Competence coverage matrix

GHENT UNIVERSITY

Master of Science in Computer Science Engineering

Academic year 2021-2022

Legend:
T=teaching methods
E=evaluation methods

			General Courses											Master's Dissertation
			E034140 Parallel Computer Systems	E019400 Information Security	E017930 Parallel and Distributed Software Systems	E017920 Design of Multimedia Applications	E031710 Research Project	E033710 Design Project	E012320 Mobile and Broadband Access Networks	E003600 Information Theory	E011322 Queueing Analysis and Simulation	E061330 Machine Learning	E091103 Master's Dissertation	
Competences in one/more scientific discipline(s)	Master and apply advanced knowledge in the own engineering discipline in solving complex problems.	T 10 E 10	T E	T E	T E	T E		T E	T E	T E	T E	T E	T E	
	Apply Computer Aided Engineering (CAE) tools and advanced communication instruments in a creative and purposeful way.	T 3 E 3	T E						T E	T E				
	Design complex digital information processing systems with an important hardware component.	T 4 E 4	T E		T E					T E			T E	
	Design complex intelligent software systems with the help of modern programming models, programming languages and other tools.	T 4 E 4			T E					T E		T E	T E	
	Design complex communication networks and multimedia applications for various application areas.	T 5 E 5				T E			T E	T E	T E		T E	
	Have a sound grasp of system models and design methodologies for information processing systems.	T 6 E 6	T E					T E		T E	T E	T E	T E	
Scientific competences	Analyse complex problems and translate them into concrete research questions.	T 5 E 3		T					T E	T E		T	T E	
	Consult the scientific literature as part of the own research.	T 5 E 5				T E	T E			T E		T E	T E	
	Select and apply the appropriate models, methods and techniques.	T 10 E 10	T E	T E	T E	T E		T E	T E	T E	T E	T E	T E	
	Develop and validate mathematical models and methods.	T 3 E 3			T E					T E	T E			
	Interpret research findings in an objective and critical manner.	T 5 E 4		T			T 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 5	T E	T		T E			T E	T E			T E	
	Apply knowledge in a creative, purposeful and innovative way to research, conceptual design and production.	T 7 E 6		T E		T E		T E	T E	T E	T		T E	
	Critically reflect on one's own way of thinking and acting, and understand the limits of one's competences.	T 5 E 5	T E	T E				T E		T E			T E	
	Stay uptodate with the evolutions in the discipline to elevate the own competences to expert level.	T 5 E 5		T E			T E		T E	T E			T E	
	Readily adapt to changing professional circumstances.	T 3 E 3						T E		T E			T E	
Competences in cooperation and communication	Have the ability to communicate in English about the own field of specialisation.	T 10 E 10	T E	T E		T E	T E	T E	T E	T E	T E	T E	T E	
	Project management: have the ability to formulate objectives, report efficiently, keep track of targets, follow the progress of the project,...	T 4 E 4		T E				T E		T E			T E	
	Have the ability to work as a member of a team in a multi disciplinary workingenvironment, as well as being capable of taking on supervisory responsibilities.	T 3 E 3					T E	T E		T E				
	Report on technical or scientific subjects verbally, in writing and using graphics.	T 9 E 9	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.	T 5 E 4		T E			T E			T E		T	T E	
	Recognize the most important business and legal aspects of the own engineering discipline.	T 3 E 3		T E				T E		T E				
	Understand the historical evolution of the own engineering discipline and its social relevance.	T 7 E 5				T E	T E		T E	T E	T	T	T E	
Profession-specific competence	Master the complexity of technical systems by using system and process models.	T 4 E 3								T E	T	T E	T E	
	Reconcile conflicting specifications and prior conditions in a high quality and innovative concept or process.	T 7 E 7		T E	T E	T E		T E	T E	T E			T E	
	Synthesize incomplete, contradictory or redundant data into useful information.	T 7 E 6		T E			T E	T E		T E	T E	T	T E	
	Possess sufficient ready knowledge and understanding to evaluate the results of complex calculations, or make approximate estimates.	T 5 E 5	T E		T E				T E	T E			T E	
	Pay attention to entire life cycles of systems, machines, and processes.	T 2 E 2						T E	T E					
	Pay attention to sustainability, energyefficiency, environmental cost, use of raw materials and labour costs.	T 4 E 3	T E	T					T E	T E				
	Pay attention to all aspects of reliability, safety, and ergonomics.	T 4 E 4		T E				T E	T E	T E				
	Have insight into and understanding of the importance of entrepreneurship.	T 1 E 1						T E						
	Show perseverance, innovativeness, and an aptitude for creating added value.	T 3 E 3						T E		T E			T E	
			W 11 E 11	W 17 E 13	W 8 E 8	W 10 E 10	W 9 E 9	W 18 E 18	W 16 E 16	W 30 E 30	W 10 E 7	W 11 E 7	W 24 E 24	

