part 1		Install	Machines		Electric	r.	
Electrical Power Engine	eering		E036130 Controlled Electrical Drives			tronics	rations	Manufacturing Planning and Control	E035010 Electrical Power System Analysis	E032322 Sensor Based Measurement Systems	r Theory: part	S	E037820 Technology of Electrical Installations	of Electrical N	ergy	ects of E	E036611 Electrical Machine Design	tation
Academic year 2021-20	22		lled Elec	E037321 Turbomachines	Displacement Pumps, undamentals	E019331 ICT and Mechatronics	E040670 Mechanical Vibrations	acturing l	al Powe	Based I	E038020 Nuclear Reactor	E030520 Power Electronics	ology of F		E035421 Sustainable Energy	E035050 Operational Aspects of	al Mach	's Dissertation
71000011110			Control	Turbon	121 Displacement ne Fundamentals	ICT an	Mechai	Manufa	Electric	Sensor	Nuclea	Power	Techno	E036900 Dynamics	Sustair	Operati	Electric	E091103 Master's
Legend: T=teaching methods			36130	37321	E037121 Engine F	19331	040670	E076221	35010	32322	38020	30520	37820	36900	35421	35050	36611	91103
E=evaluation methods  Competences in		T 12	ш	Ш	Т	Т	Т	Т	Т	Ш	Т	Т	Т	Т	Ш	Т	Т	Т
one/more scientific discipline(s)	discipline in solving complex problems.  Apply Computer Aided Engineering (CAE) tools and advanced	E 12			E	E	E	Е	E		E	E	E	E		Е	E	E
	communication instruments in a creative and purposeful way.  Have a thorough insight in the interactions between different	E 4 T 10	Т		т	E T			E T			т	Т	E		Т	E	Т
	electromechanical parts and energy conversions of complex systems.	E 10	Ė		Ė	Ė			Ė			E	Ē	Ė		Ė	Ė	Ē
	Have a thorough knowledge of measurement techniques, sensors, actuators and ICT and the ability to apply the knowledge.	T 7 E 5			T E	T E	Т			T E		T E	Т					T E
		T 2						T				T						_
	Specifically for main subject 'Mechanical Energy Engineering': Have a thorough insight in mechanical and thermodynamical	E 1 T 3 E 3		T E	T E			Е										T E
	energy conversions, fluid dynamics, heat transfer and combustion and apply the knowledge to complex problems.	⊏ 3		_														_
	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 6 E 6	T E						T E					T E		T E	T E	T E
	Specifically for main subject 'Mechanical Construction': Have a	T 1																T
	thorough insight in the design, behaviour and manufacturing of constructions and machines and apply the knowledge to complex problems.	E 1																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 5 E 4	E			E						Т		E				E
	Specifically for main subject 'Maritime Engineering': Have a thorough insight in the design, construction, functioning and exploitation of maritime systems.	T 1 E 1																T E
Scientific competences	Analyse complex problems and translate them into concrete research questions.	T 5 E 5				T E	T E				T E	T E						T E
	Consult the scientific literature as part of the own research.	T 3 E 4				E								T E		T E		T E
	Select and apply the appropriate models, methods and techniques.	T 13 E 11	T E			T E	T E	T E	T E	T E	Т	T E	T E	T E		T	T E	T
	Develop and validate mathematical models and methods.	T 5 E 5				T E	T E	T E			T E	T E						
	Interpret research findings in an objective and critical manner.	T 3 E 4				E	_					T E				T E		T E
Intellectual competences	Independently form an opinion on complex situations and problems, and defend this point of view.	T 6 E 4	T E					Т			T E			T E		T		T
competences	Apply knowledge in a creative, purposeful and innovative way to research, conceptual design and production.	T 5 E 5				E	T E				T E			T E			Т	T E
		T 3				Т					T							Т
	Stay uptodate with the evolutions in the discipline to elevate the	E 2 T 5	Т			E T								Т		Т		E T
	own competences to expert level.  Readily adapt to changing professional circumstances.	E 3	E			Т				Т		Т		Е				E T
Competences in	Have the ability to communicate in English about the own field of	E 3 T 13	Т		Т	Т	Т		Т	E T	Т	E T	Т	Т		Т	Т	E
cooperation and communication	specialisation.  Project management: have the ability to formulate objectives,	E 13 T 8	E		E	E T	E		E	E	E	E T	E	E		E	E	E
		E 8			E	E			E	E		Ē		E			E	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 3 E 3				T E				T E		T E						
	· · · ·	T 11 E 12	T E		T E	E	T E		T E	T E	T E	T E		T E		T E	T E	T E
Societal competences	Act in an ethical, professional and social way.	Т3	Т		T						_	<u>-</u>						Т
	Recognize the most important business and legal aspects of the own engineering discipline.	E 2 T 2 E 1	E					Т								T E		E
	Understand the historical evolution of the own engineering discipline and its social relevance.	T 3 E 2				T					T E							T E
Profession-specific		T 11 E 11	T E		T	T E	T E	T E	T E		T E	T E	T E	T E				T
competence	Reconcile conflicting specifications and prior conditions in a high	T 6				Т				Ţ		Т		Т			Т	Т
	quality and innovative concept or process.  Synthesize incomplete, contradictory or redundant data into useful					E T				Е		E T		Е				T
	information.  Possess sufficient ready knowledge and understanding to evaluate	E 3 T 12	Т	Т		E T	Т		Т		Т	E T	Т	Т		Т	Т	E
	the results of complex calculations, or make approximate estimates.	E 10	E	E		E			E		E	E	E	E			E	E
	Pay attention to entire life cycles of systems, machines, and processes.	T 4 E 2	Т			Т						T E	T E					

																Systems		
<del></del> Ghent					and IC					8				and Drives		wer Sy:		
UNIVERSITY					ssors			ontrol	Sis	ystem			ations			al Po		
	Electromechanical Engineering		rives		Compressors			g and Control	m Analy	Measurement Systems	ry: part 1		Electrical Installations	Machines		f Electrical Power	Design	
Electrical Power Engi	neering		E036130 Controlled Electrical Drives	ines	ent Pumps, Is	E019331 ICT and Mechatronics	E040670 Mechanical Vibrations	E076221 Manufacturing Planning	E035010 Electrical Power System Analysis	sed Measur	Reactor Theory:	tronics		of Electrical	e Energy	E035050 Operational Aspects of	Machine Des	
Academic year 2021-2	022		Controlled	Turbomachines	1 Displacement F Fundamentals	ICT and Me	Mechanica	Manufactuı	Electrical P	E032322 Sensor Based	Nuclear Re	E030520 Power Electronics	E037820 Technology of	E036900 Dynamics	E035421 Sustainable Energy	Operationa	E036611 Electrical N	
Legend: T=teaching methods E=evaluation methods			E036130	E037321	E037121 Engine Fu	E019331	E040670	E076221	E035010	E032322	E038020 Nuclear	E030520	E037820	E036900	E035421	E035050	E036611	
Profession-specific competence	Pay attention to sustainability, energyefficiency, environmental cost, use of raw materials and labour costs.	T 6 E 3	Т		Т							T E	T E	T E			Т	
	Pay attention to all aspects of reliability, safety, and ergonomics.	T 5 E 3	Т			T E						T E	Т	T E				Ī
	Have insight into and understanding of the importance of entrepreneurship.	T 2 E 1										T E	Т					Ī
	Show perseverance, innovativeness, and an aptitude for creating added value.	T 3 E 3				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 5 E 4				T E						T E		T E			Т	
	Be familiar with the energy efficiency of (electrical, mechanical and thermal) energy conversion systems and distribution systems.	T 10 E 9	T E	T E	Т				T E			T E	T E	T E		T E	T E	T
			W 15	W 3	W 11	W 22	W 10	W 7	W 11	W 8	W 12	W 25	W 12	W 20	l k	N 13	W 14	W

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

Competences in one/more scientific discipline(s)

Course	Teaching methods	Evaluation methods	Course learning outcome	
loot: leer- en evaluatievormen voorafgegaan door ** werden nie	_	Lvaluation methods	Course learning outcome	
E037121 Displacement Pumps, Compressors and Engine Fundamentals	C lecture seminar practicum	report	dimensions.  Analyse and interpret measurements on positive displace	stion engine type depending on the application and determine its basic sement machinery. on legislation and explain why a specific engine design would be chosen
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind of machine learning Represent simple motion systems with matrix groups an Discriminate between different task organizations: layers Understand basic communication techniques: setting up Design and implement computer-based motion control s Name relevant techniques and recognize the dangers fo Understand how basic components of complex mechatrons.	correct data handling and interpretation, information extraction and ad realize their limitations is, parallel threads, object oriented incommunication, choosing information channel and information content strategies in multiple-task management
E040670 Mechanical Vibrations	guided self-study seminar: coached exercises lecture	oral examination	Modelling of rotating and non-rotating mechanical syste Apply model structure preserving reduction techniques. Identify modal parameters from an experiment Design of vibration isolation and vibration absorption deverform a modal analysis and formulate structural modical culate vibration levels of mechanical structures subjections.	vices. ifications 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 pla level assess the usefulness of the different methods and tools	anning production and inventory at strategic, tactical and operational s for shop floor control in varying situations
E035010 Electrical Power System Analysis	guided self-study online seminar: coached exercises online project online lecture lecture: plenary exercises project practicum lecture	written examination report participation oral examination	Decompose three-phase quantities by means of symmer Analyse transmission lines under transient and sinusoida Analyse transient stability.  Understand the function and principle of regulating trans Determine line parameters of transmission lines.  Compute short circuit currents.	al conditions.

