THE HAGUE
UNIVERSITY OF
APPLIED SCIENCES

Academic Guide

Faculty of Technology, Innovation & Society

The Hague University of Applied Sciences

Quality Education in an International Environment

THE HAGUE
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FACULTY TECHNOLOGY, INNOVATION & SOCIETY

We have 2 campuses in The Hague and the surrounding region.

Our main campus is very centrally placed, close to the National Parliament and world famous international organisations such as the International Criminal Court.

The main campus is entirely surrounded by water, a kind of city within a city. Life on campus revolves around the magnificent oval atrium hall, with its soaring glass ceiling.

Our campus in Delft is in a rich city and a hub for technology, history, creativity and innovation. The popular tourist and business centre built on reclaimed 'polder' land, is well known for its House of Orange royal heritage, old churches, canals, blue delftware pottery and Golden Age painter Vermeer.

This vibrant and historic city is also a technical and scientific hub with its clusters of research centres and environmental technology companies. The perfect place to nurture your technical, creative and analytical skills.

Introduction Faculty Technology, Innovation & Society

The keywords here are co-production , reflection, networking , energy and inspiration. How we handle our operational processes (operational excellence) lies at the very core of this approach.

Co-production means giving preference, as a network establishment, to collaborating to the fullest extent possible with students, the education sector, the business community and our international partners when designing our offering. In our network, we constantly seek people with the right energy and draw on each other's inspiration. Continual evaluation of the programmes with the professional field committees is one aspect of this approach, as is the sharing of subject-related material with your colleagues, expressing our international outlook by adopting the CDIO global model for engineering education and through the important EPS[1] network and redeveloping academic advisory services in co-production with students, lecturers and a research group.

We regard technology as the engine of innovation. We want to stand out as a technology faculty by educating engineers who take an innovative and interdisciplinary approach, motivated by social urgency and current assignments and with a realistic mindset: engineers who create but also ensure that their creations are sustainable and economically and socially viable. Our engineers are able to connect innovations with business in the broadest sense.

We want our students to be happy and successful. When a person is empowered, they can change their world. With this in mind, we want to coach people in their development and offer them access to relevant networks. This gives them the opportunity to develop their professional identity. Of course, global citizenship also comes into play here, and this applies to all the partners in our network. We will form a hub, a knowledge and learning platform within a network, for and with everyone.

[1] European Project Semester

Welcome

We take great pride in our partnerships around the world and are very happy to welcome exchange students in our programme. This guide provides you with the information on our subjects and when they are offered.

We hope that all our guest students enjoy their stay in The Netherlands and that they will thrive from the challenges and opportunities the Faculty Technology, Innovation & Society has to offer them. We shall certainly do everything possible to make their stay with us rewarding and look forward to having you here.

The following international minors/programs will be offered from September 2016.
See for more information about courses in English language on our website .

The information on our fulltime English courses Process & Food Technology and Industrial design Engineer you can find on their respective website:

http://www.thehagueuniversity.com/bachelor-studies/bachelor-degree-programmes/process-food-technology/programme-feature

http://www.thehagueuniversity.com/bachelor-studies/bachelor-degree-programmes/industrial-design-engineering/programme-feature

Block 1 (Sep 2016 – Nov 2016)

Mark choice	Study / course [1]	Location [2]	Credits (ECTS)
0	**EPS Smart Robotics and Manufacturing** [2) 3)]	**Delft**	**30**
0	**EPS Hydraulic Engineering [3] : consisting of** **- Immersed Flood barrier** **- River Engineering**	**The Hague**	**30**
0	**EPS program Formula Student [2 3]**	**Delft**	**30**
0	**EPS and Minor program Packaging Design & Innovation [3]**	**The Hague**	**30**
0	**IDE/Module 1.1.: Society and You [4]**	**The Hague**	**15**
0	IDE/Project Communities		6
0	IDE/Cultural Differences		3
0	Visualization & Communication 1		3
0	Personal Branding		3
0	**IDE/Module 1.2.: Design Project 1 [4]**	**The Hague**	**15**
	Design Project 1		6
	Business Modeling		3
	Materials & Manufacturing		3
	Prototyping & Craftsmanship 1		3
0	**IPO Minor Product Realization**	**The Hague**	**15**
0	**Minor Robotics and vision design 1 & 2** [2) 3)]	**Delft**	**30**
0	**Minor Smart Energy Management & Design**	**Delft /The**	**15**
0	**Minor Embedded Systems 1 & 2** [2) 3)]	**Delft**	**30**

1) Note: Some courses are offered in one block period (half semester) per year only, other courses are offered twice a year.

2) Delft is a city in the direct environment of The Hague. Travel costs are applicable if the student lives in one city and takes courses in another city.

3) This project is for the duration of a semester. Motivation letter is required to send to EPS@hhs.nl.

4) Following an Industrial Design Major program is required

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Block 2 (Nov 2016 – Feb 2017)

Mark choice	Study / course [1]	Location [2]	Credits (ECTS)
0	**Minor The Many Faces of Globalization**	**The Hague**	**15**
0	**Minor Robotics and vision design 2 (must have followed 1)**	**Delft**	**15**
0	**IDE/Module 1.2: Futuring [4]**	**The Hague**	**15**
	Project Future		6
	Basics of Technology		3
	Mechanics & Maths		3
	Visualization & Communication 2		3
0	**IDE/Module 2.2.:Design Project 2 [4]**	**The Hague**	**15**
	Design Project 2		6
	Construction & Requirements		3
	Prototyping & Craftsmanship 2		3
	User involvement		3
0	**Minor Advanced Product Optimization (follow up of Product Realization)**		15

Block 3 (Feb 2017 – Apr 2017)

Mark choice	Study / course [1]	Location [2]	Credits (ECTS)
0	**EPS Smart Robotics and Manufacturing** [2] [3]	**Delft**	**30**
0	**EPS program Formula Student [2] [3]**	**Delft**	**30**
0	**IDE/Module 1.3.: People [4]**	**The Hague**	**15**
	Project Society & You		6
	Design Exploration		3
	User research		3
	Visualization & Communication 3		3
0	**IDE/Module 2.3.: Design Project 3 [4]**	**The Hague**	**15**
	Design Project 3		9
	Production preparation		3
	Prototyping & Craftsmanship 3		3

Block 4 (Apr 2017 – Jul 2017)

Mark choice	Study / course [1]	Location [2]	Credits (ECTS)
0	**IDE/Module 1.4.: Solutions [4]**	**The Hague**	**15**

	Project Create the Solution		9
	Implementing Business & Products		3
	Visualization & Communication 4		3

1) Note: Some courses are offered in one block period (half semester) per year only, other courses are offered twice a year.
2) Delft is a city in the direct environment of The Hague. Travel costs are applicable if the student lives in one city and takes courses in another city.
3) This project is for the duration of a semester. Motivation letter is required to send to EPS@hhs.nl.
4) Following an Industrial Design Major program is required.

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Description of the subjects and minors offered to exchange students

EPS Smart Manufacturing and Robotics 1

Starts in block 1 and in block 3

Title & language	**Smart Manufacturing & Robotics 1 (SMR1)** (English)
Type	In-depth minor (see 'Entry requirements')
Organising department/ programme	Faculty Technology, Innovation & Society Delft/ Mechanical Engineering
Contact person	ir. T. Brilleman (Thijs) t.brilleman@hhs.nl +31 15 – 260 6270
General objectives	After completing this minor the student has the following technical abilities: Program actual industrial robots; Integrate robots into production lines; Design flexible, automated production lines; After completing this minor the student has the following facility design abilities: • Design new production facilities; • Optimize existing production facilities; • Simulate entire factories; • Design factory logistics.

Summary of contents	The global competitive landscape of manufacturing is rapidly changing due to the onset of advanced manufacturing technologies. Smart manufacturing combines the advantages of mass production and piecewise production to bring about a fundamental change in the way production processes designed, built and executed. This industrial robot automation focused minor prepares you – by hands-on practice and theory – for this change. You will learn to design and simulate an entire factory as well as program our own industrial robots.
Indication of target group	All (international) students with a technical affinity.
Entry requirements	• Basic knowledge of production technologies. • 90 ECTS (PROPAEDEUTIC points do not count). • Sufficient English ability to be able to participate in group work, understand lectures and written materials. Note: International students may gain access after three years (or an equivalent of 135 ECTS) of university education. Please contact the minor coordinator for details.
Competency levels	At the end of this minor you will have met the Bachelor end standards of the following competencies: Executing a feasibility study of a factory automation project (research) Creating a conceptual factory automation design (design) Creating a detailed automated factory design (design) Drawing up of factory automation project plan (planned operation) Self-management (individual/group)
	All competencies except professionalization are expected to be available (previously proven) at the level that is required for the major of Mechanical Engineering, which is coupled to the Bachelor of Engineering standard.