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E034140 Parallel Computer Systems	lecture seminar: coached exercises	written examination report open book examination	Understand and be able to describe the architecture and their impact on performance of superscalar processor architectures, shared-memory multiprocessors, multi-threading, datacenters, supercomputers. Understand and be able to describe the impact of technology on parallel computer systems.
E019400 Information Security	guided self-study seminar: coached exercises project practicum lecture	open book examination report oral examination	Recognising the social and legal aspects of information security. Understanding security services (confidentiality, authentication, etc.). Using security mechanisms to achieve security functions. Recognising the complexity of achieving good information security. Estimating the necessary resources to crack cryptographic security mechanisms. Understanding the operation of security mechanisms (encryption, Firewall, biometry, etc.).
E017930 Parallel and Distributed Software Systems	guided self-study seminar: coached exercises self-reliant study activities practicum lecture	written examination report skills test participation	To know and understand the principle algorithmic problems associated with parallel and distributed systems and the standard strategies to solve them. To know the different functions of middleware, the principle architectures for realizing parallel and distributed systems, and the important software technologies for realizing parallel and distributed applications.
E017920 Design of Multimedia Applications	lecture	oral examination report	to understand, know, and be able to apply mathematical transformations that form the basis for the encoding and compression of multimedia data to understand and know current techniques for error detection, resilience, and concealment, and be able to implement (parts of) them to understand and know the structure and functionality of standards for coding of multimedia data to understand and know current techniques for encoding multimedia data, and be able to implement (parts of) them
E033710 Design Project	group work self-reliant study activities seminar project	oral examination report peer assessment skills test participation	Be able to transfer theoretical knowledge from other course to practical applications.
E012320 Mobile and Broadband Access Networks	guided self-study seminar: coached exercises practicum lecture	written examination report skills test participation open book examination	to gain insight in network modeling algorithms and their applications/limitations to apply these techniques for routing and design problems in access networks to analyse theoretical concepts in order to explain the operation and limitations of wireless and wired access networks to analyse the behavior of mobile and wireless networks through network simulations to design network protocols for mobile and wireless networks and to optimize protocol parameters to analyse and evaluate access networks and mobile networks in terms of performance and usability for diverse applications
E003600 Information Theory	lecture seminar: coached exercises project	written examination report open book examination	Compute theoretical bounds for source and channel coding. Compute performance. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding. Recognize the graphical representation of codes. Analyse hard and soft decoding. Compute the optimal quantizer. Use lossless and lossy source coding.
E011322 Queueing Analysis and Simulation	lecture seminar: coached exercises	written examination with open questions	To assess the performance of queueing systems quantitatively and qualitatively To select the most suitable models, methods and techniques for specific queueing problems To master mathematical solution techniques for queueing problems To construct a simulation program and to process simulation results
E061330 Machine Learning	guided self-study lecture	participation report	Understand the mathematical background of some common and advanced machine learning models. Understand the fundamental principles and challenges of machine learning. Analyse a new machine learning problem and address it by correctly applying the principles of machine learning and selecting suitable common machine learning models. Implement simple machine learning models and correctly apply machine learning libraries for more advanced techniques.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

<< **EMingwALG1.2 Apply Computer Aided Engineering (CAE) tools and advanced communication instruments in a creative and purposeful way.** *Competences in one/more scientific discipline(s)*

Course	Teaching methods	Evaluation methods	Course learning outcome
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E034140 Parallel Computer Systems	seminar: coached exercises	report	Understand and be able to describe the architecture and their impact on performance of superscalar processor architectures, shared-memory multiprocessors, multi-threading, datacenters, supercomputers. Understand and be able to describe the impact of technology on parallel computer systems.
E012320 Mobile and Broadband Access Networks	guided self-study seminar: coached exercises practicum lecture	written examination report skills test participation open book examination	to gain insight in network modeling algorithms and their applications/limitations to apply these techniques for routing and design problems in access networks to analyse theoretical concepts in order to explain the operation and limitations of wireless and wired access networks to analyse the behavior of mobile and wireless networks through network simulations to design network protocols for mobile and wireless networks and to optimize protocol parameters to analyse and evaluate access networks and mobile networks in terms of performance and usability for diverse applications
E003600 Information Theory	project	report	Apply error detection and error correction for soft and hard decoding. Compute performance.