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E038020 Nuclear Reactor Theory: part 1	excursion seminar: coached exercises lecture: plenary exercises lecture	written examination open book examination	The student should fully understand and be capable of defining the following TERMINOLOGY: PWR, enrichment grade, fission neutrons, energy production, burnup, fission products, Bethe-Weiszaecker formula. compound nucleus, neutron cross section, multiplication factor, Doppler effect, production factor, fast fission factor, resonance escape probability, thermal utilisation factor, neutron leakage, thermal neutrons, thermal/ epithermal/ fast energy region, homogeneous/ heterogenous core, self shielding (energetic and spatial), reactor period, average generation time, Inhour equation, antireactivity, Xe, Sm poisoning.  The student should be capable of solving exercises, of which examples are given during the course, such as e.g. calculating the necessary anti-reactivity (e.g. boron concentration) when making a reactor critical (e.g. compensation of the invested reactivity for the core life time at start-up).  The student should have achieved the knowledge to differentiate the most important (6) nuclear reactor types and to address/comment in a balanced way the safe operation of a reactor.  The student is expected to explain the physics (with mathematical formulae) of the fission phenomenon, the different types of neutron interactions, the neutron flux distribution, the operation of a reactor core with evolution of its fuel composition and being capable to reproduce all theoretical derivations (as shown on the blackboard).  The student should fully understand the operation of the core of a pressurised water reactor from neutron kinetic point of view. The student should have obtained full understanding of the coupled neutron- and thermo-dynamic response during its operation under a neutron flux.
E030520 Power Electronics	guided self-study seminar practicum lecture	written examination with open questions report simulation	INSIGHTS: Understanding voltage and current waveforms CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite SKILLS:electronic and thermal aspects
E037820 Technology of Electrical Installations	lecture seminar: coached exercises	written examination	To select appropriate battery technology for a given application.  To dimension a simple industrial electrical installation in a correct way, according to the AREI.
E036900 Dynamics of Electrical Machines and Drives	lecture seminar: practical PC room classes seminar: coached exercises project	written examination report open book examination	Calculation of transient phenomena in electrical circuits; calculation of transients via modelling of of DC machines; modelling of induction machines; modelling of synchronous machines.  Understanding the dynamic behaviour of DC machines, induction and synchronous machines.  Understanding the concepts of local stability, static and dynamic stability, input-output stability, field orientation and vector control, transient and subtransient dynamics of machines; pulsating loading of machines; voltage surges in machines.
E035050 Operational Aspects of Electrical Power Systems	s guided self-study online project online lecture project lecture demonstration	oral examination report skills test participation	Analyse optimal power flow. Understand the control of frequency, power and voltage. Understand electric power markets. Understand the function and principles of FACTS devices. Know the origin and solutions of power quality issues.
E036611 Electrical Machine Design	lecture online seminar online lecture seminar: coached exercises lecture: plenary exercises self-reliant study activities project	written examination report oral examination	Understand skin and proximity effects. Analyse parasitic effects (vibrations, noise, torques). Know the design and materials of the most common electrical machines. Use numerical methods for magnetic field computations in electrical machines. Analyse the windings of AC machines.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain.  Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.  Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,).  Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden nie	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 handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E035010 Electrical Power System Analysis	guided self-study online seminar: coached exercises online project online lecture lecture: plenary exercises project practicum lecture	written examination report participation oral examination	Decompose three-phase quantities by means of symmetrical components and the Clarke and Park transform.  Analyse transmission lines under transient and sinusoidal conditions.  Analyse transient stability.  Understand the function and principle of regulating transformers.  Determine line parameters of transmission lines.  Compute short circuit currents.
E036900 Dynamics of Electrical Machines and Driv	es lecture seminar: practical PC room classes seminar: coached exercises project	written examination report open book examination	Calculation of transient phenomena in electrical circuits; calculation of transients via modelling of of DC machines; modelling of induction machines; modelling of synchronous machines.  Understanding the dynamic behaviour of DC machines, induction and synchronous machines.  Understanding the concepts of local stability, static and dynamic stability, input-output stability, field orientation and vector control, transient and subtransient dynamics of machines; pulsating loading of machines; voltage surges in machines.
E036611 Electrical Machine Design	lecture online seminar online lecture seminar: coached exercises lecture: plenary exercises self-reliant study activities	written examination report oral examination	Understand skin and proximity effects. Analyse parasitic effects (vibrations, noise, torques). Know the design and materials of the most common electrical machines. Use numerical methods for magnetic field computations in electrical machines. Analyse the windings of AC machines.

project

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

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Course	Teaching methods	Evaluation methods	Course learning outcome
oot: leer- en evaluatievormen voorafgegaan door ** werden niet terugge	evonden in de studiefiche		
E036130 Controlled Electrical Drives	lecture	open book examination	Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal suppl 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, equivaled circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hystereis motor, stepping motors and their characteristics
E037121 Displacement Pumps, Compressors and IC	practicum	report	Analyse and interpret measurements on positive displacement machinery.
Engine Fundamentals			
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E035010 Electrical Power System Analysis	guided self-study online seminar: coached exercises online project online lecture lecture: plenary exercises project practicum lecture	written examination report participation oral examination	Decompose three-phase quantities by means of symmetrical components and the Clarke and Park transform.  Analyse transmission lines under transient and sinusoidal conditions.  Analyse transient stability.  Understand the function and principle of regulating transformers.  Determine line parameters of transmission lines.  Compute short circuit currents.
E030520 Power Electronics	lecture seminar practicum	written examination with open questions report simulation	INSIGHTS: Understanding voltage and current waveforms CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite SKILLS:electronic and thermal aspects
E037820 Technology of Electrical Installations	lecture seminar: coached exercises	written examination	To select appropriate battery technology for a given application.  To dimension a simple industrial electrical installation in a correct way, according to the AREI.
E036900 Dynamics of Electrical Machines and Drives	lecture	written examination report open book examination	Calculation of transient phenomena in electrical circuits; calculation of transients via modelling of of DC machines; modelling of induction machines; modelling of synchronous machines.  Understanding the dynamic behaviour of DC machines, induction and synchronous machines.  Understanding the concepts of local stability, static and dynamic stability, input-output stability, field orientation and vector control, transient and subtransient dynamics of machines; pulsating loading of machines; voltage surges in machines.
E035050 Operational Aspects of Electrical Power Systems	s guided self-study online project online lecture project lecture demonstration	oral examination report skills test participation	Analyse optimal power flow. Understand the control of frequency, power and voltage. Understand electric power markets. Understand the function and principles of FACTS devices. Know the origin and solutions of power quality issues.
E036611 Electrical Machine Design	lecture online seminar online lecture seminar: coached exercises lecture: plenary exercises self-reliant study activities project	written examination report oral examination	Understand skin and proximity effects. Analyse parasitic effects (vibrations, noise, torques). Know the design and materials of the most common electrical machines. Use numerical methods for magnetic field computations in electrical machines. Analyse the windings of AC machines.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain.  Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.  Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,).  Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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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 machinery.
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E040670 Mechanical Vibrations	seminar: coached exercises		Identify modal parameters from an experiment
E032322 Sensor Based Measurement Systems	lecture project	oral examination report assignment	Programming of microcontrollers for data acquisition and programming in Python to process measurement data.  Understand and describe the operation of sensors and signal conditioners  Dealing with inaccurate measurement data in a judicious way; eliminate or take into account interferences and digitizing artifacts
E030520 Power Electronics	guided self-study seminar practicum lecture	written examination with open questions report simulation	INSIGHTS: Understanding voltage and current waveforms CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite SKILLS:electronic and thermal aspects
E037820 Technology of Electrical Installations	lecture seminar: coached exercises		To select appropriate battery technology for a given application.  To dimension a simple industrial electrical installation in a correct way, according to the AREI.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain.  Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.  Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,).  Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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

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Competences in one/more scientific discipline(s)

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 for a company assess the usefulness of the different methods and tools for shop floor control in varying situations distinguish and correctly apply methods and tools for planning production and inventory at strategic, tactical and operational level quantify the impact of variability on the performance of a production system analyse and control complex production systems by using mathematical models
E030520 Power Electronics	guided self-study seminar practicum lecture		INSIGHTS: Understanding voltage and current waveforms CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite SKILLS:electronic and thermal aspects

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EMingwELME1.4 Specifically for main subject 'Mechanical Energy Engineering': Have a thorough insight in mechanical and thermodynamical	Competend
anagen, annuagaine fluid dynamiae haet transfer and annhuation and annlu the knaudades to annuay nychlama	

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Competences in one/more scientific discipline(s)

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, hydraulic turbines and wind turbines  Derive basic functioning of turbomachines and the flow in their components
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	lecture seminar practicum	report	Execute thermodynamic analyses of displacement machines and calculate performance parameters.  Choose a suitable pump, compressor or internal combustion engine type depending on the application and determine its basic dimensions.  Analyse and interpret measurements on positive displacement machinery.  Explain trends in engine design, fuel choice and emission legislation and explain why a specific engine design would be chosen according to the needs of the application.  Calculate the margin to cavitation for a pump installation and if necessary propose the required adaptations.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain.  Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.  Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,).  Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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Competences in one/more scientific discipline(s)

conversion and use of electrical po	Teaching methods	Evaluation methods	Course learning outcome
loot: leer- en evaluatievormen voorafgegaan door ** werden niet terugge	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-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on the machine and vice-versa, stepping motors versus classical motors  Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivalent circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hystereis motor, stepping motors and their characteristics
E035010 Electrical Power System Analysis	guided self-study online seminar: coached exercises online project online lecture lecture: plenary exercises project practicum lecture	written examination report participation oral examination	Decompose three-phase quantities by means of symmetrical components and the Clarke and Park transform.  Analyse transmission lines under transient and sinusoidal conditions.  Analyse transient stability.  Understand the function and principle of regulating transformers.  Determine line parameters of transmission lines.  Compute short circuit currents.
E036900 Dynamics of Electrical Machines and Drives	lecture seminar: practical PC room classes seminar: coached exercises project	written examination report open book examination	Calculation of transient phenomena in electrical circuits; calculation of transients via modelling of of DC machines; modelling of induction machines; modelling of synchronous machines.  Understanding the dynamic behaviour of DC machines, induction and synchronous machines.  Understanding the concepts of local stability, static and dynamic stability, input-output stability, field orientation and vector control, transient and subtransient dynamics of machines; pulsating loading of machines; voltage surges in machines.
E035050 Operational Aspects of Electrical Power Systems	s guided self-study online project online lecture project lecture demonstration	oral examination report skills test participation	Analyse optimal power flow. Understand the control of frequency, power and voltage. Understand electric power markets. Understand the function and principles of FACTS devices. Know the origin and solutions of power quality issues.
E036611 Electrical Machine Design	lecture online seminar online lecture seminar: coached exercises lecture: plenary exercises self-reliant study activities project	written examination report oral examination	Understand skin and proximity effects. Analyse parasitic effects (vibrations, noise, torques). Know the design and materials of the most common electrical machines. Use numerical methods for magnetic field computations in electrical machines. Analyse the windings of AC machines.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain.  Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.  Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,).  Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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of constr	tions and machines and apply the knowledge	to complex problems.	ough insight in the design, behaviour and manufacturing Competences in one/more scientific discipline
Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen	rafgegaan door ** werden niet teruggevonden in de studiefiche		
E091103 Master's Disse	ion master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain.  Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.  Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,).  Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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EMingwELME1.7 Specifically for main subject 'Control Engineering and Automation': Have a thorough insight in the design and behaviour of	Competences in one/more scientific discipline(s)
and all lands and a facultion. I manufact and a model to a local blood and a model and	