Description of tests and minimum pass rate	Courses in the minor are examined in the following manner. Project: Group report incl. robot code (decimal grade) Presentation incl. robot demonstration (pass/fail) Personal oral examination (pass/fail) Contribution to project work (decimal grade) Intercultural and English communication course (pass/fail) Robot practicum: participation (pass/fail) Automation and Robotics: Written examination (decimal grade) Design for assembly: portfolio (decimal grade) Subjects*: • Enterprise dynamics: portfolio (pass/fail) • Internal logistics: portfolio (pass/fail) For all parts of the project and all courses at least a result of 5,5 out of 10 needs to be obtained after re-examination. Practical work can be passed by active participation. If all parts are passed on these terms, the minor is completed. Examination will take place in the 8th week of the term and reexamination in the 10th (final) week of the term. Project product demonstration will be expected in the 9th week of the term. **Subject names may be subject to change.*
Teaching methods + study load	EPS cluster project "Implement a real robot in a real production line" (total: 10 ECTS): 6 ECTS: Project including robotics practicum and ICC and English course 2 ECTS: Automation and Robotics ECTS: Design for assembly ECTS: Enterprise dynamics 2 ECTS: Internal logistics • Lectures: 7 hours per week during 7 weeks • Practicums: 4 hours per week during 7 weeks Projects: 7 hours per week during 8 weeks
Contact hours	Approximately 15 hours per week
Study aids	• Various books • readers and documentation Details will be announced later
Partners	The project (or parts of it) may be executed in cooperation with local companies working in the international market. Excursions will take place to local companies working in the international market.
Minimum- and maximum participation	Minimum: 12 students, maximum: 30 students.
Fulltime / part-time and Term	Fulltime, twice a year in the first term of both semesters (blocks 1 and 3)
Subject themes (more than one possible)	Technology & Design

Miscellaneous	The minor will be taught entirely in English.
OSIRIS code	W-HMVT16-SMR1

Title & language	**Smart Manufacturing & Robotics 2 (SMR2)** (English)
Type	In-depth minor (see 'Entry requirements')
Organising department/ program	Faculty Technology, Innovation & Society Delft/ Mechanical Engineering
Contact person	dr. ir. F.M. de Wit (Frederik) f.m.dewit@hhs.nl 015 – 260 6264
General objectives	Learning to deploy robots in manufacturing environments. Gaining practical knowledge and skills in programming production robot setups and implementing the use of external sensors and actuators in these setups. Gaining theoretical knowledge and practical skills in welding and adhesive bonding technology. Learning to use and independently apply integrated product design in a (small) working production line project. Setting up and building a (small) fully functional production line for simple and low-volume customizable products.
Summary of contents	In industry, automation of manufacturing has become widely implemented for mass products. In the nearby future, a need will however arise for specialized automation of joining techniques, due to shrinking qualified labor force. Next to welding, adhesive bonding can for many industries be considered an upcoming joining technique, although it has already been applied often in, for instance, the automotive industry. For both welding as well as adhesive bonding, specialized knowledge is a prerequisite for successful implementation in practical (automated) situations. Also, skills in welding and adhesive bonding form a major contribution to the insights into applying both techniques in practice. Practical courses in both topics will be offered with partners at external locations. Integrating into the design external input signals from sensors and actuators forms an essential part to creating "smart" robots. To be able to approach the design of these processes, students will have to apply a holistic (integral) method which takes into account not only the programming of robots, but also all auxiliary systems and logistics of manufacturing. The group project will have clear links to industrial application and will therefore form a challenge not only on a technical level, but also on working in a business-like team, dealing with decision-making and deadlines.
Indication of target group	(International) students following courses in Mechanical Engineering, Mechatronics or possibly Industrial Design Engineering with an interest

	in manufacturing techniques as well as the automation of industrial production. Obligatory is to have completed minor SMR1.

Entry requirements	Students are expected to have a basic but broad understanding of materials engineering. Students should have proven technical design and group project work skills. Preferably one or more internships in industry should have been completed. As a measure of qualification, a minimum of 90 ECTS after the first year should have been obtained before enrolling in the course. Obligatory is to have completed minor SMR1.
Competency levels	Expected student competency level reached by the end of the minor, level 3, meaning guided (passive) and complex environment or independent and difficult environment or guiding (active) and simple environment: Technical competencies with regard to manufacturing technology: Executing a feasibility study of an automated production process (research) at level 3 Creating a conceptual design of an automated production process (design) at level 3 Creating a detailed part of a production, e.g. of sensors connected to an automated production process, equipment needed for welding/adhesive bonding (design) at level 3 Optimization of a product, e.g. process equipment, automation process at level 3 Maintenance and upkeep of a product, e.g. process equipment at level at level 3 General competencies as bachelor of engineering in an industrial setting: Drawing up of project plan (planned operation) of an automated production process at level 3 Self-management (individual/group) at level 3 Detailed examples of competency levels will have to be provided in an individual reflection report. For more general examples, we refer to the specific competency set for the Mechanical Engineering

European Project Semester Formula Student part 1

Start in block 1 and in block 3

Parts	Minorspecifications International Project 1
Titel van de minor Title	EPS Formula Student International Project 1 (IP1)
Categorie minor Type of minor	*Broadening* minor with entry requirements.
Aanbiedende faculteit / opleiding / lectoraat Organising faculty	Faculty Technology, Innovation & Society Technical Business
Contactpersoon Contactperson	P. Menger p.menger@hhs.nl +31 15 260 62 41 | +31 6 20 77 01 54
Algemene doelstelling General objectives	This minor is the first of two minors. This minor is continued by the minor International Project 2 (IP2). In the environment of a complex multidisciplinary engineering project students originating from several European and non-European countries will broaden and/or deepen their professional knowledge and skills depending on their discipline, interest and experience within one of the three main processes of the project, i.e. 1. Project Management Managing the team members in the engineering and support processes on the strategic level and on the operational level. This means setting up and controlling vision, mission, strategy, planning and control on the basis of all kinds of budgets (mass, energy, volume, finance, …). Performance control of all engineering and support processes, meaning diagnosing of and intervening in these processes. 2. Engineering Depending on the phase of the project and the discipline of the student (mechanical engineering, electronics, computer science, physics, mathematics, mechatronics, etc, etc) he/she will make a contribution to the orientation phase (setting system and subsystem requirements), design phase (ideas, concepts, designs), construction phase (procurement, assembling, production), application or consumers phase (performance, participating international contests). 3. Support The support processes are in the domains of marketing, communication, information management, human resource management, public relations, finance, fund raising etc. Students will develop business objectives, plans of approach and execute them. The added value of these type of projects for students is the experience of working in a team that is both international and multidisciplinary. Students need to learn to deal with the complexity of the project that arises from the strong entanglement between the disciplines (and thus the personal assignments of the students) and the level of

Parts	Minorspecifications International Project 1
	ambition (mostly international contests and/or the application of advanced technologies) as well as with different cultural perspectives among the project members. 'Standard' competencies are thus broadened in a highly ambitious environment. This implies the development of both technical knowledge and (inter)personal and cross-cultural skills to the next level.
Korte weergave inhoud Summary of contents	Student will participate in one of the projects below. The selection of the project is done in a mandatory intake (see 'entry requirements') before the minor starts. Project assignments are subject to change, because they are based on actual demand from the relevant industries and relations with other institutes. **Living Lab "Sustainable mobility"** This lab runs various projects on the topic of sustainable mobility: • ***Sustainable Urban Vehicle*** *(SUV)* The ultimate aim of this project is to produce an electric powered car designed for passenger and/or cargo transport in the urban area of the city of Delft. The project includes quantifying the vehicle's ecological footprint. The state-of-the-art technology used will of course take into account sustainability and user-friendliness. • ***Formula Student*** *(FOS)* Aim is to build a race car that will compete in a race in Silverstone 2017 and maybe in Germany and Austria as well. • ***Human Powered Vehicles*** This is a new project started in February 2016 in which urban mobility is realized based on human power. **Living Lab "Greenhouses of the Future"** • ***Monibot-X*** This development setting will be used to monitor plant growth using robots. The MoniBot-X project includes the development of monitoring techniques using sensors and driven and/or flying robots. It sets a real challenge for applying technology to food production. We are collaborating with companies such as Metazet and development institutions.
Einddoelen / competenties Competency levels	The student has shown that he/she can perform successfully as a young professional in a complex multidisciplinary engineering project on the next four aspects, i.e. 1. Technical aspect: he/she has completed a personal technical or business oriented assignment in one of the three main processes (see above) of the project. Skills involved are creative thinking, designing and improving, testing, producing, project reviewing, reporting in word and writing. 2. Interpersonal aspect: he/she has cooperated with his/her fellow team members to accomplish his/her task; has taken responsibility of his/her own and project tasks and obligations. Skills concerned are cooperation, accepting and dealing with previous results, conflict handling, decision making, information exchange and networking, keeping up to norms and values of the project team. 3. Personal aspect: he/she has shown to be critical on his own performance and has taken action to align up his/her knowledge, skills and personality to the

Parts	Minorspecifications International Project 1

project goals and processes. Skills involved are reflection, giving feedback, dealing with feedback and developing personal skills.

4. Intercultural aspects[1]:

Cultural empathy: awareness and understanding of feelings, thoughts, behaviour of persons with a different cultural perspective. Open mindedness towards people from another culture

Social initiative: the ability to be out-going, to enter into contact with persons from other cultures.

Flexibility: the ability to switch from one behavior to another, depending on the cultural context.

Cultural consciousness: a combination of intercultural knowledge, self-consciousness and confidence to deal with various cultural and interpersonal situations

Tolerance of ambiguity: the ability to deal with insecurity and indistinct situations. Emotional stability is a factor that contributes to a high score on this dimension.

5. Language: Students have improved their English language skills spoken and written.

In the IP1 minor the student will demonstrate these competences in a complex environment with intense guidance and coaching in the form of workshops, lectures and personal and group coaching.

Note: In the next minor IP2 the same competences will be deepened with less workshops and lectures. The student will have a more ambitious assignment and more responsibility for his/her own production and learning process. Guidance will be by personal and group coaching.

This minor is meant for students from all educations in the engineering domain. Therefore the competencies are described at top level according to the profile for the Bachelor of Engineering[2].

Competences Bachelor of Engineering	**Level**
Understanding the assignment or problem situation	2
Designing the product, service or control	2
Elaboration on and planning of project, tasks or activities	2
Execution of the tasks according to the planning	2

International and intercultural competences	**Level**
Communication in an international and multicultural context	2
Cooperation in an international and multicultural context	2

Personal development	**Level**
Reflection on own performance	1

Doelgroep Indication of target group	Engineering students of The Hague University of Applied Sciences, but also students interested in project management, marketing, communications, human resource

[1] Studie of stage in het buitenland en het verwerven van internationale competenties door studenten van De Haagse Hogeschool, Dr. J.H.C. Walenkamp en Dr. R.F.M. van den Hoven, 2011

[2] HBO-Raad, Cluster Engineering (2006), Profiel van de Bachelor of Engineering.