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E034140 Parallel Computer Systems	lecture seminar: coached exercises	written examination report open book examination	Understand and be able to describe the architecture and their impact on performance of superscalar processor architectures, shared-memory multiprocessors, multi-threading, datacenters, supercomputers. Understand and be able to describe the impact of technology on parallel computer systems.
E017930 Parallel and Distributed Software Systems	practicum self-reliant study activities	participation report skills test	To be able to deliver a basic design for a parallel and distributed application, realize a parallel and distributed application, and estimate performances of different implementation alternatives.
E003600 Information Theory	lecture seminar: coached exercises	written examination open book examination	Apply Viterbi decoding. Apply error detection and error correction for soft and hard decoding.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
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E017930 Parallel and Distributed Software Systems	practicum seminar: coached exercises self-reliant study activities	participation report skills test	To apply the basic strategies for solving algorithmic problems associated with parallel and distributed systems. To pay attention to scalability and performance issues at design time. To be able to deliver a basic design for a parallel and distributed application, realize a parallel and distributed application, and estimate performances of different implementation alternatives. To pay sufficient time to evaluate different design alternatives prior to implementation. To evaluate algorithms for standard problems and applying them in the most appropriate way. To be able to explain the differences between different parallel and distributed programming models.
E003600 Information Theory	lecture seminar: coached exercises project	written examination report open book examination	Compute the optimal quantizer. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding. Recognize the graphical representation of codes. Analyse hard and soft decoding.
E061330 Machine Learning	guided self-study lecture	participation report	Implement simple machine learning models and correctly apply machine learning libraries for more advanced techniques. Understand the fundamental principles and challenges of machine learning. Analyse a new machine learning problem and address it by correctly applying the principles of machine learning and selecting suitable common machine learning models.
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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E017920 Design of Multimedia Applications	lecture practicum	oral examination report skills test	to understand, know, and be able to apply mathematical transformations that form the basis for the encoding and compression of multimedia data to be able to analyze specific functional multimedia applications and to identify the associated technology requirements, and to be able to design and deploy an integrated multimedia application to understand and know current techniques for error detection, resilience, and concealment, and be able to implement (parts of) them to understand and know the structure and functionality of standards for coding of multimedia data to understand and know current techniques for encoding multimedia data, and be able to implement (parts of) them
E012320 Mobile and Broadband Access Networks	practicum seminar: coached exercises	written examination report skills test participation open book examination	to gain insight in network modeling algorithms and their applications/limitations to apply these techniques for routing and design problems in access networks to analyse theoretical concepts in order to explain the operation and limitations of wireless and wired access networks to analyse the behavior of mobile and wireless networks through network simulations to design network protocols for mobile and wireless networks and to optimize protocol parameters to analyse and evaluate access networks and mobile networks in terms of performance and usability for diverse applications
E003600 Information Theory	lecture seminar: coached exercises project	written examination report open book examination	Compute theoretical bounds for source and channel coding. Compute performance. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding. Recognize the graphical representation of codes. Analyse hard and soft decoding. Compute the optimal quantizer. Use lossless and lossy source coding.
E011322 Queueing Analysis and Simulation	lecture seminar: coached exercises	written examination with open questions	To assess the performance of queueing systems quantitatively and qualitatively To select the most suitable models, methods and techniques for specific queueing problems
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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E034140 Parallel Computer Systems	lecture seminar: coached exercises	written examination report open book examination	Understand and be able to describe the architecture and their impact on performance of superscalar processor architectures, shared-memory multiprocessors, multi-threading, datacenters, supercomputers. Understand and be able to describe the impact of technology on parallel computer systems.
E033710 Design Project	group work self-reliant study activities seminar project	oral examination report skills test	Be able to realize a prototype given a stringent time frame and limited means which meets the predefined quality criteria.
E003600 Information Theory	lecture seminar: coached exercises project	written examination report open book examination	Compute theoretical bounds for source and channel coding. Compute performance. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding. Recognize the graphical representation of codes. Analyse hard and soft decoding. Compute the optimal quantizer. Use lossless and lossy source coding.
E011322 Queueing Analysis and Simulation	lecture seminar: coached exercises	written examination with open questions report	To construct a simulation program and to process simulation results To master mathematical solution techniques for queueing problems
E061330 Machine Learning	lecture	participation	Understand the mathematical background of some common and advanced machine learning models. Understand the fundamental principles and challenges of machine learning.
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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E019400 Information Security	guided self-study seminar: coached exercises project practicum lecture		Recognising the social and legal aspects of information security. Understanding security services (confidentiality, authentication, etc.). Using security mechanisms to achieve security functions. Recognising the complexity of achieving good information security. Estimating the necessary resources to crack cryptographic security mechanisms. Understanding the operation of security mechanisms (encryption, Firewall, biometry, etc.).
E012320 Mobile and Broadband Access Networks	guided self-study seminar: coached exercises practicum lecture	written examination report skills test participation open book examination	to gain insight in network modeling algorithms and their applications/limitations to apply these techniques for routing and design problems in access networks to analyse theoretical concepts in order to explain the operation and limitations of wireless and wired access networks to analyse the behavior of mobile and wireless networks through network simulations to design network protocols for mobile and wireless networks and to optimize protocol parameters to analyse and evaluate access networks and mobile networks in terms of performance and usability for diverse applications
E003600 Information Theory	lecture seminar: coached exercises project	written examination report open book examination	Compute theoretical bounds for source and channel coding. Compute performance. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding. Recognize the graphical representation of codes. Analyse hard and soft decoding. Compute the optimal quantizer. Use lossless and lossy source coding.
E061330 Machine Learning	guided self-study lecture		Understand the mathematical background of some common and advanced machine learning models. Understand the fundamental principles and challenges of machine learning. Analyse a new machine learning problem and address it by correctly applying the principles of machine learning and selecting suitable common machine learning models.
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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E017920 Design of Multimedia Applications	guided self-study	report	to understand and know the structure and functionality of standards for coding of multimedia data
E031710 Research Project	lecture project	participation report	Perform a literature search in the scientific literature.
E003600 Information Theory	project	report	Analyse hard and soft decoding. Apply error detection and error correction for soft and hard decoding.
E061330 Machine Learning	guided self-study	participation report	Understand and critically evaluate the techniques presented in scientific literature on machine learning.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E034140 Parallel Computer Systems	lecture seminar: coached exercises	written examination report open book examination	Understand and be able to describe the architecture and their impact on performance of superscalar processor architectures, shared-memory multiprocessors, multi-threading, datacenters, supercomputers. Understand and be able to describe the impact of technology on parallel computer systems.
E019400 Information Security	guided self-study seminar: coached exercises project practicum lecture	open book examination report oral examination	Recognising the social and legal aspects of information security. Understanding security services (confidentiality, authentication, etc.). Using security mechanisms to achieve security functions. Recognising the complexity of achieving good information security. Estimating the necessary resources to crack cryptographic security mechanisms. Understanding the operation of security mechanisms (encryption, Firewall, biometry, etc.).
E017930 Parallel and Distributed Software Systems	guided self-study seminar: coached exercises self-reliant study activities practicum lecture	written examination report skills test participation	To evaluate algorithms for standard problems and applying them in the most appropriate way. To pay attention to scalability and performance issues at design time. To be able to deliver a basic design for a parallel and distributed application, realize a parallel and distributed application, and estimate performances of different implementation alternatives. To pay sufficient time to evaluate different design alternatives prior to implementation.
E017920 Design of Multimedia Applications	practicum	skills test	to be able to analyze specific functional multimedia applications and to identify the associated technology requirements, and to be able to design and deploy an integrated multimedia application
E033710 Design Project	group work self-reliant study activities seminar project	oral examination report skills test	Be able to realize a prototype given a stringent time frame and limited means which meets the predefined quality criteria. Be able to implement the configuration management of complex projects.
E012320 Mobile and Broadband Access Networks	guided self-study seminar: coached exercises practicum	written examination report skills test participation open book examination	to design network protocols for mobile and wireless networks and to optimize protocol parameters to apply these techniques for routing and design problems in access networks to analyse the behavior of mobile and wireless networks through network simulations
E003600 Information Theory	lecture seminar: coached exercises project	written examination report open book examination	Compute theoretical bounds for source and channel coding. Compute performance. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding. Recognize the graphical representation of codes. Analyse hard and soft decoding. Compute the optimal quantizer. Use lossless and lossy source coding.
E011322 Queueing Analysis and Simulation	seminar: coached exercises	written examination with open questions	To select the most suitable models, methods and techniques for specific queueing problems
E061330 Machine Learning	guided self-study lecture	participation report	Understand and critically evaluate the techniques presented in scientific literature on machine learning. Understand the fundamental principles and challenges of machine learning. Analyse a new machine learning problem and address it by correctly applying the principles of machine learning and selecting suitable common machine learning models.
E091103 Master's Dissertation	master's dissertation assignment	oral examination report	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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E017930 Parallel and Distributed Software Systems	guided self-study seminar: coached exercises self-reliant study activities practicum lecture	written examination report skills test participation	To evaluate algorithms for standard problems and applying them in the most appropriate way. To pay attention to scalability and performance issues at design time. To be able to deliver a basic design for a parallel and distributed application, realize a parallel and distributed application, and estimate performances of different implementation alternatives. To pay sufficient time to evaluate different design alternatives prior to implementation.
E003600 Information Theory	lecture seminar: coached exercises project	written examination report open book examination	Compute theoretical bounds for source and channel coding. Compute performance. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding. Recognize the graphical representation of codes. Analyse hard and soft decoding. Compute the optimal quantizer. Use lossless and lossy source coding.
E011322 Queueing Analysis and Simulation	lecture seminar: coached exercises self-reliant study activities	written examination with open questions report	To assess the performance of queueing systems quantitatively and qualitatively To construct a simulation program and to process simulation results