control loops and of system dyna			
Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terug	gevonden in de studietiche		
E036130 Controlled Electrical Drives	lecture seminar: coached exercises	open book examination	Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on the machine and vice-versa, stepping motors versus classical motors  Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivalent circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hystereis motor, stepping motors and their characteristics
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E030520 Power Electronics	guided self-study seminar practicum lecture		INSIGHTS: Understanding voltage and current waveforms CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite SKILLS:electronic and thermal aspects
E036900 Dynamics of Electrical Machines and Drives	lecture seminar: practical PC room classes seminar: coached exercises project	written examination report open book examination	Calculation of transient phenomena in electrical circuits; calculation of transients via modelling of of DC machines; modelling of induction machines; modelling of synchronous machines.  Understanding the dynamic behaviour of DC machines, induction and synchronous machines.  Understanding the concepts of local stability, static and dynamic stability, input-output stability, field orientation and vector control, transient and subtransient dynamics of machines; pulsating loading of machines; voltage surges in machines.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain.  Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.  Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,).  Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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#### EMingwELME1.8 Specifically for main subject 'Maritime Engineering': Have a thorough insight in the design, construction, functioning and Competences in one/more scientific discipline(s) << exploitation of maritime systems. Course learning outcome Course Teaching methods **Evaluation methods** Noot: leer- en evaluatievormen voorafgegaan door \*\* werden niet teruggevonden in de studiefiche 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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<<	EMingwALG2.1 Analyse complex problems and translate them into concrete research questions.				Scientific competences
Course		Teaching methods	Evaluation methods	Course learning outcome	
loot: leer- en	n evaluatievormen voorafgegaan door ** werden i	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 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 encouncied.	rmation content
E040670 N	Mechanical Vibrations	guided self-study seminar: coached exercises lecture	oral examination	Modelling of rotating and non-rotating mechanical systems based on Langrange's technique.  Apply model structure preserving reduction techniques. Identify modal parameters from an experiment Design of vibration isolation and vibration absorption devices.  Perform a modal analysis and formulate structural modifications for continuous and discrete systems.  Calculate vibration levels of mechanical structures subjected to dynamic loads.	
	Nuclear Reactor Theory: part 1	excursion seminar: coached exercises lecture: plenary exercises lecture	written examination open book examination	The student should fully understand and be capable of defining the following TERMINOLOGY: PWR, enrichmen neutrons, energy production, burnup, fission products, Bethe-Weiszaecker formula. compound nucleus, neutron cross section, must factor, Doppler effect, production factor, fast fission factor, resonance escape probability, thermal utilisation factor, neutron leakage, the thermal/ epithermal/ fast energy region, homogeneous/ heterogenous core, self shielding (energetic and spatial), reactor period, average Inhour equation, antireactivity, Xe, Sm poisoning.  The student should be capable of solving exercises, of which examples are given during the course, such as e.g. necessary anti-reactivity (e.g. boron concentration) when making a reactor critical (e.g. compensation of the invested reactivity for the constart-up).  The student should have achieved the knowledge to differentiate the most important (6) nuclear reactor types are address/comment in a balanced way the safe operation of a reactor.  The student is expected to explain the physics (with mathematical formulae) of the fission phenomenon, the differentian expectations, the neutron interactions, the neutron flux distribution, the operation of a reactor core with evolution of its fuel composition and being capable to the toretical derivations (as shown on the blackboard).  The student should fully understand the operation of the core of a pressurised water reactor from neutron kinetic The student should have obtained full understanding of the coupled neutron- and thermo-dynamic response during its operation under a restance of the coupled neutron- and thermo-dynamic response during its operation under a restance of the coupled neutron- and thermo-dynamic response during its operation under a restance of the coupled neutron- and thermo-dynamic response during its operation under a restance of the coupled neutron- and thermo-dynamic response during its operation under a restance of the coupled neutron- and thermo-dynamic response during its operation under	ultiplication ermal neutrons, generation time g. calculating the re life time at and to erent types of to reproduce all c point of view.
	Power Electronics	guided self-study seminar practicum lecture	written examination with open questions report simulation	INSIGHTS: Understanding voltage and current waveforms CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite SKILLS:electronic and thermal aspects	iodiion naxi
E091103 M	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 colleague laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literat 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	s as to ure search,

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<< E	EMingwALG2.2 Consult the scientific literature as part of the own research.
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EMingwALG2.2 Consult the scientification.	fic literature as part of t	he own research.	Scientific competence
Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terugge	vonden in de studiefiche		
E019331 ICT and Mechatronics	Only evaluation	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E036900 Dynamics of Electrical Machines and Drives	lecture	open book examination	Calculation of transient phenomena in electrical circuits; calculation of transients via modelling of of DC machines; modelling of induction machines; modelling of synchronous machines.  Understanding the dynamic behaviour of DC machines, induction and synchronous machines.  Understanding the concepts of local stability, static and dynamic stability, input-output stability, field orientation and vector control, transient and subtransient dynamics of machines; pulsating loading of machines; voltage surges in machines.
E035050 Operational Aspects of Electrical Power Systems	guided self-study online project online lecture project lecture demonstration	oral examination report skills test participation	Analyse optimal power flow. Understand the control of frequency, power and voltage. Understand electric power markets. Understand the function and principles of FACTS devices. Know the origin and solutions of power quality issues.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain.  Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.  Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,).  Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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<b>&lt;&lt;</b>	EMingwALG2.3 Select and apply the appropriate models, methods and techniques.	Scientific competences

Ewingwaldz.3 Select and apply th		us and techniques.	Scientific competence
Course Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terugge	Teaching methods	Evaluation methods	Course learning outcome
	evonden in de studienche		
E036130 Controlled Electrical Drives	lecture seminar: coached exercises practicum	open book examination	Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supp 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, equivale circuits for inverters, V/F
			supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hystereis motor, stepping motors and their characteristics
E019331 ICT and Mechatronics	guided self-study	written examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and
	seminar project lecture	report skills test oral examination	machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented
			Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies  Name relevant techniques and recognize the dangers for multiple-task management
			Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered
E040670 Mechanical Vibrations	guided self-study	oral examination	mechatronic system  Modelling of rotating and non-rotating mechanical systems based on Langrange's technique.
	seminar: coached exercises lecture		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	written examination	Calculate vibration levels of mechanical structures subjected to dynamic loads.  distinguish and correctly apply methods and tools for planning production and inventory at strategic, tactical and operational
E070221 Manufacturing Flamming and Control	seminar: coached exercises	writterrexamination	level
E035010 Electrical Power System Analysis	practicum guided self-study	written examination	assess the usefulness of the different methods and tools for shop floor control in varying situations  Decompose three-phase quantities by means of symmetrical components and the Clarke and Park transform.
	online seminar: coached exercises online project	report participation	Analyse transmission lines under transient and sinusoidal conditions.  Analyse transient stability.
	online lecture lecture: plenary exercises	oral examination	Understand the function and principle of regulating transformers.  Determine line parameters of transmission lines.
	project practicum		Compute short circuit currents.
E032322 Sensor Based Measurement Systems	lecture project	assignment	Dealing with inaccurate measurement data in a judicious way; eliminate or take into account interferences and digitizing artifact
E038020 Nuclear Reactor Theory: part 1	excursion	report	The student should fully understand and be capable of defining the following TERMINOLOGY: PWR, enrichment grade, fission
	seminar: coached exercises lecture: plenary exercises		neutrons, energy production, burnup, fission products, Bethe-Weiszaecker formula. compound nucleus, neutron cross section, multiplication
	lecture		factor, Doppler effect, production factor, fast fission factor, resonance escape probability, thermal utilisation factor, neutron leakage, thermal neutrons,
			thermal/ epithermal/ fast energy region, homogeneous/ heterogenous core, self shielding (energetic and spatial), reactor period, average generation time Inhour equation,
			antireactivity, Xe, Sm poisoning.  The student should be capable of solving exercises, of which examples are given during the course, such as e.g. calculating the
			necessary anti-reactivity (e.g. boron concentration) when making a reactor critical (e.g. compensation of the invested reactivity for the core life time at
			start-up). The student should have achieved the knowledge to differentiate the most important (6) nuclear reactor types and to
			address/comment in a balanced way the safe operation of a reactor.
			The student is expected to explain the physics (with mathematical formulae) of the fission phenomenon, the different types of neutron interactions, the
			neutron flux distribution, the operation of a reactor core with evolution of its fuel composition and being capable to reproduce all theoretical derivations (as
			shown on the blackboard).  The student should fully understand the operation of the core of a pressurised water reactor from neutron kinetic point of view.
			The student should have
E030520 Power Electronics	guided self-study	written examination with open	obtained full understanding of the coupled neutron- and thermo-dynamic response during its operation under a neutron flux.  INSIGHTS: Understanding voltage and current waveforms
	seminar practicum	questions report	CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite SKILLS:electronic and thermal aspects
E037820 Technology of Electrical Installations	lecture lecture	simulation written examination	To select appropriate battery technology for a given application.
E036900 Dynamics of Electrical Machines and Drives	seminar: coached exercises	written examination	To dimension a simple industrial electrical installation in a correct way, according to the AREI.  Calculation of transient phenomena in electrical circuits; calculation of transients via modelling of DC machines; modelling of
E030900 Dynamics of Electrical Machines and Drives	seminar: practical PC room classes seminar: coached exercises		induction machines; modelling of synchronous machines.
	project	•	Understanding the dynamic behaviour of DC machines, induction and synchronous machines.  Understanding the concepts of local stability, static and dynamic stability, input-output stability, field orientation and vector control, transient and
FOREOED Operational Aspects of Floatrical Power Systems	s guided self-study		subtransient dynamics of machines; pulsating loading of machines; voltage surges in machines.  Analyse optimal power flow.
EU JOUGU UNE MINIOUS ACNOME NI EIGMINIMI EMMER COMMINI	,		Understand the control of frequency, power and voltage.
E035050 Operational Aspects of Electrical Power Systems	online project		
E035050 Operational Aspects of Electrical Power Systems	online project online lecture project		Understand the control of frequency, power and voltage.  Understand electric power markets.  Understand the function and principles of FACTS devices.