Parts	Minorspecifications International Project 1
	management and /or finances. Students of above mentioned educations originate from all over Europe.
Samenwerkingspartners Partners	Educations of The Hague University of Applied Sciences, ENIM, companies and sponsors.
Ingangseisen Entry requirements	As the student will be involved in a complex multidisciplinary project the entry requirements are as follows: 1. A match has to be made between available assignments within a specific project and the student. This is done in a mandatory personal interview with the senior project leader. For this the student has to send in an application letter including a detailed portfolio / curriculum vitae and grades to the contact person of this minor. 2. The student has mastered English spoken and written and will show this in an intake interview.
Werkvormen + verdeling van de studielast Teaching methods + studyload	Study load is 420 hrs = 15 credit points (cp) • Project and Personal Coaching: 24 hrs • Project Management Courses: 86 hrs • Project Work: 276 hrs • Languages & Culture: 28 hrs • Social Activities: 6 hrs[3]
Contacturen per week Contact hours	With team: full time (40 hrs/wk), including personal coaching of 1 hr/wk.
Toetsing en minimumeisen voor een voldoende Description of tests and minimum pass rate	The assessment is done on the basis of the following deliverables of the personal assignments 1) Technical report and observations by the guiding lecturer on performance as member of the project team. 2) Oral reflection on the basis of personal process report on mutual cooperation and own performance. Minimum requirements for adequate performance: 1) Technical report in readable English , meeting the requirements of methodology and knowledge that the own education imposes on an internship report or otherwise a generally accepted way of reasoning in problem analysis , quantitative research including conclusion and recommendations or otherwise reflection from a preselected professional perspective on one or more processes within the project. Partial grade is expressed as a number C1 between 0 and 10. 2) Additional courses on project management and/or systems engineering and/or cultural differences and/or English language. Partial grade C2 is expressed as a number between 0 and 10. 3) Process report in readable English with at least five fully elaborated incidents. Partial grade is expressed in 'pass' or 'fail'. The overall assessment is expressed in the final grade is a weighted averaging of the above figures: Final grade (C): C= 0,7 x C1 + 0,3 x C2. In order to be awarded this grade, the process report should have been graded with 'pass'.

[3] Due to rounding errors numbers may not add up correctly to 420 hrs.

Parts	Minorspecifications International Project 1
	The final grade is transformed to the standards of the own education. In case of minor omissions a second chance is given in terms of a complement of the assignment. If a student shows severe malpractice and/or misbehaviour he/she is removed from the course and a second chance is given in another project if available and suitable.
Leer(hulp)middelen Study aids	Blackboard, handouts, readers, project archive. Books related to own assignment and personal learning goals. Students are stimulated to consult academic libraries as well as visiting conferences/symposia/exhibitions etc.
Minimum- en maximumdeelname Minimum- and maximum participation	N/A.
Blok / lint en periode van uitvoering Fulltime / parttime and Term	The minor is offered fulltime form early September as well as from early February for a period of 10 weeks.
Themavelden (meerdere keuzes mogelijk) Subject themes (more than one possible)	X Economics & marketing X Computer Science X Management, organization, human resources X Technology and Design X International themes X Public relations
Bijzonderheden Miscellaneous	This minor and the minor International Project 2 are considered as a whole lasting in total one semester. This minor is executed in combination with the minor 'Living Labs'.
OSIRIS code	TBK-HMVT14-IP1

European Project Semester Formula Student part 2

Start in block 2 and in block 4

Parts	Minor specifications International Project 2
Titel v.d. minor Title	International Project 2 (IP2)
Categorie minor Type of minor	*Deepening* minor with entry requirements.
Aanbiedende faculteit / opleiding Organising faculty	Faculty Technology, Innovation & Society Technical Business
Contactpersoon Contactperson	P. Menger p.menger@hhs.nl +31 15 260 62 41 | +31 6 20 77 01 54
Algemene doelstelling General objectives	This minor is a continuation of the minor International Project 1 (IP1). The competences developed in the previous minor IP1 are deepened by completing a more ambitious assignment with more own responsibility for project work and learning processes.
Korte weergave inhoud Summary of contents	The student completes his assignment started in the previous minor, i.e. International Project 1.
Einddoelen / competenties Competency levels	For a detailed description of the competency levels see International Project 1. The competencies are described at top level according to the profile for the Bachelor of Engineering[4].

Competences Bachelor of Engineering	**Level**
Understanding the assignment or problem situation	3
Designing the product, service or control	3
Elaboration on and planning of project, tasks or activities	3
Execution of the tasks according to the planning	3

International and intercultural competences	**Level**
Communication in an international and multicultural context	3
Cooperation in an international and multicultural context	3

[4] HBO-Raad, Cluster Engineering (2006), Profiel van de Bachelor of Engineering.

	Personal development | **Level** Reflection on own performance | 2
Doelgroep Indication of target group	Engineering students of The Hague University of Applied Sciences, but also students interested in project management, marketing, communications, human resource management and /or finances. Students of above mentioned educations originate from all over Europe.
Samenwerkingspartners Partners	Educations of The Hague University of Applied Sciences, ENIM, companies and sponsors.
Ingangseisen Entry requirements	This minor is a deepening of the minor International Project 1 (IP1). The project work is continued on a higher level of ambition and development. Therefore this minor can only be followed if the student has successfully completed minor IP1.
Werkvormen + verdeling van de studielast Teaching methods + studyload	Study load is 420 hrs = 15 credit points (cp)[5] • Project and Personal Coaching: 24 hrs • Project Management Courses: 86 hrs • Project Work: 276 hrs • Languages & Culture: 28 hrs • Social Activities: 6 hrs[6]
Contacturen per week Contact hours	With team: full time (40 hrs/wk), including personal coaching of 1 hr/wk.
Toetsing en minimumeisen voor een voldoende Description of tests and minimum pass rate	The assessment is done on the basis of the following deliverables of the personal assignments 3) Technical report and observations by the guiding lecturer on performance as member of the project team. 4) Oral reflection on the basis of personal process report on mutual cooperation and own performance. Minimum requirements for adequate performance: 4) Technical report in readable English , meeting the requirements of methodology and knowledge that the own education imposes on an internship report or otherwise a generally accepted way of reasoning in problem analysis , quantitative research including conclusion and recommendations or otherwise reflection from a preselected professional perspective on one or more processes within the project. Partial grade is expressed as a number C1 between 0 and 10. 5) Additional courses on project management and/or systems engineering and/or cultural differences and/or English language. Partial grade C2 is expressed as a number between 0 and 10. 6) Process report in readable English with at least five fully elaborated incidents. Partial grade is expressed in ‘pass’ or ‘fail’.

[5] The IP1 minor and the IP2 minor together meet the requirements of the European Project Semester (EPS).
[6] Due to rounding errors numbers may not add up correctly to 420 hrs.

	The overall assessment is expressed in the final grade is a weighted averaging of the above figures: Final grade (C): C= 0,7 x C1 + 0,3 x C2. In order to be awarded this grade, the process report should have been graded with 'pass'. The final grade is transformed to the standards of the own education. In case of minor omissions a second chance is given in terms of a complement of the assignment. If a student shows severe malpractice and/or misbehaviour he/she is removed from the course and a second chance is given in another project if available and suitable.
Leer(hulp)middelen Study aids	Blackboard, handouts, readers, project archive. Books related to own assignment and personal learning goals. Students are stimulated to consult academic libraries as well as visiting conferences/symposia/exhibitions etc.
Minimum- en maximumdeelname Minimum- and maximum participation	N/A
Blok / lint en periode van uitvoering Fulltime / parttime and Term	The minor is offered fulltime form mid-November as well as from mid-April for a period of 10 weeks.
Themavelden (meerdere keuzes mogelijk) Subject themes (more than one possible)	X Economics & marketing X Computer Science X Management, organization, human resources X Technology and Design X International themes X Public relations
Bijzonderheden Miscellaneous	This minor and the minor International Project 1 are considered as a whole lasting in total one semester. This minor is executed in combination with the minor 'Living Labs'.
Code (voor OSIRIS) OSIRIS code	TBK-HMVT14-IP2

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EUROPEAN PROJECT SEMESTER
TIS – CIVIL ENGINEERING
HYDRAULIC ENGINEERING

DESCRIPTION

The programme of Civil Engineering (CE) at De Haagse Hogeschool (THUAS), invites students from partner universities to participate in its European Project Semester (EPS) in Hydraulic Engineering.

Prospective Students: The EPS is intended for students cursing their 3rd or 4th year of bachelor from Civil Engineering or Mechanical Engineering with interest in hydraulic engineering. The students must have previous courses in fluid mechanics and basic hydraulics.

English Requirements: For non-native English speakers an IELTS = 6.0, or certification of English from the partner university will be required.

ECTS: This EPS is composed of three different modules which are compulsory for a total of 30 ECTS.

- Communication Skills and Dutch or English Language (3.0 ECTS)
- Minor Immersed Tunnels (13.5 ECTS)
- Minor River Engineering (13.5 ECTS)

Duration: The EPS will start in September 2016 and lasts until mid-February 2017.