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E019400 Information Security	guided self-study seminar: coached exercises project practicum lecture		Recognising the social and legal aspects of information security. Understanding security services (confidentiality, authentication, etc.). Using security mechanisms to achieve security functions. Recognising the complexity of achieving good information security. Estimating the necessary resources to crack cryptographic security mechanisms. Understanding the operation of security mechanisms (encryption, Firewall, biometry, etc.).
E031710 Research Project	project	participation peer assessment assignment	Analyse results of others in an objective and critical manner.
E033710 Design Project	group work self-reliant study activities seminar project	oral examination report skills test	Be able to transfer theoretical knowledge from other course to practical applications. Be able to identify the risks of a project and design a mitigation plan. Be able to realize a prototype given a stringent time frame and limited means which meets the predefined quality criteria. Be able to efficiently prepare, organize and lead project reviews. Be able to document a project in a professional way.
E003600 Information Theory	project	report	Analyse hard and soft decoding. Compute performance. Apply error detection and error correction for soft and hard decoding.
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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E034140 Parallel Computer Systems	lecture seminar: coached exercises	written examination report open book examination	Understand and be able to describe the architecture and their impact on performance of superscalar processor architectures, shared-memory multiprocessors, multi-threading, datacenters, supercomputers. Understand and be able to describe the impact of technology on parallel computer systems.
E019400 Information Security	guided self-study seminar: coached exercises project practicum lecture		Recognising the social and legal aspects of information security. Understanding security services (confidentiality, authentication, etc.). Using security mechanisms to achieve security functions. Recognising the complexity of achieving good information security. Estimating the necessary resources to crack cryptographic security mechanisms. Understanding the operation of security mechanisms (encryption, Firewall, biometry, etc.).
E017920 Design of Multimedia Applications	guided self-study	oral examination	to understand and know the structure and functionality of standards for coding of multimedia data
E012320 Mobile and Broadband Access Networks	guided self-study seminar: coached exercises practicum lecture	written examination report skills test participation open book examination	to gain insight in network modeling algorithms and their applications/limitations to apply these techniques for routing and design problems in access networks to analyse theoretical concepts in order to explain the operation and limitations of wireless and wired access networks to analyse the behavior of mobile and wireless networks through network simulations to design network protocols for mobile and wireless networks and to optimize protocol parameters to analyse and evaluate access networks and mobile networks in terms of performance and usability for diverse applications
E003600 Information Theory	project	report	Analyse hard and soft decoding. Compute performance. Apply error detection and error correction for soft and hard decoding.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E019400 Information Security	guided self-study seminar: coached exercises project practicum lecture	open book examination report oral examination	Recognising the social and legal aspects of information security. Understanding security services (confidentiality, authentication, etc.). Using security mechanisms to achieve security functions. Recognising the complexity of achieving good information security. Estimating the necessary resources to crack cryptographic security mechanisms. Understanding the operation of security mechanisms (encryption, Firewall, biometry, etc.).
E017920 Design of Multimedia Applications	practicum	skills test	to be able to analyze specific functional multimedia applications and to identify the associated technology requirements, and to be able to design and deploy an integrated multimedia application
E033710 Design Project	group work self-reliant study activities seminar project	oral examination report peer assessment skills test participation	Be able to transfer theoretical knowledge from other course to practical applications. Be able to make a planning for a large development team and identify the dependencies. Be able to implement the configuration management of complex projects. Be able to identify the risks of a project and design a mitigation plan. Be able to realize a prototype given a stringent time frame and limited means which meets the predefined quality criteria.
E012320 Mobile and Broadband Access Networks	guided self-study seminar: coached exercises practicum lecture	written examination report skills test participation open book examination	to gain insight in network modeling algorithms and their applications/limitations to apply these techniques for routing and design problems in access networks to analyse theoretical concepts in order to explain the operation and limitations of wireless and wired access networks to analyse the behavior of mobile and wireless networks through network simulations to design network protocols for mobile and wireless networks and to optimize protocol parameters to analyse and evaluate access networks and mobile networks in terms of performance and usability for diverse applications
E003600 Information Theory	lecture seminar: coached exercises project	written examination report open book examination	Compute theoretical bounds for source and channel coding. Compute performance. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding. Recognize the graphical representation of codes. Analyse hard and soft decoding. Compute the optimal quantizer. Use lossless and lossy source coding.
E011322 Queueing Analysis and Simulation	lecture seminar: coached exercises		To assess the performance of queueing systems quantitatively and qualitatively To select the most suitable models, methods and techniques for specific queueing problems To master mathematical solution techniques for queueing problems To construct a simulation program and to process simulation results
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E034140 Parallel Computer Systems	lecture seminar: coached exercises	written examination open book examination	Understand and be able to describe the architecture and their impact on performance of superscalar processor architectures, shared-memory multiprocessors, multi-threading, datacenters, supercomputers. Understand and be able to describe the impact of technology on parallel computer systems.
E019400 Information Security	guided self-study seminar: coached exercises project practicum lecture	open book examination report oral examination	Recognising the social and legal aspects of information security. Understanding security services (confidentiality, authentication, etc.). Using security mechanisms to achieve security functions. Recognising the complexity of achieving good information security. Estimating the necessary resources to crack cryptographic security mechanisms. Understanding the operation of security mechanisms (encryption, Firewall, biometry, etc.).
E033710 Design Project	group work self-reliant study activities seminar project	oral examination report peer assessment skills test participation	Be able to document a project in a professional way. Be able to make a planning for a large development team and identify the dependencies. Be able to present project results during a final pitch. Be able to identify the risks of a project and design a mitigation plan. Be able to efficiently prepare, organize and lead project reviews.