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E036611 Electrical Machine Design	lecture online seminar online lecture seminar: coached exercises lecture: plenary exercises self-reliant study activities project	written examination report oral examination	Understand skin and proximity effects.  Analyse parasitic effects (vibrations, noise, torques).  Know the design and materials of the most common electrical machines.  Use numerical methods for magnetic field computations in electrical machines.  Analyse the windings of AC machines.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain.  Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.  Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,).  Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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#### EMingwALG2.4 Develop and validate mathematical models and methods.

Scientific competences

EMingwALG2.4 Develop and value.	alidate mathematical models an	d methods.	Scientific competences
Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden 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 extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E040670 Mechanical Vibrations	guided self-study seminar: coached exercises lecture	oral examination	Modelling of rotating and non-rotating mechanical systems based on Langrange's technique.  Apply model structure preserving reduction techniques. Identify modal parameters from an experiment Design of vibration isolation and vibration absorption devices. Perform a modal analysis and formulate structural modifications for continuous and discrete systems. Calculate vibration levels of mechanical structures subjected to dynamic loads.
E076221 Manufacturing Planning and Control	lecture seminar: coached exercises	written examination	analyse and control complex production systems by using mathematical models quantify the impact of variability on the performance of a production system
E038020 Nuclear Reactor Theory: part 1	excursion seminar: coached exercises lecture: plenary exercises lecture	written examination open book examination	The student should fully understand and be capable of defining the following TERMINOLOGY: PWR, enrichment grade, fission neutrons, energy production, burnup, fission products, Bethe-Weiszaecker formula. compound nucleus, neutron cross section, multiplication factor, Doppler effect, production factor, fast fission factor, resonance escape probability, thermal utilisation factor, neutron leakage, thermal neutrons, thermal/ epithermal/ fast energy region, homogeneous/ heterogenous core, self shielding (energetic and spatial), reactor period, average generation time Inhour equation, antireactivity, Xe, Sm poisoning.  The student should be capable of solving exercises, of which examples are given during the course, such as e.g. calculating the necessary anti-reactivity (e.g. boron concentration) when making a reactor critical (e.g. compensation of the invested reactivity for the core life time at start-up).  The student should have achieved the knowledge to differentiate the most important (6) nuclear reactor types and to address/comment in a balanced way the safe operation of a reactor.  The student is expected to explain the physics (with mathematical formulae) of the fission phenomenon, the different types of neutron interactions, the neutron flux distribution, the operation of a reactor core with evolution of its fuel composition and being capable to reproduce all theoretical derivations (as shown on the blackboard).  The student should fully understand the operation of the core of a pressurised water reactor from neutron kinetic point of view. The student should have obtained full understanding of the coupled neutron- and thermo-dynamic response during its operation under a neutron flux.
E030520 Power Electronics	guided self-study seminar practicum lecture	written examination with open questions report simulation	INSIGHTS: Understanding voltage and current waveforms CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite SKILLS:electronic and thermal aspects

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

Scientific competences

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 handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E030520 Power Electronics	guided self-study seminar practicum lecture	written examination with open questions report simulation	INSIGHTS: Understanding voltage and current waveforms CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite SKILLS:electronic and thermal aspects
E035050 Operational Aspects of Electrical Power System	os guided self-study online project online lecture project lecture demonstration	oral examination report skills test participation	Analyse optimal power flow. Understand the control of frequency, power and voltage. Understand electric power markets. Understand the function and principles of FACTS devices. Know the origin and solutions of power quality issues.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain.  Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.  Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,).  Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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Course	Topology water als	Eveluation water to	Course learning autoeme	
Course	Teaching methods	Evaluation methods	Course learning outcome	
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terug	ggevonden in de studietiche			
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-sinuso Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperatu starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, folioad commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator mach commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, 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, 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	orced and nines, AC effects of , equivalent
E076221 Manufacturing Planning and Control	lecture		assess the usefulness of the different methods and tools for shop floor control in varying situations	
E038020 Nuclear Reactor Theory: part 1	excursion seminar: coached exercises lecture: plenary exercises	written examination open book examination	The student should fully understand and be capable of defining the following TERMINOLOGY: PWR, enrichment grad neutrons, energy production, burnup, fission products, Bethe-Weiszaecker formula. compound nucleus, neutron cross section, multiplication.	
	lecture		factor, Doppler effect, production factor, fast fission factor, resonance escape probability, thermal utilisation factor, neutron leakage, thermal thermal/ epithermal/ fast	
			energy region, homogeneous/ heterogenous core, self shielding (energetic and spatial), reactor period, average general Inhour equation, antireactivity, Xe, Sm poisoning.	
			The student should be capable of solving exercises, of which examples are given during the course, such as e.g. calc necessary anti-reactivity  (e.g. boron concentration) when making a reactor critical (e.g. compensation of the invested reactivity for the core life	· ·
			start-up). The student should have achieved the knowledge to differentiate the most important (6) nuclear reactor types and to address/comment in a balanced way	
			the safe operation of a reactor.  The student is expected to explain the physics (with mathematical formulae) of the fission phenomenon, the different t neutron interactions, the	
			neutron flux distribution, the operation of a reactor core with evolution of its fuel composition and being capable to reputheoretical derivations (as shown on the blackboard).	roduce all
			The student should fully understand the operation of the core of a pressurised water reactor from neutron kinetic point The student should have	
E036900 Dynamics of Electrical Machines and Drives	project	report	obtained full understanding of the coupled neutron- and thermo-dynamic response during its operation under a neutro Calculation of transient phenomena in electrical circuits; calculation of transients via modelling of of DC machines; mo induction machines;	
			modelling of synchronous machines.  Understanding the dynamic behaviour of DC machines, induction and synchronous machines.  Understanding the concepts of local stability, static and dynamic stability, input-output stability, field orientation and ve	ector
			control, transient and subtransient dynamics of machines; pulsating loading of machines; voltage surges in machines.	
E035050 Operational Aspects of Electrical Power System	•		Analyse optimal power flow.	
	online project online lecture		Understand the control of frequency, power and voltage. Understand electric power markets.	
	project		Understand the function and principles of FACTS devices.	
	lecture demonstration		Know the origin and solutions of power quality issues.	
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain.  Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.  Self-assessment with adequate and critical self-correction and objectivity.	
			Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.	O .
			Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature se topical study, research and the	earch,
			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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tellectual comp	petences
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<<	Emiligazeos.z Apply kilowiedge i	a orcanive, purposerur anu n	movanivo way to rescarcii	, conceptual design and production.	Intellectual competence
Course		Teaching methods	Evaluation methods	Course learning outcome	
Noot: leer- en	evaluatievormen voorafgegaan door ** werden niet terugg	gevonden in de studiefiche			
E019331 I	CT and Mechatronics	Only evaluation	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpreta 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 informat 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 Propose, analyze, select and implement hard- and software solutions for sensing and actual mechatronic system	ation channel and information content
E040670 N	Mechanical Vibrations	seminar: coached exercises	oral examination	Perform a modal analysis and formulate structural modifications for continuous and discret Apply model structure preserving reduction techniques.  Design of vibration isolation and vibration absorption devices.	te systems.
E038020 N	Nuclear Reactor Theory: part 1	excursion seminar: coached exercises lecture: plenary exercises lecture	written examination open book examination	The student should fully understand and be capable of defining the following TERMINOLOG neutrons, energy production, burnup, fission products, Bethe-Weiszaecker formula. compound nucleus, neutrons, Doppler effect, production factor, fast fission factor, resonance escape probability, thermal utilisation factor thermal/ epithermal/ fast energy region, homogeneous/ heterogenous core, self shielding (energetic and spatial), real inhour equation, antireactivity, Xe, Sm poisoning.  The student should be capable of solving exercises, of which examples are given during the necessary anti-reactivity (e.g. boron concentration) when making a reactor critical (e.g. compensation of the investestart-up).  The student should have achieved the knowledge to differentiate the most important (6) nuaddress/comment in a balanced way the safe operation of a reactor.  The student is expected to explain the physics (with mathematical formulae) of the fission pneutron interactions, the neutron flux distribution, the operation of a reactor core with evolution of its fuel composition theoretical derivations (as shown on the blackboard).  The student should fully understand the operation of the core of a pressurised water reactor the student should have obtained full understanding of the coupled neutron- and thermo-dynamic response during in	tron cross section, multiplication or, neutron leakage, thermal neutrons, actor period, average generation time the course, such as e.g. calculating the ed reactivity for the core life time at aclear reactor types and to the phenomenon, the different types of on and being capable to reproduce all for from neutron kinetic point of view.
	Dynamics of Electrical Machines and Drives	lecture seminar: practical PC room classes seminar: coached exercises project	written examination report open book examination	Calculation of transient phenomena in electrical circuits; calculation of transients via model induction machines; modelling of synchronous machines.  Understanding the dynamic behaviour of DC machines, induction and synchronous machin Understanding the concepts of local stability, static and dynamic stability, input-output stabic control, transient and subtransient dynamics of machines; pulsating loading of machines; voltage surges in machines	lling of of DC machines; modelling of nes. bility, field orientation and vector
	Electrical Machine Design	lecture online seminar online lecture seminar: coached exercises lecture: plenary exercises self-reliant study activities project		Understand skin and proximity effects. Analyse parasitic effects (vibrations, noise, torques). Know the design and materials of the most common electrical machines. Use numerical methods for magnetic field computations in electrical machines. Analyse the windings of AC machines.	
E091103 M	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, initial Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present and found the laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, consider the proportion of the research, experiments, experimentations, designs, simulations, results, consider the proportion of the research, experiments, experimentations, designs, simulations, results, consider the proportion of the research, experiments, experimentations, designs, simulations, results, consider the proportion of the research, experiments, experimentations, designs, simulations, results, consider the proportion of the research, experiments, experimentations, designs, simulations, results, consider the proportion of the research, experiments, experimentations, designs, simulations, results, consider the proportion of the research and the research	em, both to colleagues as to ion of research (literature search, onclusions,).