Code of the program is CV-EPS-Hyen

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Minor/EPS 2016

Part 1 block 1
Immersed Tunnels

Course-name	Minor Immersed Tunnels
Period	Start: first week of **September 2016 (10 weeks)**
Lecturer(s)	From THUAS: Mr. R. Weersink From http://www.strukton.com/ , Mr. P. v. Westendorp
Overall Set -up	The minor of immersed tunnels is developed by the Civil Engineering program and will serve the students to develop insight in the understanding and design of such structures with up to date technology. The professional set-up of lecturers and assignments provides the students the required skills and competences to develop engineering work in the design and construction of immersed tunnels. The minor is fully taught in English.
Learning goals	Main goal is gaining insight and knowledge of practical aspects in the field of immersed tunnels engineering. Application of knowledge is made by performing a design of several structures related to the famous **Flood barrier near Venice** (Italy) ***Knowledge*** -Engineering Immersed Tunnels -Knowledge of suitable calculation-formulas and its validity aspects -Floating stability of immersed structures ***Skills*** -Gaining insight in applying calculation methods/models for immersed tunnels. -Dimensioning immersed tunnels. -Project teamwork in assignment.
Professional-competences	***General*** - Problem analysis ; - Dimensioning & design calculations for an immersed tunnel related structure; - Understanding of construction phases required for an immersed structure ***Skills:*** - Cooperation with fellow students on the same subject; - Project management (work break down, planning);

	- Knowledge on cultural differences - Enhance presentation and communication skills. - Reports and presentations are all in English.		
Relation with other subjects	Coastal-Engineering, Fluid mechanics, Project management.		
Learning methods:	X Project x College ☐ Computer lab		
Basic requirements	Basic principles of fluid-mechanics,		
Learning materials	Material:	See Coastal-Engineering (HHS-Blackboard)	
	List of Books:	-Immersed Tunnels (Lenniss and Braber, 2013) -Fluid Mechanics, (Nortier, de Koning) -Several hand-outs	
Examination	☐ Exam		Description No written examination
	X Assignments		Description Every week a student-group (max 4 students) gets an assignment/case. A week later the assignment has to be finished and feedback will be given. If the group did not pass their week-assignment, the group will have, one week later, the opportunity to get on a satisfying level. If the group did pass all of their week-assignments/cases, they can start making their final project-thesis. The final project will be judged by a panel.
	X Presentation		-review after 4 weeks -presentation final project after 10 weeks
Study Load	**13.5 ECTS**		
Main subjects:	-Problem-definition and description of way of solving the problem related to immersed tunnels -Multi-criteria analysis and alternative selection -Design of immersed tunnels -Wave-effects on immersed tunnels		
Additional Information	About the minor contents: Rob Weersink: r.weersink@hhs.nl International programs in Civil Engineering at HHS: Mario Castro Gama: mecastro@hhs.nl		

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Minor/EPS 2016

Part 2 block 2

River Engineering

Course-name	Minor: River Engineering and Flood Control
Period	Start: **mid November 2016 (10 weeks)**
Lecturer(s)	From HHS: M. Castro-Gama, R. Weersink External Consultant: Mr. G. Beaufort Government Institutions: Department of Public Works of The Netherlands, http://www.rijkswaterstaat.nl/en/ Water Board of Delfland, http://www.hhdelfland.nl/
Overall Set -up	The minor of river engineering and flood control is developed by the Civil Engineering program and will serve the students to develop insight in the Dutch way of river management. The Netherlands is a country located in a flood prone delta. Its engineering know-how for the design and construction of marine barriers and flood protection structures for rivers is world famous. The use of state of the art technology is the common basis for developing the learning objectives. Lecturers and assignments will provide the students the required skills and competences to develop engineering work in river engineering in areas where flood protection is required. The minor is fully taught in English.
Learning goals	Main goal is gaining insight in practical knowledge and applying this knowledge in the area of river engineering. This knowledge will be used to design river related items (using computer model Sobek (rural), river-flows,-currents, -depths, morphology, structures). ***Knowledge*** -The use/requirements of a river in a flood control context -Type of rivers river, flows and water depths in a flood prone area. -Understanding of computer modelling, and suitable calculation-formulas for flood events. ***Skills***

	-Gaining insight in applying calculation methods/models for river flows and water depths during flooding events. - Understanding flood management structures. -Dimensioning of river structures. -project teamwork in assignment.	
Professional-competences	***General*** - The student will develop a critical understanding of the Dutch Water Management philosophy - The student will work in the analysis of a real flood problem in a delta environment. - The student will gain experience into the design of hydraulic structures for flood management through engineering design, calculation, report and drawing ***Skills:*** - The student will develop a broader understanding of hydraulic engineering in an international environment. - Project management (work break-down, planning, delivering goals and milestones in a timeline basis); - Knowledge on cultural differences - Enhance presentation and communication skills. - Reports and presentations are all in English. It is intended that students develop their final report and presentation for a committee as it is done in The Netherlands.	
Relation with other subjects	- River engineering - Fluid mechanics - Project management.	
Learning-method:	X Project ☐ College X Computer lab	
Basic requirements	Basic principles of fluid-mechanics and open flow hydraulics.	
Learning materials	Material:	See River-Engineering (HHS-Blackboard)
	List of Books:	-Room for the river project -Plan Beaufort -Fluid Mechanics, (Nortier, de Koning) -Several handouts
	Field Trips	Two field trips are planned during the minor. 1) Structures of Room for the river project 2) Maeslantkering (Rotterdam).

	Partners	Currently the minor includes teh collabotation of Rijkswaterstaat (part of the Dutch Ministry of Infrastructure and the Environment) and Hoogheemraadschap of Delfland (Water boards)
Examination	☐ Exam	Description
	X Assignments	Description Every week a student-group (max 4 students) gets an assignment/case. A week later the assignment has to be finished and feedback will be given. If the group did not pass their week-assignment, the group will have, one week later, the opportunity to get on a satisfying level. If the group did pass all of their week-assignments/cases, they can start making their final project-thesis. The final project will be judged by a panel.
	X Final Presentation	-review after 4 weeks -presentation final project after 10 weeks
Study Load	**13.5 ECTS**	
Main subjects:	-Problem-definition for a flood inundation problem. -Methodological approach to the design of a flood control structure. -Multi-criteria analysis applied for river structures -Detailed design of structures under guidance. The use of common practices and EU standards is emphasized. -Computer modeling includes the following tools: +waterverdeeler +Saint Venant 1D simulator. +HEC-RAS 4.1.	
Additional Information	About the program and International programs of Civil Engineering: Mario Castro Gama: mecastro@hhs.nl	

EPS program part 1

Description minor PDI – Packaging Design & Innovation (academy TISH, program IPO)

Title and language	Packaging Design & Innovation Language: English
Type of minor	Basic minor (no entry level requirements); English at C1 level recommended
Organising department/ program	Academy Technology, Innovation and Society/ program Industrial Product Design
Contact persons	W.H. (Wander) Colenbrander, 0031704458962, w.h.colenbrander@hhs.nl G.J. (Gerard) de Koning, 0031704458962, g.j.dekoning@hhs.nl
General objectives	This minor is developed within the programme Industrial Product Design for the specialization Packaging Design. The minor is intended as an introduction to the field of packaging and packaging design. The overall objective of this minor is to get acquainted with the process of designing packaging. The student combines creativity, knowledge of production, design, ergonomics and marketing. The student is introduced in a relatively short time to know another area of expertise. The goal is not only to gain knowledge about the complexity of packaging design but also to work on relevant skills, such as doing research, presentations (oral and written), designs, generating ideas, different alternatives and assess the suitability of solutions.
Summary of contents	Designing good packaging is not easy. Not only the end user (usually the consumer) but many other parties use packaging for short or long periods. All these parties set their own specific demands on packaging. A good packaging designer is trying to develop talents to unite all these requirements together in an effective, attractive, responsible and environmentally conscious packaging. The minor is designed to cover many important aspects of the design of a package. It is not just theory, the practical part offered also gets a lot of attention in the form of a

	design assignment. Based on a design brief and supporting colleges this minor provides an intensive introduction and deepening in the field of packaging design. The supporting lectures cover topics in the field of: packaging materials (production and properties), food and packaging , printing, logistics, transport packaging, environmental and marketing aspects. Based upon the lectures some home assignments are provided. The topic of these home assignments are listed below. There are three home assignments, each with approximately 20 hours of study. The home assignments are: • Marketing & environment • Packaging related methods of optimization & logistics • Materials, production and packaging lines
Indication of target group	Students Industrial Product Design who want to specialize in the design of packaging. Students from other programs who want to know more about packaging and designing in relation to their specific areas of interest. These include areas such as retail, food & beverage, specific user groups (elderly, disabled) or commerce and management.
Entry requirements	None
Competency levels	• Understand the role of a product designer in the development of a package. • Become familiar with the design process. • Ability to analyze a product and its environments. • Understanding packaging materials and packaging processes. • Understanding various printing techniques for packaging • Establish a process tree for a package. • Understand the logistical processes around distribution centers. • Understand the demands of foods in packaging / packing materials. • Packaging related mathematics and testing methods (storage, protection from packaging). • acquire research skills (e.g library, internet and patent database). • Be able to make a good design and process report.
Description of tests and minimum pass rate	The final assessment of the minor consists out of three parts 1. Review of all submitted home assignments related to the lecture material (*) 2. Project Assessment (**) 3. Final test (written exam) The final result will be the weight average of all the above parts where each individual result should be 5,5 or higher on a scale of 1 to 10. A presence of 80% during the programme is mandatory. (*) Rating assignments: on the basis of written assignments. (**) Project Assessment: on the basis of submitted report, model, and oral presentation. Depending on the type of design project, students work individually or in pairs. Handing in your reports takes place in the 9th week of the minor, if necessary a re-examination will take place 10 weeks later.