E003600 Information Theory	lecture seminar: coached exercises project	written examination report open book examination	Compute theoretical bounds for source and channel coding. Compute performance. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding. Recognize the graphical representation of codes. Analyse hard and soft decoding. Compute the optimal quantizer. Use lossless and lossy source coding.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E019400 Information Security	guided self-study seminar: coached exercises project practicum lecture	open book examination report oral examination	Recognising the social and legal aspects of information security. Understanding security services (confidentiality, authentication, etc.). Using security mechanisms to achieve security functions. Recognising the complexity of achieving good information security. Estimating the necessary resources to crack cryptographic security mechanisms. Understanding the operation of security mechanisms (encryption, Firewall, biometry, etc.).
E031710 Research Project	project	participation report assignment	Be aware of ongoing evolutions in the field of interest, improve competence to expert level.
E012320 Mobile and Broadband Access Networks	lecture	written examination	to analyse theoretical concepts in order to explain the operation and limitations of wireless and wired access networks
E003600 Information Theory	lecture	written examination open book examination	Analyse hard and soft decoding. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E033710 Design Project	group work self-reliant study activities seminar project	oral examination report peer assessment skills test participation	Be able to transfer theoretical knowledge from other course to practical applications. Be able to make a planning for a large development team and identify the dependencies. Be able to present project results during a final pitch. Be able to implement the configuration management of complex projects. Be able to identify the risks of a project and design a mitigation plan. Be able to realize a prototype given a stringent time frame and limited means which meets the predefined quality criteria. Be able to efficiently prepare, organize and lead project reviews. Be able to document a project in a professional way.
E003600 Information Theory	lecture seminar: coached exercises project	written examination report open book examination	Compute theoretical bounds for source and channel coding. Compute performance. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding. Recognize the graphical representation of codes. Analyse hard and soft decoding. Compute the optimal quantizer. Use lossless and lossy source coding.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E034140 Parallel Computer Systems	lecture seminar: coached exercises	written examination report open book examination	Understand and be able to describe the architecture and their impact on performance of superscalar processor architectures, shared-memory multiprocessors, multi-threading, datacenters, supercomputers. Understand and be able to describe the impact of technology on parallel computer systems.
E019400 Information Security	guided self-study seminar: coached exercises project practicum lecture	open book examination report oral examination	Recognising the social and legal aspects of information security. Understanding security services (confidentiality, authentication, etc.). Using security mechanisms to achieve security functions. Recognising the complexity of achieving good information security. Estimating the necessary resources to crack cryptographic security mechanisms. Understanding the operation of security mechanisms (encryption, Firewall, biometry, etc.).
E017920 Design of Multimedia Applications	guided self-study practicum lecture	oral examination report skills test	to understand, know, and be able to apply mathematical transformations that form the basis for the encoding and compression of multimedia data to be able to analyze specific functional multimedia applications and to identify the associated technology requirements, and to be able to design and deploy an integrated multimedia application to understand and know current techniques for error detection, resilience, and concealment, and be able to implement (parts of) them to understand and know the structure and functionality of standards for coding of multimedia data to understand and know current techniques for encoding multimedia data, and be able to implement (parts of) them
E031710 Research Project	lecture project	assignment report peer assessment	Communicate also in English about the field of interest.
E033710 Design Project	group work self-reliant study activities seminar project	oral examination report skills test	Be able to document a project in a professional way. Be able to make a planning for a large development team and identify the dependencies. Be able to present project results during a final pitch. Be able to identify the risks of a project and design a mitigation plan. Be able to efficiently prepare, organize and lead project reviews.
E012320 Mobile and Broadband Access Networks	guided self-study seminar: coached exercises practicum lecture	written examination report skills test participation open book examination	to gain insight in network modeling algorithms and their applications/limitations to apply these techniques for routing and design problems in access networks to analyse theoretical concepts in order to explain the operation and limitations of wireless and wired access networks to analyse the behavior of mobile and wireless networks through network simulations to design network protocols for mobile and wireless networks and to optimize protocol parameters to analyse and evaluate access networks and mobile networks in terms of performance and usability for diverse applications
E003600 Information Theory	project	report	Analyse hard and soft decoding. Apply error detection and error correction for soft and hard decoding.
E011322 Queueing Analysis and Simulation	self-reliant study activities	report	To construct a simulation program and to process simulation results
E061330 Machine Learning	guided self-study lecture	report	Understand and critically evaluate the techniques presented in scientific literature on machine learning. Understand the fundamental principles and challenges of machine learning. Analyse a new machine learning problem and address it by correctly applying the principles of machine learning and selecting suitable common machine learning models. Implement simple machine learning models and correctly apply machine learning libraries for more advanced techniques. Understand the mathematical background of some common and advanced machine learning models.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E019400 Information Security	guided self-study seminar: coached exercises project practicum lecture	open book examination report oral examination	Recognising the social and legal aspects of information security. Understanding security services (confidentiality, authentication, etc.). Using security mechanisms to achieve security functions. Recognising the complexity of achieving good information security. Estimating the necessary resources to crack cryptographic security mechanisms. Understanding the operation of security mechanisms (encryption, Firewall, biometry, etc.).
E033710 Design Project	group work self-reliant study activities seminar project	oral examination report peer assessment skills test participation	Be able to transfer theoretical knowledge from other course to practical applications. Be able to make a planning for a large development team and identify the dependencies. Be able to present project results during a final pitch. Be able to implement the configuration management of complex projects. Be able to identify the risks of a project and design a mitigation plan. Be able to realize a prototype given a stringent time frame and limited means which meets the predefined quality criteria. Be able to efficiently prepare, organize and lead project reviews. Be able to document a project in a professional way.
E003600 Information Theory	project	report	Analyse hard and soft decoding. Compute performance. Apply error detection and error correction for soft and hard decoding.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