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ntellectual competences	
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•	flect on one's own way of thinking	<u> </u>	•	Intellectual competence
Course	Teaching methods	Evaluation methods	Course learning outcome	
Noot: leer- en evaluatievormen voorafgegaan door ** werden	n 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 intermachine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object orie Understand basic communication techniques: setting up communication, choosing 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, especiall Propose, analyze, select and implement hard- and software solutions for sensing and	ented nformation channel and information content y on the ICT side
E038020 Nuclear Reactor Theory: part 1	excursion seminar: coached exercises lecture: plenary exercises lecture		The student should fully understand and be capable of defining the following TERMII neutrons, energy production, burnup, fission products, Bethe-Weiszaecker formula. compound nucleur factor, Doppler effect, production factor, fast fission factor, resonance escape probability, thermal utilisation thermal/ epithermal/ fast energy region, homogeneous/ heterogenous core, self shielding (energetic and spati Inhour equation, antireactivity, Xe, Sm poisoning.  The student should be capable of solving exercises, of which examples are given du necessary anti-reactivity (e.g. boron concentration) when making a reactor critical (e.g. compensation of the instart-up).  The student should have achieved the knowledge to differentiate the most important address/comment in a balanced way the safe operation of a reactor.  The student is expected to explain the physics (with mathematical formulae) of the fineutron interactions, the neutron flux distribution, the operation of a reactor core with evolution of its fuel computence of the student should fully understand the operation of the core of a pressurised water. The student should have obtained full understanding of the coupled neutron- and thermo-dynamic response desired to explain the physics and thermo-dynamic response desired full understanding of the coupled neutron- and thermo-dynamic response desired formulae of the coupled neutron-	s, neutron cross section, multiplication in factor, neutron leakage, thermal neutrons, ial), reactor period, average generation time iring the course, such as e.g. calculating the invested reactivity for the core life time at (6) nuclear reactor types and to ssion phenomenon, the different types of position and being capable to reproduce all reactor from neutron kinetic point of view.
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 Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present and for laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the etopical study, research and the reflection on the research, experiments, experimentations, designs, simulations, resulting an appropriate methodology, in accordance with the applicable scientific norms	execution of research (literature search,

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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	lecture seminar: coached exercises	open book examination	Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivalen circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hystereis motor, stepping motors and their characteristics
E019331 ICT and Mechatronics	guided self-study seminar project lecture		Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side
E036900 Dynamics of Electrical Machines and Drives	lecture seminar: practical PC room classes seminar: coached exercises project	written examination report open book examination	Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system  Calculation of transient phenomena in electrical circuits; calculation of transients via modelling of of DC machines; modelling of induction machines; modelling of synchronous machines.  Understanding the dynamic behaviour of DC machines, induction and synchronous machines.  Understanding the concepts of local stability, static and dynamic stability, input-output stability, field orientation and vector control, transient and subtransient dynamics of machines; pulsating loading of machines; voltage surges in machines.
E035050 Operational Aspects of Electrical Power System	ms guided self-study online project online lecture project lecture demonstration		Analyse optimal power flow. Understand the control of frequency, power and voltage. Understand electric power markets. Understand the function and principles of FACTS devices. Know the origin and solutions of power quality issues.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain.  Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.  Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,).  Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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# EMingwALG3.5 Readily adapt to changing professional circumstances.

< EMingwALG3.5 Readily adapt	< EMingwALG3.5 Readily adapt to changing professional circumstances.		
Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet	teruggevonden in de studiefiche		
E019331 ICT and Mechatronics	guided self-study seminar project lecture		Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E032322 Sensor Based Measurement Systems	project	assignment report	Collaborate in a small group on a project to design and realize a practical sensor based measurement system.
E030520 Power Electronics	guided self-study seminar practicum lecture	written examination with open questions report simulation	INSIGHTS: Understanding voltage and current waveforms CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite SKILLS:electronic and thermal aspects
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain.  Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.  Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,).  Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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Living WALO4.1 Have the ability to	communicate in English abou	tile own field of specialis	Sation: Competences in cooperation and communication
Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terugg	gevonden 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-sinusoidal supple 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, equivale circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hystereis motor, stepping motors and their characteristics
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	lecture seminar practicum	report	Calculate the margin to cavitation for a pump installation and if necessary propose the required adaptations.  Choose a suitable pump, compressor or internal combustion engine type depending on the application and determine its basic dimensions.  Analyse and interpret measurements on positive displacement machinery.  Explain trends in engine design, fuel choice and emission legislation and explain why a specific engine design would be chose according to the needs of the application.
E019331 ICT and Mechatronics	guided self-study	written examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and
	seminar project lecture	report skills test oral examination	machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E040670 Mechanical Vibrations	lecture	oral examination	Modelling of rotating and non-rotating mechanical systems based on 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.
E035010 Electrical Power System Analysis	guided self-study online seminar: coached exercises online project online lecture lecture: plenary exercises project practicum	written examination report participation oral examination	Decompose three-phase quantities by means of symmetrical components and the Clarke and Park transform.  Analyse transmission lines under transient and sinusoidal conditions.  Analyse transient stability.  Understand the function and principle of regulating transformers.  Determine line parameters of transmission lines.  Compute short circuit currents.
E032322 Sensor Based Measurement Systems	lecture	oral examination	Collaborate in a small group on a project to design and realize a practical sensor based measurement system.
E038020 Nuclear Reactor Theory: part 1  E030520 Power Electronics	excursion seminar: coached exercises lecture: plenary exercises lecture	written examination open book examination  written examination with open	Understand and describe the operation of sensors and signal conditioners  The student should fully understand and be capable of defining the following TERMINOLOGY: PWR, enrichment grade, fission neutrons, energy production, burnup, fission products, Bethe-Weiszaecker formula. compound nucleus, neutron cross section, multiplication factor, Doppler effect, production factor, fast fission factor, resonance escape probability, thermal utilisation factor, neutron leakage, thermal neutrons, thermal/ epithermal/ fast energy region, homogeneous/ heterogenous core, self shielding (energetic and spatial), reactor period, average generation time Inhour equation, antireactivity, Xe, Sm poisoning.  The student should be capable of solving exercises, of which examples are given during the course, such as e.g. calculating the necessary anti-reactivity (e.g. boron concentration) when making a reactor critical (e.g. compensation of the invested reactivity for the core life time at start-up).  The student should have achieved the knowledge to differentiate the most important (6) nuclear reactor types and to address/comment in a balanced way the safe operation of a reactor.  The student is expected to explain the physics (with mathematical formulae) of the fission phenomenon, the different types of neutron interactions, the neutron flux distribution, the operation of a reactor core with evolution of its fuel composition and being capable to reproduce all theoretical derivations (as shown on the blackboard).  The student should fully understand the operation of the core of a pressurised water reactor from neutron kinetic point of view. The student should have obtained full understanding of the coupled neutron- and thermo-dynamic response during its operation under a neutron flux. INSIGHTS: Understanding voltage and current waveforms
	seminar practicum lecture	questions report simulation	CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite SKILLS:electronic and thermal aspects
E037820 Technology of Electrical Installations	lecture seminar: coached exercises	written examination	To select appropriate battery technology for a given application.  To dimension a simple industrial electrical installation in a correct way, according to the AREI.
E036900 Dynamics of Electrical Machines and Drives	lecture	written examination report open book examination	Calculation of transient phenomena in electrical circuits; calculation of transients via modelling of of DC machines; modelling of induction machines; modelling of synchronous machines.  Understanding the dynamic behaviour of DC machines, induction and synchronous machines.  Understanding the concepts of local stability, static and dynamic stability, input-output stability, field orientation and vector control, transient and subtransient dynamics of machines; pulsating loading of machines; voltage surges in machines.
E035050 Operational Aspects of Electrical Power System		oral examination	Analyse optimal power flow.
	online project	report	Understand the control of frequency, power and voltage.

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E036611 Electrical Machine Design	lecture online seminar online lecture seminar: coached exercises lecture: plenary exercises self-reliant study activities project	written examination report oral examination	Understand skin and proximity effects. Analyse parasitic effects (vibrations, noise, torques). Know the design and materials of the most common electrical machines. Use numerical methods for magnetic field computations in electrical machines. Analyse the windings of AC machines.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain.  Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.  Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,).  Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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### 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

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project, Course	Teaching methods	Evaluation methods	Course learning outcome
loot: leer- en evaluatievormen voorafgegaan door ** werden niet terug	ggevonden in de studiefiche		•
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	practicum	report	Analyse and interpret measurements on positive displacement machinery.
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E035010 Electrical Power System Analysis	guided self-study online seminar: coached exercises online project online lecture lecture: plenary exercises project practicum lecture	written examination report participation oral examination	Decompose three-phase quantities by means of symmetrical components and the Clarke and Park transform.  Analyse transmission lines under transient and sinusoidal conditions.  Analyse transient stability.  Understand the function and principle of regulating transformers.  Determine line parameters of transmission lines.  Compute short circuit currents.
E032322 Sensor Based Measurement Systems	project	assignment report	Programming of microcontrollers for data acquisition and programming in Python to process measurement data.  Collaborate in a small group on a project to design and realize a practical sensor based measurement system.
E030520 Power Electronics	guided self-study seminar practicum lecture	written examination with open questions report simulation	INSIGHTS: Understanding voltage and current waveforms CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite SKILLS:electronic and thermal aspects
E036900 Dynamics of Electrical Machines and Drives	project seminar: practical PC room classes seminar: coached exercises	written examination report	Calculation of transient phenomena in electrical circuits; calculation of transients via modelling of of DC machines; modelling of induction machines; modelling of synchronous machines.  Understanding the dynamic behaviour of DC machines, induction and synchronous machines.  Understanding the concepts of local stability, static and dynamic stability, input-output stability, field orientation and vector control, transient and subtransient dynamics of machines; pulsating loading of machines; voltage surges in machines.
E036611 Electrical Machine Design	lecture online seminar online lecture seminar: coached exercises lecture: plenary exercises self-reliant study activities project	written examination report oral examination	Understand skin and proximity effects. Analyse parasitic effects (vibrations, noise, torques). Know the design and materials of the most common electrical machines. Use numerical methods for magnetic field computations in electrical machines. Analyse the windings of AC machines.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain.  Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.  Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,).  Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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# 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.