Teaching methods and study load	Design Education: 32 hours Lectures: 48 hours Company visits / excursions: 16 hours Self-tuition: 228 hours Resit (if applicable): 76 hours
Contact hours	15 hours per week
Study aids	We use black board for all relevant information and documentation. An extensive literature list is provided. The following books are obligatory: • Rob Thompson: The Manufacturing Guides – Sustainable Materials, Processes and Production (Thames & Hudson) • Rob Thompson: The Manufacturing Guides – Graphics and Packaging Production (Thames & Hudson)
Partners	During the minor we work with a company or organization. This party (or parties) provide a draft contract, arrange a tour, take part in the presentation and / or give guest lecture(). Examples of cooperation partners are: Bakkersland, Bunzl, HAS Den Bosch, International Innovation Company (IIC) and the Netherlands Nutrition Centre.
Minimum and maximum participation	Maximum amount of students: 35
Fulltime / part-time and Term	Block minor Fulltime / block period 1
Subject themes	X Economie en Markt O Gezondheid en Sport O ICT en Media O Internationale thema's X Management en Organisatie O Mens en Cultuur O Recht, Veiligheid en Maatschappij X Techniek en Design O Werk, Welzijn en Onderwijs
Miscellaneous	After completing this minor you can start with the minor Sustainable Packaging Design & Innovation (SPDI, block 2, block minor, 15 ects).
OSIRIS code	IPO-HMVT16-PDI

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EPS program part 2

Minor SPDI – Sustainable Packaging Design & Innovation (academy TISH, programme IPO) Block 2

Title & language	Sustainable Packaging Design & Innovation (Minor is in English)
Type of minor	 Basic minor (no entrance requirements) English at C1 level recommended
Organising department/ program	Academy Technology, Innovation and Society/Programme Industrial Product Design (IPO)
Contact persons	G.J. (Gerard) de Koning, 070-4458962, g.j.dekoning@hhs.nl W.H. (Wander) Colenbrander, 070-4458962, w.h.colenbrander@hhs.nl
General objectives	Sustainable Packaging stands for the integration of environmental aspects in the design of a product/packaging combinations. This means that, in addition to marketing, economic and technical criteria also take into account environmental criteria. Sustainable packaging improves the quality perception of products, leads to cost savings, helps to meet legislation and provides environmental benefits. In this minor attention is given to developments in the field of sustainability in relation to packaging development. Sustainability should be understood in most broad sense: both technically and economically.
Summary of contents	Subject of this minor is *redesign* of an existing packaging concept centered around sustainability as explained in the text above. The actual assignment, the design project, will be formulated in cooperation with a company. Examples of design projects are industrial packaging, consumer packaging or last-minute-packaging (packaging which is applied at the very last moment of sale). Research skills are being trained by so-called student lectures. Students prepare these lectures by doing research about a selected theme and writing a detailed report. Eventually the students present the outcome in a lecture to be concluded by a question and debating round. Examples of selected themes are environmental management systems, recycling, sustainability, biomimicry, eco design, globalization, corporate social responsibility (CSR), CSR of small and medium enterprises and CSR of emerging economies.
Indication of target group	Students of Industrial Design Engineering wanting to specialize on packaging design.

	Students of other programmes wanting to learn more about packaging and its design methods focused upon their educational backgrounds. Examples of these backgrounds are retail, food & beverage, specific user groups (elderly, disabled) or commerce and management.
Entry requirements	The minor Packaging Design & Innovation (PDI) has to be succesfully completed.
Competency levels	• Obtaining insight of the role of a packaging designer at the packaging development process. • Learning the design method of Industrial Product Design (IPO). • Capable to analyze context and environment of product and packaging. • Obtaining knowledge of packaging materials and processes. • Obtaining knowledge of relevant marketing trends. • Learning to make a process tree for packaging. • Obtaining research skills (including desk research, use of library, internet and patent database). • Learning about aspects of sustainability like Cradle-to-cradle, Life Cycle Analysis (LCA). • Obtaining knowledge about business economic aspects. • Training of writing process and design assignment reports.
Description of tests and minimum pass rate	The final assessment of the minor consists out of three parts: 1. Review of all submitted home assignments related to the lecture material (*) 2. Project Assessment (**) 3. Final test (written exam) The final result will be the weight average of all the above parts where each individual result should be 5,5 or higher on a scale of 1 to 10. A presence of 80% during the programme is mandatory. (*) The assessment of the design project is based upon grades of report, prototype/dummy/mock-up and presentation. The assignment is carried out individually or in groups of two students. Results to be handed in (hard copy) at week 9 (of blockperiod 2), resit/re-exam takes place at week 9 (of blockperiod 3).
Teaching methods + studyload	Design training and instruction (workshop): 32 hours Lectures: 48 hours Excursions and company visits: 16 hours Selftuition: 228 hours Resit/re-examination (if applicable): 76 hours
Contact hours	15 contact hours per week
Study aids	BlackBoard is used as an online tool for his minor. All relevant information and documentation is provided on its pages. A comprehensive list of literature is provided additionally. The following books are obligatory:

	• Rob Thompson: The Manufacturing Guides – Sustainable Materials, Processes and Production (Thames & Hudson) • Rob Thompson: The Manufacturing Guides – Graphics and Packaging Production (Thames & Hudson)
Partners	The cooperation with a company or NGO is included in this minor. These organizations supply the design assignment, an excursion and lectures and attend presentations. Examples of cooperating organizations of the recent minors are Paperfoam, Kennisinstituut Duurzaam Verpakken (KIDV), Easyfairs, Oerlemans Plastics, Cloetta en GoBio.
Minimum- and maximum participation	Maximum number of students: 35
Fulltime / part-time and Term	Block minor (full-time) Blockperiod 2
Subject themes (more than one possible)	*X Economie en Markt* *O Gezondheid en Sport* *O ICT en Media* *X Techniek en Design* *O Internationale thema's* *X Management en Organisatie* *O Mens en Cultuur* *O Recht, Veiligheid en Maatschappij* *O Werk, Welzijn en Onderwijs*
Miscellaneous	This minor is obligatory for students of the programme Industrial Product Design (IPO/IDE, The Hague) to obtain the certificate of Packaging Design.
OSIRIS code	**IPO-HMVT16-SPDI**

For these Industrial Design Engineer modules you need to get in contact with the program manager:

Mr. C.A.H.M. Dekkers, email address C.A.H.M.Dekkers@hhs.nl

IDE/Module 1.1.: Society and You [4)]
IDE/Project Communities
IDE/Cultural Differences
Visualization & Communication 1
Personal Branding
IDE/Module 1.2.: Design Project 1 [4)]
Design Project 1
Business Modeling
Materials & Manufacturing
Prototyping & Craftsmanship 1

IDE/Module 1.2: Futuring [4)]
Project Future
Basics of Technology
Mechanics & Maths
Visualization & Communication 2
IDE/Module 2.2.:Design Project 2 [4)]
Design Project 2
Construction & Requirements
Prototyping & Craftsmanship 2
User involvement

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Minor Product Realization

Industrial Product Design

Onderdelen minorbeschrijving	Tekst minorbeschrijving
Titel v.d. minor & taal Title & language	Title: Product Realisation Language: English
Categorie Type	O Basisminor (geen ingangseisen; voorheen: hogeschool brede minor) X Verdiepende minor (ingangseisen) O Keuzemodule met een omvang van x studiepunten
Aanbiedende academie / opleiding Organising department/ program	TISH IPO/IDE (zelfde CROHO)
Contactpersoon Contactperson	Eduard van Rossum (8959) E.H.vanRossum@hhs.nl
Algemene doelstelling General objectives	Integral (re)design of a consumer product. Emphasis on engineering.
Korte weergave inhoud Summary of contents	Design project. Design strategy, user research, styling, manufacturing, construction, electronics, costs.
Doelgroep Indication of target group	- Product designers (IPO and IDE) - Third year students WTB (Mechanics) or comparable - International product design students
Ingangseisen Entry requirements	Propedeuse plus a. knowledge of production techniques and materials; b. experience in 3D modelling and technical drawing (preferably SolidWorks); c. advanced sketching skills, ability to communicate by sketching Students <u>not</u> from IPO/IDE will have to prove that they have the relevant knowledge and skills (use descriptions and grades of relevant modules or otherwise).
Einddoelen / competenties Competency levels	**Learning goals** *In addition to the general IPO/IDE-competences for working in projects and development of ideas and concepts.* <u>The student should be able to:</u> 1 conduct SET analysis to find product opportunity gaps. 2 develop design strategy for a design concept to meet product portfolio and positioning requirements. 3 define design strategy for branded product development. 4 research feasibility, deliver realistic proposals for: a. technical feasibility, b. financial feasibility, c. consumer acceptation. 5 be aware of and understand the critical points in the design concept and translate these to relevant arithmetic models concerning strength and rigidity, use of materials, functioning, etc.; and draw conclusions which are relevant for the design. 6 dimension the design with up-to-date simulation techniques. 7 detail the construction of the concept taking into account materials and production techniques. 8 communicate with electronic engineer. 9 design a product with electronics.

	10 detail the design concerning colours, styling, finishing and graphics, in relation to production. 11 optimize the product in relation to costs, manufacturing (make or buy) and assembly. 12 test the product with models and simulations (including user tests). 13 prepare for manufacturing: advise production techniques in relation to materials, construction, assembly and logistics. 14 know about outsourcing: possibilities, advantages and disadvantages, comparing local manufacturing with manufacturing in low-wage countries.
Toetsing en minimumeisen voor en voldoende Description of tests and minimum pass rate	Project assessment (report, presentation and model/prototype) 70%, minimal grade 5.0. Written exam 30%, minimal grade 5.0. Project assessment will be in week 9. Written exam will be in week 10. Resit in period 2. Project in student groups. Written exam individually. Subjects written exam: design strategy, user research, electronics, costing, manufacturing, materials and assembly.
Werkvormen + verdeling van de studielast Teaching methods + studyload	Working in design studio (8 h/w) Lectures (3 h/w) Workshops, assignments (4 h/w) Working independently (home/studio) (25 h/w)
Contacturen per week Contact hours	15 h/w
Leer(hulp)middelen Study aids	- Project manual - Literature and/or reader
Samenwerkingspartners Partners	The project assessment will done in cooperation with a company.
Minimum- en maximumdeelname Minimum- and maximum participation	No minimum. Maximum: 100 students
Blok / lint en periode van uitvoering Fulltime / part-time and Term	Blockminor fulltime Period 1
Themavelden (meerdere keuzes mogelijk) Subject themes (more than one possible)	Studenten kunnen in OSIRIS student minors zoeken op basis van onderstaande thema's. Geef aan in welk themagebied de minor valt door één of meer van onderstaande opties aan te kruisen: O Economie en Markt O Gezondheid en Sport O ICT en Media O Internationale thema's O Management en Organisatie O Mens en Cultuur O Recht, Veiligheid en Maatschappij X Techniek en Design O Werk, Welzijn en Onderwijs
Bijzonderheden Miscellaneous	A personal laptop with recent version of SolidWorks is recommended.