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

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E031710 Research Project	project	participation report assignment	Cooperate in heterogeneous groups.
E033710 Design Project	group work self-reliant study activities seminar project	oral examination report peer assessment skills test participation	Be able to transfer theoretical knowledge from other course to practical applications. Be able to make a planning for a large development team and identify the dependencies. Be able to present project results during a final pitch. Be able to implement the configuration management of complex projects. Be able to identify the risks of a project and design a mitigation plan. Be able to realize a prototype given a stringent time frame and limited means which meets the predefined quality criteria. Be able to efficiently prepare, organize and lead project reviews. Be able to document a project in a professional way.
E003600 Information Theory	project	report	Analyse hard and soft decoding. Compute performance. Apply error detection and error correction for soft and hard decoding.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E034140 Parallel Computer Systems	lecture seminar: coached exercises	written examination report open book examination	Understand and be able to describe the architecture and their impact on performance of superscalar processor architectures, shared-memory multiprocessors, multi-threading, datacenters, supercomputers. Understand and be able to describe the impact of technology on parallel computer systems.
E019400 Information Security	guided self-study seminar: coached exercises project practicum lecture	open book examination report oral examination	Recognising the social and legal aspects of information security. Understanding security services (confidentiality, authentication, etc.). Using security mechanisms to achieve security functions. Recognising the complexity of achieving good information security. Estimating the necessary resources to crack cryptographic security mechanisms. Understanding the operation of security mechanisms (encryption, Firewall, biometry, etc.).
E017930 Parallel and Distributed Software Systems	practicum seminar: coached exercises self-reliant study activities	written examination report	To apply the basic strategies for solving algorithmic problems associated with parallel and distributed systems. To pay attention to scalability and performance issues at design time. To be able to deliver a basic design for a parallel and distributed application, realize a parallel and distributed application, and estimate performances of different implementation alternatives. To pay sufficient time to evaluate different design alternatives prior to implementation. To evaluate algorithms for standard problems and applying them in the most appropriate way.
E017920 Design of Multimedia Applications	guided self-study practicum	skills test report	to understand, know, and be able to apply mathematical transformations that form the basis for the encoding and compression of multimedia data to be able to analyze specific functional multimedia applications and to identify the associated technology requirements, and to be able to design and deploy an integrated multimedia application to understand and know current techniques for error detection, resilience, and concealment, and be able to implement (parts of) them to understand and know the structure and functionality of standards for coding of multimedia data to understand and know current techniques for encoding multimedia data, and be able to implement (parts of) them
E031710 Research Project	lecture project	assignment report peer assessment	Report on technical or scientific subjects in writing.
E033710 Design Project	group work self-reliant study activities seminar project	oral examination report skills test participation	Be able to document a project in a professional way. Be able to make a planning for a large development team and identify the dependencies. Be able to present project results during a final pitch. Be able to identify the risks of a project and design a mitigation plan. Be able to efficiently prepare, organize and lead project reviews.
E012320 Mobile and Broadband Access Networks	guided self-study seminar: coached exercises practicum lecture	written examination report skills test participation open book examination	to gain insight in network modeling algorithms and their applications/limitations to apply these techniques for routing and design problems in access networks to analyse theoretical concepts in order to explain the operation and limitations of wireless and wired access networks to analyse the behavior of mobile and wireless networks through network simulations to design network protocols for mobile and wireless networks and to optimize protocol parameters to analyse and evaluate access networks and mobile networks in terms of performance and usability for diverse applications
E003600 Information Theory	project	report	Analyse hard and soft decoding. Compute performance. Apply error detection and error correction for soft and hard decoding.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E019400 Information Security	guided self-study seminar: coached exercises project practicum lecture	open book examination report oral examination	Recognising the social and legal aspects of information security. Understanding security services (confidentiality, authentication, etc.). Using security mechanisms to achieve security functions. Recognising the complexity of achieving good information security. Estimating the necessary resources to crack cryptographic security mechanisms. Understanding the operation of security mechanisms (encryption, Firewall, biometry, etc.).
E031710 Research Project	lecture project	participation report peer assessment	Act in an ethical, professional and social way.
E003600 Information Theory	lecture seminar: coached exercises project	written examination report open book examination	Compute theoretical bounds for source and channel coding. Compute performance. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding. Recognize the graphical representation of codes. Analyse hard and soft decoding. Compute the optimal quantizer. Use lossless and lossy source coding.
E061330 Machine Learning	lecture		Understand the fundamental principles and challenges of machine learning.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E019400 Information Security	guided self-study seminar: coached exercises project practicum lecture	open book examination report oral examination	Recognising the social and legal aspects of information security. Understanding security services (confidentiality, authentication, etc.). Using security mechanisms to achieve security functions. Recognising the complexity of achieving good information security. Estimating the necessary resources to crack cryptographic security mechanisms. Understanding the operation of security mechanisms (encryption, Firewall, biometry, etc.).
E033710 Design Project	group work self-reliant study activities seminar project	oral examination report peer assessment skills test participation	Be able to transfer theoretical knowledge from other course to practical applications. Be able to make a planning for a large development team and identify the dependencies. Be able to present project results during a final pitch. Be able to implement the configuration management of complex projects. Be able to identify the risks of a project and design a mitigation plan. Be able to realize a prototype given a stringent time frame and limited means which meets the predefined quality criteria. Be able to efficiently prepare, organize and lead project reviews. Be able to document a project in a professional way.
E003600 Information Theory	lecture seminar: coached exercises project	written examination report open book examination	Compute theoretical bounds for source and channel coding. Compute performance. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding. Recognize the graphical representation of codes. Analyse hard and soft decoding. Compute the optimal quantizer. Use lossless and lossy source coding.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E017920 Design of Multimedia Applications	lecture	oral examination	to understand and know the structure and functionality of standards for coding of multimedia data
E031710 Research Project	project	participation report assignment	Interpret the historical evolution of own field of engineering and its social relevance.
E012320 Mobile and Broadband Access Networks	lecture	written examination	to analyse and evaluate access networks and mobile networks in terms of performance and usability for diverse applications