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Course	Teaching methods	Evaluation methods	Course learning outcome
		Lvaidation metrious	Course rearring outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet te	eruggevonden in de studietiche		
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information conten Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E032322 Sensor Based Measurement Systems	project	assignment report	Collaborate in a small group on a project to design and realize a practical sensor based measurement system.
E030520 Power Electronics	guided self-study seminar practicum lecture	written examination with open questions report simulation	INSIGHTS: Understanding voltage and current waveforms CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite SKILLS:electronic and thermal aspects

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Course Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terug	Teaching methods	Evaluation methods	Course learning outcome
	gevonden in de stadienane		
E036130 Controlled Electrical Drives	practicum	skills test	Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal sup Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced ar 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, equival circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation,
			hystereis motor, stepping motors and their characteristics
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	practicum	report	Analyse and interpret measurements on positive displacement machinery.
E019331 ICT and Mechatronics	Only evaluation	written examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and
		report skills test oral examination	machine learning Represent simple motion systems with matrix groups and realize their limitations  Discriminate between different task organizations: layers parallel threads, chiest griented
		oral examination	Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side
			Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E040670 Mechanical Vibrations	lecture seminar: coached exercises	report	Modelling of rotating and non-rotating mechanical systems based on Langrange's technique.  Perform a modal analysis and formulate structural modifications for continuous and discrete systems.
E035010 Electrical Power System Analysis	guided self-study online seminar: coached exercises	written examination report	Decompose three-phase quantities by means of symmetrical components and the Clarke and Park transform.  Analyse transmission lines under transient and sinusoidal conditions.
	online project	participation	Analyse transient stability.
	online lecture lecture: plenary exercises project practicum lecture	oral examination	Understand the function and principle of regulating transformers.  Determine line parameters of transmission lines.  Compute short circuit currents.
E032322 Sensor Based Measurement Systems	project	oral examination	Collaborate in a small group on a project to design and realize a practical sensor based measurement system.
E038020 Nuclear Reactor Theory: part 1	excursion	report written examination	The student should fully understand and be capable of defining the following TERMINOLOGY: PWR, enrichment grade, fission
	seminar: coached exercises lecture: plenary exercises lecture	open book examination	neutrons, energy production, burnup, fission products, Bethe-Weiszaecker formula. compound nucleus, neutron cross section, multiplication factor, Doppler effect, production factor, fast fission factor, resonance escape probability, thermal utilisation factor, neutron leakage, thermal neutron thermal/ epithermal/ fast
			energy region, homogeneous/ heterogenous core, self shielding (energetic and spatial), reactor period, average generation tir Inhour equation, antireactivity, Xe, Sm poisoning.  The student should be capable of solving exercises, of which examples are given during the course, such as e.g. calculating t
			necessary anti-reactivity  (e.g. boron concentration) when making a reactor critical (e.g. compensation of the invested reactivity for the core life time at
			start-up).  The student should have achieved the knowledge to differentiate the most important (6) nuclear reactor types and to address/comment in a balanced way
			the safe operation of a reactor.  The student is expected to explain the physics (with mathematical formulae) of the fission phenomenon, the different types of
			neutron flux distribution, the operation of a reactor core with evolution of its fuel composition and being capable to reproduce a
			theoretical derivations (as shown on the blackboard).
			The student should fully understand the operation of the core of a pressurised water reactor from neutron kinetic point of view.  The student should have
E030520 Power Electronics	guided self-study	written examination with open	obtained full understanding of the coupled neutron- and thermo-dynamic response during its operation under a neutron flux.  INSIGHTS: Understanding voltage and current waveforms
	seminar practicum lecture	questions report simulation	CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite SKILLS:electronic and thermal aspects
E036900 Dynamics of Electrical Machines and Drives	project	report	Calculation of transient phenomena in electrical circuits; calculation of transients via modelling of of DC machines; modelling of induction machines; modelling of synchronous machines.
			Understanding the dynamic behaviour of DC machines, induction and synchronous machines. Understanding the concepts of local stability, static and dynamic stability, input-output stability, field orientation and vector control, transient and
E035050 Operational Aspects of Electrical Power System	•	oral examination	subtransient dynamics of machines; pulsating loading of machines; voltage surges in machines.  Analyse optimal power flow.
	online project online lecture	report skills test	Understand the control of frequency, power and voltage. Understand electric power markets.
	project lecture	participation	Understand the function and principles of FACTS devices. Know the origin and solutions of power quality issues.
E036611 Electrical Machine Design	demonstration lecture	written examination	Understand skin and proximity effects.
<del>-</del>	online seminar online lecture	report oral examination	Analyse parasitic effects (vibrations, noise, torques).  Know the design and materials of the most common electrical machines.
	seminar: coached exercises lecture: plenary exercises self-reliant study activities project		Use numerical methods for magnetic field computations in electrical machines.  Analyse the windings of AC machines.

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E091103 Master's Dissertation master's dissertation oral examination assignment Define, study and analyse the research problem in a specific domain.

Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.

Self-assessment with adequate and critical self-correction and objectivity.

Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.

Render and synthesise the results concisely.

Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the

reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,...). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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## < EMingwALG5.1 Act in an ethical, professional and social way. Societal competences

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-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on the machine and vice-versa, stepping motors versus classical motors  Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivalent circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation,
			hystereis motor, stepping motors and their characteristics
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	lecture		Explain trends in engine design, fuel choice and emission legislation and explain why a specific engine design would be chosen according to the needs of the application.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain.  Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.  Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,).  Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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# EMingwALG5.2 Recognize the most important business and legal aspects of the own engineering discipline.

Societal competences

Course	Teaching methods	Evaluation methods	Course learning outcome	
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet	teruggevonden in de studiefiche			
E076221 Manufacturing Planning and Control	lecture		indicate the strategic importance of production planning and control for a company	
E035050 Operational Aspects of Electrical Power Sy	ystems guided self-study online project online lecture project lecture demonstration	oral examination report skills test participation	Analyse optimal power flow. Understand the control of frequency, power and voltage. Understand electric power markets. Understand the function and principles of FACTS devices. Know the origin and solutions of power quality issues.	

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<<	EMINGWALG5.3 Understand t	the historical evolution of the ow	n engineering discipline a	ind its social relevance.	etal competence
Course		Teaching methods	Evaluation methods	Course learning outcome	
loot: leer- en e	valuatievormen voorafgegaan door ** werden n	iet teruggevonden in de studiefiche			
E019331 IC	T and Mechatronics	guided self-study seminar project lecture		Understanding the reasoning and assumptions behind correct data handling and interpretation, information of 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 en	nformation content
				mechatronic system	
E038020 Nu	uclear Reactor Theory: part 1	excursion seminar: coached exercises lecture: plenary exercises lecture	written examination open book examination	The student should fully understand and be capable of defining the following TERMINOLOGY: PWR, enrich neutrons, energy production, burnup, fission products, Bethe-Weiszaecker formula. compound nucleus, neutron cross section factor, Doppler effect, production factor, fast fission factor, resonance escape probability, thermal utilisation factor, neutron leakage thermal/ epithermal/ fast energy region, homogeneous/ heterogenous core, self shielding (energetic and spatial), reactor period, aver Inhour equation, antireactivity, Xe, Sm poisoning.  The student should be capable of solving exercises, of which examples are given during the course, such as necessary anti-reactivity (e.g. boron concentration) when making a reactor critical (e.g. compensation of the invested reactivity for the start-up).  The student should have achieved the knowledge to differentiate the most important (6) nuclear reactor type address/comment in a balanced way the safe operation of a reactor.  The student is expected to explain the physics (with mathematical formulae) of the fission phenomenon, the neutron interactions, the neutron flux distribution, the operation of a reactor core with evolution of its fuel composition and being capa theoretical derivations (as shown on the blackboard).  The student should fully understand the operation of the core of a pressurised water reactor from neutron kir The student should fully understand neutron- and thermo-dynamic response during its operation unde	multiplication  a, thermal neutrons, age generation time  a e.g. calculating the core life time at a and to  different types of ble to reproduce all netic point of view.
E091103 Ma	aster'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 persevers 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 collea laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (lit 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 st	ance. gues as to erature search,

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Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terug	gevonden 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-sinusoidal supportation distribution of the differences and similarities between space vectors and (time) phasors, voltage and temperature limits of 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, equivaled circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hystereis motor, stepping motors and their characteristics
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	practicum seminar	report	Execute thermodynamic analyses of displacement machines and calculate performance parameters.  Choose a suitable pump, compressor or internal combustion engine type depending on the application and determine its basic dimensions.  Analyse and interpret measurements on positive displacement machinery.  Calculate the margin to cavitation for a pump installation and if necessary propose the required adaptations.
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered
E040670 Mechanical Vibrations	guided self-study seminar: coached exercises lecture	oral examination	mechatronic system  Modelling of rotating and non-rotating mechanical systems based on Langrange's technique.  Apply model structure preserving reduction techniques.  Identify modal parameters from an experiment  Design of vibration isolation and vibration absorption devices.  Perform a modal analysis and formulate structural modifications for continuous and discrete systems.  Calculate vibration levels of mechanical structures subjected to dynamic loads.
E076221 Manufacturing Planning and Control	lecture seminar: coached exercises	written examination	analyse and control complex production systems by using mathematical models quantify the impact of variability on the performance of a production system
E035010 Electrical Power System Analysis	guided self-study online seminar: coached exercises online project online lecture lecture: plenary exercises project practicum lecture	written examination report participation oral examination	Decompose three-phase quantities by means of symmetrical components and the Clarke and Park transform.  Analyse transmission lines under transient and sinusoidal conditions.  Analyse transient stability.  Understand the function and principle of regulating transformers.  Determine line parameters of transmission lines.  Compute short circuit currents.
E038020 Nuclear Reactor Theory: part 1	excursion seminar: coached exercises lecture: plenary exercises lecture	written examination open book examination	The student should fully understand and be capable of defining the following TERMINOLOGY: PWR, enrichment grade, fission neutrons, energy production, burnup, fission products, Bethe-Weiszaecker formula. compound nucleus, neutron cross section, multiplication factor, Doppler effect, production factor, fast fission factor, resonance escape probability, thermal utilisation factor, neutron leakage, thermal neutrons thermal/ epithermal/ fast energy region, homogeneous/ heterogenous core, self shielding (energetic and spatial), reactor period, average generation tim Inhour equation, antireactivity, Xe, Sm poisoning.  The student should be capable of solving exercises, of which examples are given during the course, such as e.g. calculating th necessary anti-reactivity (e.g. boron concentration) when making a reactor critical (e.g. compensation of the invested reactivity for the core life time at start-up).  The student should have achieved the knowledge to differentiate the most important (6) nuclear reactor types and to address/comment in a balanced way the safe operation of a reactor.  The student is expected to explain the physics (with mathematical formulae) of the fission phenomenon, the different types of neutron interactions, the neutron flux distribution, the operation of a reactor core with evolution of its fuel composition and being capable to reproduce al theoretical derivations (as shown on the blackboard).  The student should fully understand the operation of the core of a pressurised water reactor from neutron kinetic point of view. The student should have obtained full understanding of the coupled neutron- and thermo-dynamic response during its operation under a neutron flux.
E030520 Power Electronics	guided self-study seminar practicum lecture	written examination with open questions report simulation	INSIGHTS: Understanding voltage and current waveforms  CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite  SKILLS:electronic and thermal aspects
E037820 Technology of Electrical Installations	lecture	written examination	To select appropriate battery technology for a given application.
E036900 Dynamics of Electrical Machines and Drives	seminar: coached exercises lecture seminar: practical PC room classes seminar: coached exercises project	written examination report open book examination	To dimension a simple industrial electrical installation in a correct way, according to the AREI.  Calculation of transient phenomena in electrical circuits; calculation of transients via modelling of of DC machines; modelling of induction machines; modelling of synchronous machines.  Understanding the dynamic behaviour of DC machines, induction and synchronous machines.  Understanding the concepts of local stability, static and dynamic stability, input-output stability, field orientation and vector control, transient and subtransient dynamics of machines; pulsating loading of machines; voltage surges in machines.