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E-HMVT14-RVD1 - Minor Robotics and Vision Design 1 (2016)

Title & language	Robotics and Vision Design – part 1 English language minor, for national and international participation This minor is an integrated whole with the Robotics and Vision Design – part 2 minor. The part 2 minor only can be followed in combination with part 1. To clearly show the integrated relation between both parts, this description also contains the part 2 description.
Type	O In-depth minor (with entry requirements)
Organising department/ programme	Faculty Technology, Innovation & Society / Mechatronics in cooperation with Mechanical Engineering
Contact person	dr.ir. Rufus Fraanje, tel. 015 - 260 6362, p.r.fraanje@hhs.nl ing. Theo Koreneef, tel. 015 - 260 6304, t.j.koreneef@hhs.nl ir. Anita Le Mair, tel. 015 - 260 6251, a.lemair@hhs.nl
General objectives	Today robots are being applied in many fields, from industrial automation and defense to agriculture, health care and assistance of handicapped persons. By following the minor Robotics and Vision Design part 1 and part 2, you will learn the state-of-the-art of robotics and vision techniques and you will learn to apply this knowledge to design and realize a prototype using commercial-off-the-shelf (COTS) equipment. More specifically, you will learn how to: 1. model the kinematics and simulate (arm-type and mobile) robotic systems (achieved in part 1); 2. design a robot controller and implement it on a platform such as ROS, the Robot Operating System (achieved in part 1 and 2); 3. translate control tasks into optimization problems and how to solve these with a computer program (achieved in part 1); 4. design a vision system (optics and image capturing) for robotic systems (achieved in part 1); 5. apply various image processing techniques to extract relevant features (achieved in part 2); 6. design and evaluate learning algorithms to learn complex behavior using data from different types of sensors (achieved in part 2); 7. analyze the architecture of robots and model over several levels in hierarchy with the object oriented Systems Modeling Language (SysML) (achieved in part 1); 8. design, implement, test and integrate robotic and vision subsystems to realize a product for an external stakeholder (achieved partly in part 1 and partly in part 2);

	9. guarantee the quality of the design and the realized product by performing a rigorous requirements analysis and verification (achieved partly in part 1 and partly in part 2); 10. investigate and evaluate results from scientific literature and exploit these for the purpose of the project (achieved partly in part 1 and partly in part 2);
Summary of contents	The minor consists of 7 courses and a project with a company as one of the stakeholders. The theory and application of various robotics and vision techniques are dealt with in the courses. The project focuses on the integration of the techniques. Courses and project with learning goals: i. Robot modelling, learning goal 1 (in part 1); ii. Robot control, learning goals 2 and 3 (in part 2); iii. Intelligent methods, learning goal 3 (in part 1); iv. Image capturing and processing, learning goals 4 and 5 (in part 1); v. Pattern recognition, learning goal 5 and 6 (in part 2); vi. Machine learning, learning goal 6 (in part 2); vii. Systems engineering, learning goal 7 and 9 (in part 1); viii. Project, learning goals 8, 9 and 10 (in part 1 and part 2).
Indication of target group	Third and final year Bachelor of Engineering (BEng/BE) students with a background in mechatronics, motion technology, physics, mechanical engineering, electrical engineering or computer science.
Entry requirements	To be admitted to this minor you need to have mastered the following subjects: • Matrix calculus: matrix vector multiplication, solving set of linear equations; • Dynamics: speed, acceleration, free body diagrams and equation of motion; • Basics of control engineering: transfer functions, block schemes, system responses; • Introduction in programming: some experience with writing of programs in a compiler or interpreter language, such as C, C++, Python or Mat lab; • Project management: experience with working in project groups, writing a plan of approach, parallel planning, goal oriented working. In addition, you should have obtained at least 60 ECTS of the main phase of your study.
Competency levels	The focus of this minor (consisting of part 1 and part 2 as one whole) is on learning existing technology in robotics and vision and to develop creativity in applying these techniques to design new or improve existing tools or products. After successful completion of the part 1 minor, you are able to: • model and simulate robotic systems (learning goal 1)

	• solve optimization problems with numerical methods (learning goal 3) • design a vision system (optics and image capturing) for robotic systems (learning goal 4) • analyze the architecture of robotic systems using systems engineering tools (part of learning goal 7) • perform a stakeholder and requirements analysis for a robotic system design problem (part of learning goal 9) In addition you can demonstrate one of the following competences by means of individual project results: • overview of relevant (scientific) literature for the project (researcher role) • plan of approach with effective division of labour, a time-schedule and a budget proposal (manager role) • a description of the design (systems engineer role) • a stakeholder and requirements analysis (advisors role)
Description of tests and minimum pass rate	The assessment of part 1 consists of: • course assessments (week 8, resit in week 10): ◦ Robot modelling (study load corresponds to 3ECTS) ▪ theoretical exam (weight 50%) ▪ practical assessment (weight 50%) ◦ Intelligent methods (study load corresponds to 3ECTS) ▪ theoretical exam (weight 50%) ▪ practical assessment (weight 50%) ◦ Image capturing and processing (study load corresponds to 3ECTS) ▪ theoretical exam (weight 50%) ▪ practical assessment (weight 50%) ◦ Systems engineering (study load corresponds to 2ECTS) ▪ assignment: rigorous requirements analysis and system architecture • project assessment part 1 consisting of (in week 9, resit in week 10; study load corresponds to 4ECTS): ◦ plan of approach ◦ systems design (structure, motivation behind and description) ◦ presentation (content: problem, global design and questions adequately answered, form: structure, quality of presentation material, self-confidence) ◦ documentation of project work The weights are: ◦ plan of approach: 25% ◦ description design: 25% ◦ presentation: 25% ◦ documentation: 25%

	The final mark is given only when the individual assessments are all at least 5.5 and is calculated as a weighted average of the assessments where the weights are given by the number of ECTS.
Teaching methods + study load	Courses and educational organisation: • Robot modelling (study load corresponds to 3ECTS): ◦ each week one lecture of 90 minutes ◦ each week one practical op 90 minutes • Intelligent methods (study load corresponds to 3ECTS): ◦ each week one lecture of 90 minutes ◦ each week one practical op 90 minutes • Image capturing and processing (study load corresponds to 3ECTS): ◦ each week one lecture of 90 minutes ◦ each week one practical op 90 minutes • Systems engineering (study load corresponds to 2ECTS): ◦ each week one lecture of 90 minutes, including a lecture part and a student presentation part Project organization (study load corresponds to 4ECTS): • weekly meetings with project coach • 3 guest lectures, each of 90 minutes • 3 tutorials, each of 90 minutes
Contact hours	The minimal number of contact hours per week is: 10.5 hours (these are clock hours).
Study aids	The teaching material will be announced before the summer holidays. Examples of textbooks being used are: • M. Spong et al., Robot Modelling and Control, Wiley, 2005. • C. Woodford and C. Philips, Numerical methods with worked examples: Mat lab edition, Springer, 2012. • R. Szeliski, Computer Vision: Algorithms and Applications. • L. Delligatti, SysML distilled, 2014
Partners	PRIVA, Robot Care Systems, Lely, TNO, TU Delft, Festo, Omron, and several other companies
Minimum- and maximum participation	minimum of 10 students maximum of 50 students
Fulltime / part-time and Term	Part 1: Fulltime minor, period 1 (15 ECTS)
Subject themes (more than one possible)	Technology and Design
Miscellaneous	The courses, project and all documents and reports will be in the English language. The members of the project groups will have different nationalities, which will prepare students to work in an international environment.
OSIRIS code	ME-HMVT14-RVD1

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ME-HMVT14-RVD2 - Minor Robotics and Vision Design 2 (2016) Block 2

Title & language	Robotics and Vision Design – part 2 English language minor, for national and international participation This minor is an integrated whole with the Robotics and Vision Design – part 2 minor. The part 2 minor only can be followed in combination with part 1. To clearly show the integrated relation between both parts, this description also contains the part 1 description.
Type	In-depth minor (with entry requirements)
Organising department/ program	Faculty Technology, Innovation & Society / Mechatronics in cooperation with Mechanical Engineering
Contact person	dr.ir. Rufus Fraanje, tel. 015 260 6362, p.r.fraanje@hhs.nl ing. Theo Koreneef, tel. 015 260 6304, t.j.koreneef@hhs.nl ir. Anita Le Mair, tel. 015 260 6251, a.lemair@hhs.nl
General objectives	Today robots are being applied in many fields, from industrial automation and defense to agriculture, health care and assistance of handicapped persons. By following the minor Robotics and Vision Design part 1 and part 2, you will learn the state-of-the-art of robotics and vision techniques and you will learn to apply this knowledge to design and realize a prototype using commercial-off-the-shelf (COTS) equipment. More specifically, you will learn how to: 1. model the kinematics and simulate (arm-type and mobile) robotic systems (achieved in part 1); 2. design a robot controller and implement it on a platform such as ROS, the Robot Operating System (achieved in part 2); 3. translate control tasks into optimization problems and how to solve these with a computer program (achieved in part 1); 4. design a vision system (optics and image capturing) for robotic systems (achieved in part 1); 5. apply various image processing techniques to extract relevant features (achieved in part 2); 6. design and evaluate learning algorithms to learn complex behavior using data from different types of sensors (achieved in part 2); 7. analyze the architecture of robots and model over several levels in hierarchy with the object oriented Systems Modeling Language (SysML) (achieved in part 1);