E003600 Information Theory	lecture seminar: coached exercises project	written examination report open book examination	Compute theoretical bounds for source and channel coding. Compute performance. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding. Recognize the graphical representation of codes. Analyse hard and soft decoding. Compute the optimal quantizer. Use lossless and lossy source coding.
E011322 Queueing Analysis and Simulation	lecture		To master mathematical solution techniques for queueing problems To select the most suitable models, methods and techniques for specific queueing problems
E061330 Machine Learning	lecture		Understand the mathematical background of some common and advanced machine learning models. Understand the fundamental principles and challenges of machine learning.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E003600 Information Theory	lecture seminar: coached exercises project	written examination report open book examination	Compute theoretical bounds for source and channel coding. Compute performance. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding. Recognize the graphical representation of codes. Analyse hard and soft decoding. Compute the optimal quantizer. Use lossless and lossy source coding.
E011322 Queueing Analysis and Simulation	lecture seminar: coached exercises		To assess the performance of queueing systems quantitatively and qualitatively To select the most suitable models, methods and techniques for specific queueing problems To master mathematical solution techniques for queueing problems To construct a simulation program and to process simulation results
E061330 Machine Learning	guided self-study lecture	participation report	Understand the mathematical background of some common and advanced machine learning models. Understand the fundamental principles and challenges of machine learning. Analyse a new machine learning problem and address it by correctly applying the principles of machine learning and selecting suitable common machine learning models. Implement simple machine learning models and correctly apply machine learning libraries for more advanced techniques.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E019400 Information Security	guided self-study seminar: coached exercises project practicum lecture	open book examination report oral examination	Recognising the social and legal aspects of information security. Understanding security services (confidentiality, authentication, etc.). Using security mechanisms to achieve security functions. Recognising the complexity of achieving good information security. Estimating the necessary resources to crack cryptographic security mechanisms. Understanding the operation of security mechanisms (encryption, Firewall, biometry, etc.).
E017930 Parallel and Distributed Software Systems	guided self-study seminar: coached exercises self-reliant study activities practicum lecture	written examination report skills test participation	To evaluate algorithms for standard problems and applying them in the most appropriate way. To pay attention to scalability and performance issues at design time. To be able to deliver a basic design for a parallel and distributed application, realize a parallel and distributed application, and estimate performances of different implementation alternatives. To pay sufficient time to evaluate different design alternatives prior to implementation.
E017920 Design of Multimedia Applications	lecture	oral examination	to understand and know current techniques for encoding multimedia data, and be able to implement (parts of) them to be able to analyze specific functional multimedia applications and to identify the associated technology requirements, and to be able to design and deploy an integrated multimedia application to understand and know current techniques for error detection, resilience, and concealment, and be able to implement (parts of) them to understand and know the structure and functionality of standards for coding of multimedia data
E033710 Design Project	group work self-reliant study activities seminar project	oral examination report skills test	Be able to transfer theoretical knowledge from other course to practical applications. Be able to make a planning for a large development team and identify the dependencies. Be able to present project results during a final pitch. Be able to implement the configuration management of complex projects. Be able to identify the risks of a project and design a mitigation plan. Be able to realize a prototype given a stringent time frame and limited means which meets the predefined quality criteria. Be able to efficiently prepare, organize and lead project reviews. Be able to document a project in a professional way.
E012320 Mobile and Broadband Access Networks	guided self-study seminar: coached exercises practicum lecture	written examination report skills test participation open book examination	to gain insight in network modeling algorithms and their applications/limitations to apply these techniques for routing and design problems in access networks to analyse theoretical concepts in order to explain the operation and limitations of wireless and wired access networks to analyse the behavior of mobile and wireless networks through network simulations to design network protocols for mobile and wireless networks and to optimize protocol parameters to analyse and evaluate access networks and mobile networks in terms of performance and usability for diverse applications
E003600 Information Theory	lecture seminar: coached exercises project	written examination report open book examination	Compute theoretical bounds for source and channel coding. Compute performance. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding. Recognize the graphical representation of codes. Analyse hard and soft decoding. Compute the optimal quantizer. Use lossless and lossy source coding.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E019400 Information Security	guided self-study seminar: coached exercises project practicum lecture	open book examination report oral examination	Recognising the social and legal aspects of information security. Understanding security services (confidentiality, authentication, etc.). Using security mechanisms to achieve security functions. Recognising the complexity of achieving good information security. Estimating the necessary resources to crack cryptographic security mechanisms. Understanding the operation of security mechanisms (encryption, Firewall, biometry, etc.).
E031710 Research Project	project	assignment	Report on technical or scientific subjects in writing.
E033710 Design Project	group work self-reliant study activities seminar project	participation peer assessment	Be able to transfer theoretical knowledge from other course to practical applications. Be able to make a planning for a large development team and identify the dependencies. Be able to present project results during a final pitch. Be able to implement the configuration management of complex projects. Be able to identify the risks of a project and design a mitigation plan. Be able to realize a prototype given a stringent time frame and limited means which meets the predefined quality criteria. Be able to efficiently prepare, organize and lead project reviews. Be able to document a project in a professional way.
E003600 Information Theory	lecture seminar: coached exercises project	written examination report open book examination	Compute theoretical bounds for source and channel coding. Compute performance. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding. Recognize the graphical representation of codes. Analyse hard and soft decoding. Compute the optimal quantizer. Use lossless and lossy source coding.
E011322 Queueing Analysis and Simulation	lecture seminar: coached exercises	written examination with open questions	To assess the performance of queueing systems quantitatively and qualitatively To select the most suitable models, methods and techniques for specific queueing problems To master mathematical solution techniques for queueing problems To construct a simulation program and to process simulation results
E061330 Machine Learning	guided self-study lecture		Understand the mathematical background of some common and advanced machine learning models. Understand the fundamental principles and challenges of machine learning. Analyse a new machine learning problem and address it by correctly applying the principles of machine learning and selecting suitable common machine learning models. Implement simple machine learning models and correctly apply machine learning libraries for more advanced techniques.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