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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. E091103 Master's Dissertation master's dissertation oral examination 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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#### EMingwALG6.2 Reconcile conflicting specifications and prior conditions in a highquality and innovative concept or process.

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Course	Teaching methods	Evaluation methods	and innovative concept or process.  Course learning outcome	Profession-specific competen
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terug	_	Lvaidation methods	Course rearring outcome	
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling machine learning Represent simple motion systems with matrix groups and realize their limitat Discriminate between different task organizations: layers, parallel threads, of Understand basic communication techniques: setting up communication, cho Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task mana Understand how basic components of complex mechatronic systems work, e Propose, analyze, select and implement hard- and software solutions for ser mechatronic system	ions bject oriented bosing information channel and information content agement especially on the ICT side
E032322 Sensor Based Measurement Systems	project	assignment report	Programming of microcontrollers for data acquisition and programming in Py Collaborate in a small group on a project to design and realize a practical se	
E030520 Power Electronics	guided self-study seminar practicum lecture	written examination with open questions report simulation	INSIGHTS: Understanding voltage and current waveforms CONCEPTS: simple designs of converters and passive components inducto SKILLS:electronic and thermal aspects	-
E036900 Dynamics of Electrical Machines and Drives	project	report	Calculation of transient phenomena in electrical circuits; calculation of transic induction machines; modelling of synchronous machines.  Understanding the dynamic behaviour of DC machines, induction and synch Understanding the concepts of local stability, static and dynamic stability, inp control, transient and subtransient dynamics of machines; pulsating loading of machines; voltage stability.	ronous machines. out-output stability, field orientation and vector
E036611 Electrical Machine Design	lecture online seminar online lecture seminar: coached exercises lecture: plenary exercises self-reliant study activities project		Understand skin and proximity effects. Analyse parasitic effects (vibrations, noise, torques). Know the design and materials of the most common electrical machines. Use numerical methods for magnetic field computations in electrical machine Analyse the windings of AC machines.	es.
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 of Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, and appropriate methodology, in accordance with the applicable scientification.	t and found them, both to colleagues as to in the execution of research (literature search, ons, results, conclusions,).

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

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Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** wel	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 extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E030520 Power Electronics	guided self-study seminar practicum lecture	written examination with open questions report simulation	INSIGHTS: Understanding voltage and current waveforms CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite SKILLS:electronic and thermal aspects
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain.  Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.  Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,).  Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terugge	evonden in de studiefiche		
E036130 Controlled Electrical Drives	lecture seminar: coached exercises practicum	open book examination skills test	Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on
			the machine and vice-versa, stepping motors versus classical motors  Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivaler 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
E037321 Turbomachines	practicum	written examination	and their characteristics  Calculate the flow in a turbomachine using one-dimensional analysis
E019331 ICT and Mechatronics	seminar: coached exercises		
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E040670 Mechanical Vibrations	seminar: coached exercises		Perform a modal analysis and formulate structural modifications for continuous and discrete systems.  Apply model structure preserving reduction techniques.  Identify modal parameters from an experiment
E035010 Electrical Power System Analysis	guided self-study	written examination	Design of vibration isolation and vibration absorption devices.  Decompose three-phase quantities by means of symmetrical components and the Clarke and Park transform.
E033010 Electrical Fower System Analysis	online seminar: coached exercises online project online lecture lecture: plenary exercises project practicum lecture	report participation oral examination	Analyse transmission lines under transient and sinusoidal conditions.  Analyse transient stability.  Understand the function and principle of regulating transformers.  Determine line parameters of transmission lines.  Compute short circuit currents.
E038020 Nuclear Reactor Theory: part 1	excursion seminar: coached exercises	written examination open book examination	The student should fully understand and be capable of defining the following TERMINOLOGY: PWR, enrichment grade, fission neutrons, energy
E030520 Power Electronics	lecture: plenary exercises lecture	written examination with open	production, burnup, fission products, Bethe-Weiszaecker formula. compound nucleus, neutron cross section, multiplication factor, Doppler effect, production factor, fast fission factor, resonance escape probability, thermal utilisation factor, neutron leakage, thermal neutrons, thermal/ epithermal/ fast energy region, homogeneous/ heterogenous core, self shielding (energetic and spatial), reactor period, average generation time Inhour equation, antireactivity, Xe, Sm poisoning.  The student should be capable of solving exercises, of which examples are given during the course, such as e.g. calculating the necessary anti-reactivity (e.g. boron concentration) when making a reactor critical (e.g. compensation of the invested reactivity for the core life time at start-up).  The student should have achieved the knowledge to differentiate the most important (6) nuclear reactor types and to address/comment in a balanced way the safe operation of a reactor.  The student is expected to explain the physics (with mathematical formulae) of the fission phenomenon, the different types of neutron interactions, the neutron flux distribution, the operation of a reactor core with evolution of its fuel composition and being capable to reproduce all theoretical derivations (as shown on the blackboard).  The student should fully understand the operation of the core of a pressurised water reactor from neutron kinetic point of view. The student should have obtained full understanding of the coupled neutron- and thermo-dynamic response during its operation under a neutron flux. INSIGHTS: Understanding voltage and current waveforms
	seminar practicum lecture	questions report simulation	CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite SKILLS:electronic and thermal aspects
E037820 Technology of Electrical Installations	lecture seminar: coached exercises	written examination	To select appropriate battery technology for a given application.  To dimension a simple industrial electrical installation in a correct way, according to the AREI.
E036900 Dynamics of Electrical Machines and Drives	project seminar: practical PC room classes seminar: coached exercises	written examination report	Calculation of transient phenomena in electrical circuits; calculation of transients via modelling of of DC machines; modelling of induction machines; modelling of synchronous machines.  Understanding the dynamic behaviour of DC machines, induction and synchronous machines.  Understanding the concepts of local stability, static and dynamic stability, input-output stability, field orientation and vector control, transient and subtransient dynamics of machines; pulsating loading of machines; voltage surges in machines.
E035050 Operational Aspects of Electrical Power Systems	s guided self-study online project online lecture project lecture demonstration		Analyse optimal power flow. Understand the control of frequency, power and voltage. Understand electric power markets. Understand the function and principles of FACTS devices. Know the origin and solutions of power quality issues.
E036611 Electrical Machine Design	lecture online seminar online lecture seminar: coached exercises lecture: plenary exercises self-reliant study activities project	written examination report oral examination	Understand skin and proximity effects. Analyse parasitic effects (vibrations, noise, torques). Know the design and materials of the most common electrical machines. Use numerical methods for magnetic field computations in electrical machines. Analyse the windings of AC machines.

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E091103 Master's Dissertation master's dissertation oral examination assignment Define, study and analyse the research problem in a specific domain.

Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.

Self-assessment with adequate and critical self-correction and objectivity.

Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.

Render and synthesise the results concisely.

Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the

reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,...). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet	t teruggevonden in de studiefiche		
E036130 Controlled Electrical Drives	lecture		Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with
			classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI
			and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines
			versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on
			the machine and vice-versa, stepping motors versus classical motors
			Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivalent circuits for inverters, V/F
			supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hystereis motor, stepping motors
			and their characteristics
E019331 ICT and Mechatronics	guided self-study seminar		Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning
	project		Represent simple motion systems with matrix groups and realize their limitations
	lecture		Discriminate between different task organizations: layers, parallel threads, object oriented
			Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies
			Name relevant techniques and recognize the dangers for multiple-task management
			Understand how basic components of complex mechatronic systems work, especially on the ICT side
			Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered
			mechatronic system
E030520 Power Electronics	guided self-study	written examination with open	INSIGHTS: Understanding voltage and current waveforms
	seminar	questions	CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite
	practicum	report	SKILLS:electronic and thermal aspects
	lecture	simulation	
E037820 Technology of Electrical Installations	lecture	written examination	To select appropriate battery technology for a given application.
	seminar: coached exercises		To dimension a simple industrial electrical installation in a correct way, according to the AREI.