	8. design, implement, test and integrate robotic and vision subsystems to realize a product for an external stakeholder (achieved partly in part 1 and partly in part 2); 9. guarantee the quality of the design and the realized product by performing a rigorous requirements analysis and verification (achieved partly in part 1); 10. investigate and evaluate results from scientific literature and exploit these for the purpose of the project (achieved partly in part 1 and partly in part 2);
Summary of contents	The minor consists of 7 courses and a project with a company as one of the stakeholders. The theory and application of various robotics and vision techniques are dealt with in the courses. The project focuses on the integration of the techniques. Courses and project with learning goals: i. Robot modelling, learning goal 1 (in part 1); ii. Robot control, learning goals 2 and 3 (in part 2); iii. Intelligent methods, learning goal 3 (in part 1); iv. Image capturing and processing, learning goals 4 and 5 (in part 1); v. Pattern recognition, learning goal 5 and 6 (in part 2); vi. Machine learning, learning goal 6 (in part 2); vii. Systems engineering, learning goal 7 (in part 1); viii. Project, learning goals 8, 9 and 10 (in part 1 and part 2).
Indication of target group	Third and final year Bachelor of Engineering (BEng/BE) students with a background in mechatronics, motion technology, physics, mechanical engineering, electrical engineering or computer science.
Entry requirements	You must have finished part 1 of this minor successfully to be able to start with this part 2.
Competency levels	The focus of this minor (consisting of part 1 and part 2 as one whole) is on learning existing technology in robotics and vision and to develop creativity in applying these techniques to design new or improve existing tools or products. After successful completion of the part 2 minor, you are able to: • explain and apply techniques for modelling, simulation, optimization, learning and control of robotics and vision systems and their integration (learning goal 2, 5 and 6); • analyze robotic design problems in a systematic manner, with the help of systems engineering and the knowledge from the courses on robotics and vision techniques (learning goal 7 and 8); • design innovative robotic solutions, showing creativity and the effective integration of multiple subsystems (learning goal 8); • document the design and its argumentation in a well-structured manner (learning goal 8 and 9);

	• realize a successful robotic system and document the realization process (learning goal 9 and 10). In addition you can demonstrate one of the following competences by means of individual project results:
Description of tests and minimum pass rate	The assessment of part 2 consists of: • course assessments (week 8, resit in week 10): ◦ Robot control (study load corresponds to 3ECTS) ▪ theoretical exam (weight 50%) ▪ practical assessment (weight 50%) ◦ Pattern recognition (study load corresponds to 3ECTS) ▪ theoretical exam (weight 50%) ▪ practical assessment (weight 50%) ◦ Machine learning (study load corresponds to 3ECTS) ▪ theoretical exam (weight 50%) ▪ practical assessment (weight 50%) • project assessment part 2 consisting of (in week 9, resit in week 10; study load corresponds to 6ECTS): ◦ detailed design (structure, motivation behind and description) ◦ realized product (agreement with design, realization process, quality and successfulness in terms of agreement with stakeholders requirements) ◦ presentation and demonstration (content: problem, design and technical realization well-presented and questions adequately answered, form: structure, quality of presentation material, self-confidence) ◦ documentation (structure, completeness: is it possible to follow the design and realize the system only based on the documentation?) The weights are: ◦ detailed design: 25% ◦ realized product: 25% ◦ presentation and demonstration: 25% ◦ documentation: 25% The final mark is given only when the individual assessments are all at least 5.5 and is calculated as a weighted average of the assessments where the weights corresponds to the study load.
Teaching methods + studyload	Courses and educational organization: • Robot control (study load corresponds to 3ECTS): ◦ each week one lecture of 90 minutes ◦ each week one practical op 90 minutes • Pattern recognition (study load corresponds to 3ECTS): ◦ each week one lecture of 90 minutes ◦ each week one practical op 90 minutes

	• Machine learning (study load corresponds to 3ECTS): ◦ each week one lecture of 90 minutes ◦ each week one practical op 90 minutes Project organization (study load corresponds to 6ECTS): • weekly meetings with project coach • 3 guest lectures, each of 90 minutes • 3 tutorials, each of 90 minutes
Contact hours	The minimal number of contact hours per week is: 10.5 hours (these are clock hours).
Study aids	The teaching material will be announced before the summer holidays. Examples of textbooks being used are: • M. Spong et al., Robot Modeling and Control, Wiley, 2005. • R. Szeliski, Computer Vision: Algorithms and Applications. • S. Marsland, Machine learning, an algorithmic perspective, CRC Press, 2009.
Partners	PRIVA, Robot Care Systems, TNO, TU Delft, Festo, Omron, and several other companies
Minimum- and maximum participation	minimum of 10 students maximum of 50 students
Fulltime / part-time and Term	Part 2: Fulltime minor, period 2 (15 ECTS)
Subject themes (more than one possible)	Technology and Design / Techniek en design
Miscellaneous	The courses, project and all documents and reports will be in the English language. The members of the project groups will have different nationalities, which will prepare students to work in an international environment.
OSIRIS code	ME-HMVT14-RVD2

THE HAGUE
UNIVERSITY OF
APPLIED SCIENCES

Minor Smart Energy Management & Design

	Smart Energy Management & Design
Title & language	Smart Energy Management & Design: (Re)Design and sustainable management of sustainable buildings, in multidisciplinary teams. The language is English.
Type	Inter-faculty minor with entry requirements, 15ecs
Organising department/ program	Faculty Technology, Innovation & Society / Mechanical Engineering (examination board) The administration of the minor is performed by the Research Group Energy and the Built Environment (Lectoraat EGO) in close collaboration with the programs Mechanical Engineering, Electrical Engineering, Climate & Management, Architecture and Technical Business Administration of the faculty 'Technology, Innovation & Society', and the programme Facility Management of the faculty 'Management & Organization'.
Contact person	T. B. Salcedo Rahola: +31 (0)152606312 t.b.salcedorahola@hhs.nl
General objectives	In the day-to-day practice of designing, renovating and managing sustainable buildings there currently is a great demand for higher professional education graduates with Smart Energy skills, who also understand the thought processes of other actors in the chain (from design to management). Innovative designs in the field of sustainability and smart energy in buildings are largely – and will increasingly be - integrated designs that take account of every link in the organization chain. The objective of this minor is to give students from various study programs the tools they need to fulfil their future role, which is to realize a sustainable and energy-neutral built environment.
Summary of contents	The main focus from day one is a multidisciplinary design project, based on an actual case and involving a genuine commissioning party from the industry. The project involves creating a professional product (consultancy/design report with recommendations) related to energy-efficient, zero-energy and green buildings, in collaboration with all actors in the chain. Throughout the project, the students must use their own expertise to create an integrated design. Students are coached on content and process, and expand on their knowledge by conducting research. Next to the project, introductory modules are given on the important ways of thinking and designing in the various energy related disciplines (architecture/building physics/comfort, maintenance and building management/energy management, energy concepts for heating, cooling and electricity) so that students from one programme are able to communicate with students from other programs, a skill required in professional practice. In addition, every study programme provides a specialist module for its own students in support of the project (given by a mixture of teaching staff from The Hague University of Applied Sciences and guest lecturers).Special attention is

	also devoted to research methods and integrated design in multidisciplinary teams.
Indication of target group	Students from the programs architecture, civil engineering, building construction, mechanical engineering, electrical engineering, technical business management, climate management and facility management, who are interested in a deepening study of energy requirements for the built environment (energy-efficient and energy-neutral buildings, green buildings, sustainable energy, energy management), and wish to play an active role in real situations ('living labs') and learn to design and give professional advice within multidisciplinary teams.
Entry requirements	- *Students:* Students must follow a program (higher professional education), in architecture, civil engineering, building construction, mechanical engineering, electrical engineering, technical business management, climate management, facility management or equivalent, and must have passed their foundation course (propaedeutic)and have obtained at least 90 credits in their major. - *External:* Demonstrable work experience in one of the relevant fields as well as the academic level of a third-year student in higher professional education. Admission following a preliminary interview.
Competency levels	The main competency acquired by students during the minor is the ability to apply the knowledge and insight gained through their own study programs within a multidisciplinary team, as required in the construction and construction management industry for creating energy-efficient, zero-energy, or even energy-producing sustainable buildings. The following competencies are acquired: • Knowledge of energy issues from the perspectives of: architecture, indoor climate, building management, energy management, and installation technology and energy generation. • The students' ability to convert a complex problem from professional practice into a clear overview of requirements for their own discipline, taking the needs/prerequisites of other disciplines into consideration. • The students' ability to solve a problem within their own discipline for use in an integrated solution using methods such as research, systems thinking and modelling. • Being able to justify and explain the principles and results to other members of the design team. • The ability to combine knowledge and understanding from various disciplines into an integrated design that creates added value.
Description of tests and minimum pass rate	- 50% of credits (7,5) for the group assignment, the end products of which are an advisory report (40%) and a presentation (10%). Multidisciplinary design methods and specialization in own discipline are tested through the group assignment. If the report is found insufficient, the group has one second chance to improve it within one week. Performance within the team and individual contributions are assessed separately, meaning that each student gets an own grade varying between the group's grade ± 2 points. - 50% of credits based on three individual written tests (one test per discipline, all tests are weighted equally, 2,5 credits each). Each student gets three written test on the introductory modules. The student's own discipline will be determined at the start of the minor. These three tests can be done over