<< **EMingwALG6.4 Possess sufficient ready knowledge and understanding to evaluate the results of complex calculations, or make approximate estimates.** *Profession-specific competence*

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E034140 Parallel Computer Systems	lecture seminar: coached exercises	written examination open book examination	Understand and be able to describe the architecture and their impact on performance of superscalar processor architectures, shared-memory multiprocessors, multi-threading, datacenters, supercomputers. Understand and be able to describe the impact of technology on parallel computer systems.
E017930 Parallel and Distributed Software Systems	guided self-study seminar: coached exercises self-reliant study activities practicum lecture	written examination report skills test participation	To apply the basic strategies for solving algorithmic problems associated with parallel and distributed systems. To pay attention to scalability and performance issues at design time. To be able to deliver a basic design for a parallel and distributed application, realize a parallel and distributed application, and estimate performances of different implementation alternatives. To pay sufficient time to evaluate different design alternatives prior to implementation. To evaluate algorithms for standard problems and applying them in the most appropriate way. To be able to explain the differences between different parallel and distributed programming models.
E012320 Mobile and Broadband Access Networks	guided self-study seminar: coached exercises practicum lecture	written examination report skills test participation open book examination	to gain insight in network modeling algorithms and their applications/limitations to apply these techniques for routing and design problems in access networks to analyse theoretical concepts in order to explain the operation and limitations of wireless and wired access networks to analyse the behavior of mobile and wireless networks through network simulations to design network protocols for mobile and wireless networks and to optimize protocol parameters to analyse and evaluate access networks and mobile networks in terms of performance and usability for diverse applications
E003600 Information Theory	lecture seminar: coached exercises project	written examination report open book examination	Compute theoretical bounds for source and channel coding. Compute performance. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding. Recognize the graphical representation of codes. Analyse hard and soft decoding. Compute the optimal quantizer. Use lossless and lossy source coding.
E091103 Master's Dissertation	master's dissertation	oral examination assignment	Define, study and analyse the research problem in a specific domain. Give proof of independency, motivation, dedication, drive to innovation and creativity, initiative and perseverance. Self-assessment with adequate and critical self-correction and objectivity. Communicate adequately on the research, the results and problems, present and found them, both to colleagues as to laypeople. Render and synthesise the results concisely. Critically analyse, formulate, study, execute and/or process different aspects in the execution of research (literature search, topical study, research and the reflection on the research, experiments, experimentations, designs, simulations, results, conclusions,…). Find an appropriate methodology, in accordance with the applicable scientific norms of the specific field of study.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E033710 Design Project	group work self-reliant study activities seminar project	oral examination report peer assessment skills test participation	Be able to document a project in a professional way. Be able to make a planning for a large development team and identify the dependencies. Be able to present project results during a final pitch. Be able to implement the configuration management of complex projects. Be able to identify the risks of a project and design a mitigation plan. Be able to realize a prototype given a stringent time frame and limited means which meets the predefined quality criteria. Be able to efficiently prepare, organize and lead project reviews.
E012320 Mobile and Broadband Access Networks	guided self-study seminar: coached exercises practicum lecture	written examination report skills test participation open book examination	to gain insight in network modeling algorithms and their applications/limitations to apply these techniques for routing and design problems in access networks to analyse theoretical concepts in order to explain the operation and limitations of wireless and wired access networks to analyse the behavior of mobile and wireless networks through network simulations to design network protocols for mobile and wireless networks and to optimize protocol parameters to analyse and evaluate access networks and mobile networks in terms of performance and usability for diverse applications

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E034140 Parallel Computer Systems	lecture seminar: coached exercises	written examination open book examination	Understand and be able to describe the architecture and their impact on performance of superscalar processor architectures, shared-memory multiprocessors, multi-threading, datacenters, supercomputers. Understand and be able to describe the impact of technology on parallel computer systems.
E019400 Information Security	guided self-study seminar: coached exercises project practicum lecture		Recognising the social and legal aspects of information security. Understanding security services (confidentiality, authentication, etc.). Using security mechanisms to achieve security functions. Recognising the complexity of achieving good information security. Estimating the necessary resources to crack cryptographic security mechanisms. Understanding the operation of security mechanisms (encryption, Firewall, biometry, etc.).
E012320 Mobile and Broadband Access Networks	guided self-study seminar: coached exercises practicum lecture	written examination report skills test participation open book examination	to gain insight in network modeling algorithms and their applications/limitations to apply these techniques for routing and design problems in access networks to analyse theoretical concepts in order to explain the operation and limitations of wireless and wired access networks to analyse the behavior of mobile and wireless networks through network simulations to design network protocols for mobile and wireless networks and to optimize protocol parameters to analyse and evaluate access networks and mobile networks in terms of performance and usability for diverse applications
E003600 Information Theory	lecture seminar: coached exercises project	written examination report open book examination	Compute theoretical bounds for source and channel coding. Compute performance. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding. Recognize the graphical representation of codes. Analyse hard and soft decoding. Compute the optimal quantizer. Use lossless and lossy source coding.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E019400 Information Security	guided self-study seminar: coached exercises project practicum lecture	open book examination report oral examination	Recognising the social and legal aspects of information security. Understanding security services (confidentiality, authentication, etc.). Using security mechanisms to achieve security functions. Recognising the complexity of achieving good information security. Estimating the necessary resources to crack cryptographic security mechanisms. Understanding the operation of security mechanisms (encryption, Firewall, biometry, etc.).
E033710 Design Project	group work self-reliant study activities seminar project	oral examination report peer assessment skills test participation	Be able to document a project in a professional way. Be able to make a planning for a large development team and identify the dependencies. Be able to present project results during a final pitch. Be able to identify the risks of a project and design a mitigation plan. Be able to realize a prototype given a stringent time frame and limited means which meets the predefined quality criteria. Be able to efficiently prepare, organize and lead project reviews.
E012320 Mobile and Broadband Access Networks	guided self-study seminar: coached exercises practicum lecture	written examination report skills test participation open book examination	to gain insight in network modeling algorithms and their applications/limitations to apply these techniques for routing and design problems in access networks to analyse theoretical concepts in order to explain the operation and limitations of wireless and wired access networks to analyse the behavior of mobile and wireless networks through network simulations to design network protocols for mobile and wireless networks and to optimize protocol parameters to analyse and evaluate access networks and mobile networks in terms of performance and usability for diverse applications
E003600 Information Theory	lecture seminar: coached exercises project	written examination report open book examination	Compute theoretical bounds for source and channel coding. Compute performance. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding. Recognize the graphical representation of codes. Analyse hard and soft decoding. Compute the optimal quantizer. Use lossless and lossy source coding.

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

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E033710 Design Project	group work self-reliant study activities seminar project	oral examination report skills test participation	Be able to document a project in a professional way. Be able to make a planning for a large development team and identify the dependencies. Be able to present project results during a final pitch. Be able to identify the risks of a project and design a mitigation plan. Be able to realize a prototype given a stringent time frame and limited means which meets the predefined quality criteria. Be able to efficiently prepare, organize and lead project reviews.

Course	Teaching methods	Evaluation methods	Course learning outcome
*Noot: leer- en evaluatievormen voorafgegaan door ** werden niet teruggevonden in de studiefiche*			
E033710 Design Project	group work self-reliant study activities seminar project	oral examination report peer assessment skills test participation	Be able to transfer theoretical knowledge from other course to practical applications. Be able to make a planning for a large development team and identify the dependencies. Be able to present project results during a final pitch. Be able to implement the configuration management of complex projects. Be able to identify the risks of a project and design a mitigation plan. Be able to realize a prototype given a stringent time frame and limited means which meets the predefined quality criteria. Be able to efficiently prepare, organize and lead project reviews. Be able to document a project in a professional way.
E003600 Information Theory	lecture seminar: coached exercises project	written examination report open book examination	Compute theoretical bounds for source and channel coding. Compute performance. Apply error detection and error correction for soft and hard decoding. Apply Viterbi decoding. Recognize the graphical representation of codes. Analyse hard and soft decoding. Compute the optimal quantizer. Use lossless and lossy source coding.
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.