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Course	Teaching methods	Evaluation methods	Course learning outcome	
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet te	_		<b>3</b>	
E036130 Controlled Electrical Drives	lecture seminar: coached exercises		Understanding the differences and similarities between space vectors a Gaining insight into the differences and similarities between space vectors attring, 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 machine power electronic supply on the machine and vice-versa, stepping motors versus classical motors. Understanding the principle of current supply versus voltage supply, so circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), hystereis motor, stepping motors and their characteristics	tors and (time) phasors, voltage and temperature limits for and speed control, current and torque control, forced and vo drives, small versus large commutator machines, AC es, small versus large synchronous machines, effects of chemes and modulation principles for inverters, equivale
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals	lecture		Explain trends in engine design, fuel choice and emission legislation ar according to the needs of the application.  Choose a suitable pump, compressor or internal combustion engine type dimensions.	
E030520 Power Electronics	guided self-study seminar practicum lecture	written examination with open questions report simulation	INSIGHTS: Understanding voltage and current waveforms CONCEPTS: simple designs of converters and passive components in SKILLS:electronic and thermal aspects	ductors and transformers with ferrite
E037820 Technology of Electrical Installations	lecture seminar: coached exercises	written examination	To select appropriate battery technology for a given application.  To dimension a simple industrial electrical installation in a correct way,	according to the AREI.
E036900 Dynamics of Electrical Machines and Drives		written examination report open book examination	Calculation of transient phenomena in electrical circuits; calculation of tinduction machines; modelling of synchronous machines.  Understanding the dynamic behaviour of DC machines, induction and sunderstanding the concepts of local stability, static and dynamic stabilic control, transient and subtransient dynamics of machines; pulsating loading of machines; vol	transients via modelling of of DC machines; modelling of synchronous machines. ty, input-output stability, field orientation and vector
E036611 Electrical Machine Design	lecture online seminar online lecture seminar: coached exercises lecture: plenary exercises self-reliant study activities project		Understand skin and proximity effects.  Analyse parasitic effects (vibrations, noise, torques).  Know the design and materials of the most common electrical machine Use numerical methods for magnetic field computations in electrical machines analyse the windings of AC machines.	es.

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Liming WALOUT Tay attention to an aspects of renability, safety, and ergonomics.	<<	EMingwALG6.7 Pay attention to all aspects of reliability, safety, and ergonomics.	
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Profession-specific competence

Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet terug	gevonden in de studiefiche		
E036130 Controlled Electrical Drives	lecture		Understanding the differences and similarities between space vectors and time phasors for sinusoidal and non-sinusoidal supply Gaining insight into the differences and similarities between space vectors and (time) phasors, voltage and temperature limits for starting, restraints with classical starting methods, power electronic starting methods, voltage and speed control, current and torque control, forced and load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, small versus large commutator machines, AC commutator machines versus DC commutator machines, small versus large induction machines, small versus large synchronous machines, effects of power electronic supply on the machine and vice-versa, stepping motors versus classical motors  Understanding the principle of current supply versus voltage supply, schemes and modulation principles for inverters, equivaler circuits for inverters, V/F supply, vector control and field orientation, DTC (direct torque control), servo drives, shaded pole motor, p.m. excitation, hystereis motor, stepping motors and their characteristics
E019331 ICT and Mechatronics	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E030520 Power Electronics	guided self-study seminar practicum lecture	written examination with open questions report simulation	INSIGHTS: Understanding voltage and current waveforms CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite SKILLS:electronic and thermal aspects
E037820 Technology of Electrical Installations	lecture seminar: coached exercises		To select appropriate battery technology for a given application.  To dimension a simple industrial electrical installation in a correct way, according to the AREI.
E036900 Dynamics of Electrical Machines and Drives	lecture seminar: practical PC room classes seminar: coached exercises project	written examination report open book examination	Calculation of transient phenomena in electrical circuits; calculation of transients via modelling of of DC machines; modelling of induction machines; modelling of synchronous machines.  Understanding the dynamic behaviour of DC machines, induction and synchronous machines.  Understanding the concepts of local stability, static and dynamic stability, input-output stability, field orientation and vector control, transient and subtransient dynamics of machines; pulsating loading of machines; voltage surges in machines.

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#### EMingwALG6.8 Have insight into and understanding of the importance of entrepreneurship.

Profession-specific competence

Course	Teaching methods	Evaluation methods	Course learning outcome
Noot: leer- en evaluatievormen voorafgegaan door ** werden niet t	eruggevonden in de studiefiche		
E030520 Power Electronics	guided self-study	written examination with open	INSIGHTS: Understanding voltage and current waveforms
	seminar	questions	CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite
	practicum	report	SKILLS:electronic and thermal aspects
	lecture	simulation	
E037820 Technology of Electrical Installations	lecture		To select appropriate battery technology for a given application.
	seminar: coached exercises		To dimension a simple industrial electrical installation in a correct way, according to the AREI.

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

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Profession-specific competence

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 extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E030520 Power Electronics	guided self-study seminar practicum lecture	written examination with open questions report simulation	INSIGHTS: Understanding voltage and current waveforms CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite SKILLS:electronic and thermal aspects
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain.  Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.  Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,).  Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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# EMingwELME6.1 Integrate the advanced knowledge of mechanical and electrical systems and ICT in order to design, implement and exploit

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Profession-specific competence

technological innovations.			
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	guided self-study seminar project lecture	written examination report skills test oral examination	Understanding the reasoning and assumptions behind correct data handling and interpretation, information extraction and machine learning Represent simple motion systems with matrix groups and realize their limitations Discriminate between different task organizations: layers, parallel threads, object oriented Understand basic communication techniques: setting up communication, choosing information channel and information content Design and implement computer-based motion control strategies Name relevant techniques and recognize the dangers for multiple-task management Understand how basic components of complex mechatronic systems work, especially on the ICT side Propose, analyze, select and implement hard- and software solutions for sensing and actuation in a newly encountered mechatronic system
E030520 Power Electronics	guided self-study seminar practicum lecture	written examination with open questions report simulation	INSIGHTS: Understanding voltage and current waveforms CONCEPTS: simple designs of converters and passive components inductors and transformers with ferrite SKILLS:electronic and thermal aspects
E036900 Dynamics of Electrical Machines and Drives	project seminar: practical PC room classes seminar: coached exercises	report	Calculation of transient phenomena in electrical circuits; calculation of transients via modelling of of DC machines; modelling of induction machines; modelling of synchronous machines.  Understanding the dynamic behaviour of DC machines, induction and synchronous machines.  Understanding the concepts of local stability, static and dynamic stability, input-output stability, field orientation and vector control, transient and subtransient dynamics of machines; pulsating loading of machines; voltage surges in machines.
E036611 Electrical Machine Design	lecture online seminar online lecture seminar: coached exercises lecture: plenary exercises self-reliant study activities project		Understand skin and proximity effects. Analyse parasitic effects (vibrations, noise, torques). Know the design and materials of the most common electrical machines. Use numerical methods for magnetic field computations in electrical machines. Analyse the windings of AC machines.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain.  Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance.  Self-assessment with adequate and critical self-correction and objectivity.  Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,).  Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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	EMingwELME6.2 Be familiar with the energy efficiency of (electrical, mechanical and thermal) energy conversion systems and distribution systems.				Profession-specific competence	
Course	<b>-,</b>	Teaching methods	Evaluation methods	Course learning outcome		
Voot: leer- en ev	aluatievormen voorafgegaan door ** werden niet terugg	gevonden in de studiefiche				
E036130 Controlled Electrical Drives		lecture seminar: coached exercises	open book examination	Understanding the differences and similarities between space vectors and time phase Gaining insight into the differences and similarities between space vectors and (time) starting, restraints with classical starting methods, power electronic starting methods, voltage and speed con	phasors, voltage and temperature limits for	
				load commutation in VSI and CSI, differences and similarities between controlled drives and servo drives, sma	·	
				commutator machines versus DC commutator machines, small versus large induction machines, small versus power electronic supply on	us large synchronous machines, effects of	
				the machine and vice-versa, stepping motors versus classical motors Understanding the principle of current supply versus voltage supply, schemes and m circuits for inverters, V/F	odulation principles for inverters, equivalent	
				supply, vector control and field orientation, DTC (direct torque control), servo drives, shystereis motor, stepping motors and their characteristics	shaded pole motor, p.m. excitation,	
E037321 Tur	bomachines	guided self-study lecture	oral examination	Derive parameter choice and layout of fans, steam turbines, pumps, hydraulic turbine	s and wind turbines	
E037121 Displacement Pumps, Compressors and IC Engine Fundamentals		lecture		Explain trends in engine design, fuel choice and emission legislation and explain why according to the needs of the application.		
				Choose a suitable pump, compressor or internal combustion engine type depending dimensions.	• •	
E035010 Electrical Power System Analysis		guided self-study online seminar: coached exercises online project	written examination report participation	Decompose three-phase quantities by means of symmetrical components and the Cla Analyse transmission lines under transient and sinusoidal conditions. Analyse transient stability.	arke and Park transform.	
		online lecture lecture: plenary exercises	oral examination	Understand the function and principle of regulating transformers.  Determine line parameters of transmission lines.  Compute short circuit currents.		
		project practicum lecture		Compute short circuit currents.		
E030520 Pov	wer Electronics	guided self-study seminar practicum lecture	written examination with open questions report simulation	INSIGHTS: Understanding voltage and current waveforms CONCEPTS: simple designs of converters and passive components inductors and tra SKILLS:electronic and thermal aspects	ansformers with ferrite	
E037820 Ted	chnology of Electrical Installations	lecture seminar: coached exercises	written examination	To select appropriate battery technology for a given application.  To dimension a simple industrial electrical installation in a correct way, according to the AREI.		
E036900 Dyr	namics of Electrical Machines and Drives	lecture seminar: practical PC room classes seminar: coached exercises	written examination report open book examination	Calculation of transient phenomena in electrical circuits; calculation of transients via r induction machines; modelling of synchronous machines.	modelling of of DC machines; modelling of	
		project		Understanding the dynamic behaviour of DC machines, induction and synchronous munderstanding the concepts of local stability, static and dynamic stability, input-output control, transient and	t stability, field orientation and vector	
E005050 O=	and in all Annual of Florida Down Contain	an aviidad aalf atvah	and according to a	subtransient dynamics of machines; pulsating loading of machines; voltage surges in	machines.	
E035050 Op	erational Aspects of Electrical Power Systen	online project online lecture	oral examination report skills test	Analyse optimal power flow. Understand the control of frequency, power and voltage. Understand electric power markets.		
		project lecture demonstration	participation	Understand the function and principles of FACTS devices.  Know the origin and solutions of power quality issues.		
E036611 Ele	ctrical Machine Design	lecture online seminar	written examination report	Understand skin and proximity effects. Analyse parasitic effects (vibrations, noise, torques).		
		online lecture seminar: coached exercises lecture: plenary exercises self-reliant study activities	oral examination	Know the design and materials of the most common electrical machines. Use numerical methods for magnetic field computations in electrical machines. Analyse the windings of AC machines.		
E091103 Ma	ster's Dissertation	project 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, Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and fou	·	
				laypeople.  Render and synthesise the results concisely.  Critically analyse, formulate, study, execute and/or process different aspects in the experience of the control o	· ·	
				topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, resu Find an appropriate methodology, in accordance with the applicable scientific norms of the second study.	Its, conclusions,).	

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