	separately with a maximum of two times per test. The student passes for the minor if the weighted average of his grade for the group assignment and the five individual tests is higher than 5.5
Teaching methods + study load	The project begins with a specialist module in the student's own discipline. There is a commissioning party from outside the university (a client), and students play their own role (consultant in their own discipline).Students are coached on the process (1 coach per team) and on subject content (one contact person per discipline). - Systems engineering and multidisciplinary design methods are common themes that run throughout all subjects. - Three modules are given at the level of introductory courses: ▪ Sustainable exploitation (Facility Management Climate & Management/Technical business Management) ▪ Smart architectural design (Architecture) ▪ Sustainable energy conversion & HVAC (Mechanical/Electrical Engineering) Specialization in each discipline offered through additional lecture and documents and specific coaching on the project.
Contact hours	- Lectures/tutorials: 14 hours a week (12 hours for introductory modules, 2 hours for deepening module) - Project workshops, incl. excursions: 8 hours a week - Coaching: 3 hours a week It is a full time minor where presence to all classes, workshops and group work is compulsory.
Study aids	- Course notes in each discipline - Sustainable Urban Environments (book) - Green Building Bible (book) - Software simulations
Partners	- *Internal:* TIS Faculty (Technical Business Management, Mechanical Engineering, Electrical Engineering, Climate & Management and Architecture), M&O faculty (Facility Management) and the TIS Expertise Centre. - *External:* Sector organizations (like TVVL - Platform for People and Technology, SBR and Facility Management Netherlands), consultants specialized in building physics, installations and energy generation and,
Minimum- and maximum participation	Minimum 12, maximum 50. All of the various study programs must be represented; the goal therefore is to achieve a balanced spread of disciplines within each group (~ 5 students). If there is too great an imbalance, some applications may be rejected.
Fulltime / part-time and Term	Blok 1, full time (15 credits)
Subject themes (more than one is possible)	Economy and Market Management and Organisation Technology and
Miscellaneous	Some sections of this minor are given in Delft and others in The Hague. The language of instruction is English, literature is in English. If needed, specific assistance can be given in Dutch.
OSIRIS code	W-HMVT15-SEMD

Electrical Engineering - Minor Embedded Systems Part 1 (2016/2017)

Onderdelen minorbeschrijving	Tekst minorbeschrijving
Titel v.d. minor & taal Title & language	**Embedded Systems – part 1** English language minor, for national and international participation. This minor is part 1 of the 1 semester minor. Part 2 of the minor can only be followed after successful accomplishment of part 1.
Categorie Type	O In-depth minor (with entry requirements)
Aanbiedende academie / opleiding Organising department/ program	Faculty: Technology, Innovation & Society / Electrical Engineering in cooperation with Applied Computer Science
Contactpersoon Contactperson	ir. F. Theinert, tel. 015 – 260 6238, jftheinert@hhs.nl ir. D. Holt, tel. 015 – 260 6346, d.holt@hhs.nl drs. M. Dirksen, tel. 015 – 260 6357, c.f.m.dirksen@hhs.nl
Algemene doelstelling General objectives	Today Embedded Systems are found in many devices and are used in a large variety of instruments and applications. Most users do not know that their device contains an embedded system. Examples of applications are washing machines, telephones, heating devices, automobiles, consumer devices, medical appliances, measuring devices, internet connected devices (IoT) ... By following the minor Embedded Systems part 1 and part 2, the student will learn to design state-of-the-art microcontroller systems and will thereafter be able to apply this knowledge to realize prototypes using professional and modern tools and components. **More specifically, the student will learn how to:** 1a) work with different microcontroller architectures (in part 1); 1b) convert customer requirements into hardware and software specifications (in part 1); 1c) create hardware design requirements (in part 1); 12a) examine and evaluate results from scientific literature and develop software on different development platforms (in part 1 and in part 2); 12b) apply this information in the project work (in part 1 and in part 2); 12c) carry out an engineering project using applicable group skills and project management skills (in part 1 and in part 2); 12d) design, implement and test algorithms and optimize their performance (in part 1 and in part 2); 2a) design software with 'state of the art' tools using open-source and commercial tool-chains (part 2); 2b) Specifically design and evaluate algorithms to implement complex behavior using data from different sensors (in part 2);

	2c) design vision-systems and process images (in part 2); 2d) perform tests and verifications to guarantee the quality of the design and the realized product (in part 2);
Korte weergave inhoud Summary of contents	Part 1 of the minor consists of 2 courses with 2 corresponding practical lab-/ workshops and a project with preferably a company acting as customer. The theory and application of techniques and methods are offered in the courses and workshops. The project will offer the learning experience of integration of embedded systems as well as dealing with personal, group, project-management and customer management issues. **The following courses are offered in part 1:** **Course 1:** HM-ES1-th, advanced real-time systems Developing advanced Real-Time Systems (Real-Time behavior, RTOS, data-acquisition, datacommunication, IoT…) With the following learning goals: 1a, 1b, 1c, 12d **Workshop 1:** HM-ES1-pr1, advanced real-time systems Implementing advanced Real-Time Systems (realizing Real-Time behavior with and without a kernel, working with state-of-the-art microcontrollers, data-communication, IoT …) With the following learning goals: 1a, 12d **Course 2:** HM-ES1-th2, dsp software and algorithms Software Development on DSP's (Developing algorithms for audio and video processing, …) With the following learning goals: 1a, 1b, 12a, 12d **Workshop 2:** HM-ES1-pr2, dsp software and algorithms Implementing algorithms on DSP's (Writing software to realize IIR, FIR filters, echo, …) With the following learning goals: 1a, 1b, 12a, 12b, 12d **Project Embedded Systems:** HM-ES1-pj, project Developing an embedded system according to customer specifications. With the following learning goals: 1a, 12a, 12b, 12c, 12d **Note:** Students following both parts of the minor can participate in one project covering a whole semester.
Doelgroep Indication of target group	Third and fourth year students following a Bachelor of Science (BSc) study in the fields of electrical engineering, computer science, mechatronics, mechanical engineering or physics.
Ingangseisen Entry requirements	To start with this minor the student should have relevant experience in the following fields: Programming skills: basic experience in writing programs for a compiler or interpreter

	language, such as C, C++, Python, Pascal or Matlab; Mathematics: Matrix vector processing, solving sets of linear equations; Basics of control engineering: transfer functions, block schemes, system responses; Project management: experience with working in project groups, writing a plan of approach, parallel planning, goal oriented working. Basic skills in digital electronics, reading and drawing schematics Experience with real-time systems and/or data-communication is an advantage. In addition, the student should have obtained at least 60 ECTS of the bachelor (main) phase of the study (excl. propaedeutic phase of 60 ECTS).
Einddoelen / competenties Competency levels	The focus of this minor (part 1 and part 2) is on learning state-of-the-art technologies of microcontroller- and vision-systems and to develop intelligent solutions for the internet (internet of things, IoT), industrial or consumer appliances and applying the learned techniques to design new or to improve existing systems and products. **After successful completion of part 1 of the minor, the student is able to:** design the hardware of an embedded system learning goals 1a, 1c, 12a, 12b design the software for an embedded system learning goals 1a, 1b, 12d optimize own or given algorithms learning goal 12c, 12d analyze the architecture of a given embedded system learning goal 1a, 12a **In addition the student will acquire at least one of the following competences by working on the project:** a) As a researcher: collecting know-how from relevant (engineering and/of scientific) literature for the project b) As a (project)manager: setting up a 'plan of approach', splitting up relevant tasks into work-packages and working out a budget proposal, control change c) As adviser: working out a requirements analysis
Toetsing en minimumeisen voor een voldoende Description of tests and minimum pass rate	To successfully pass part 1 of the minor the student has to 1) do a theoretical exam for course 1 in week 8 with a minimum score of 5.5 2) participate in a workshop assessment with a final report evaluated sufficiently deadline of submitting the report is week 8 3) do a theoretical exam for course 2 in week 8 with a minimum score of 5.5 4) participate in a workshop assessment with a final report evaluated sufficiently

	deadline of submitting the report is week 8 The student can participate in a reexamination for both theoretical exams of course 1 and/or course 2 in week 10 if necessary. The student can participate in a reassessment for both workshops of course 1 and/or course 2 in week 10 if required. 5) Project assessment for part 1 (in week 9, with optional reassessment in week 10) The student has to deliver the following items to successfully pass the assessment. All individual items are required to score sufficiently a) Plan of approach b) Design of prototype c) Presentation c1) content: problem description, global design, detailed explanation of approach chosen to accomplish job c2) answering questions about project-work adequately d) Documentation of project work: d1) including thorough description of assignment / problem d2) all schematics with detailed comments on chosen items d3) documented and commented source-code developed d4) detailed conclusion and recommendations on accomplished work. e) reflection Weighting: Plan of approach: 15% Prototype-design: 30% Presentation: 25% Documentation: 30% All individual items need to score at least 5.5 to successfully pass the project.
Werkvormen + verdeling van de studielast Teaching methods + studyload	**Course 1** (study load corresponds to 3 ECTS): each week one lecture of 90 minutes, accompanied by homework / independent learning of approximately 4 hours **Workshop 1** (study load corresponds to 2 ECTS): each week one practical lab-session of 90 minutes Students are required to prepare these sessions adequately **Course 2** (study load corresponds to 3 ECTS): each week one lecture of 90 minutes, accompanied by homework / independent learning of approximately 4 hour **Workshop 2** (study load corresponds to 2 ECTS): each week one practical lab-session of 90 minutes Students are required to prepare these sessions adequately **Project** organization (study load corresponds to 5 ECTS): at least one meeting per week with project-coach

	Students are supposed to work out the project-assignment within their group independently. Size of the group will be 4 to 6 students. Students have to follow additional guest-lectures and / or tutorials of 90 minutes if required.
Contacturen per week Contact hours	The minimal number of contact hours per week is: 8 clock hours
Leer(hulp)middelen Study aids	The teaching material will be announced before the summer holidays.
Samenwerkingspartners Partners	t.b.d.
Minimum- en maximumdeelname Minimum- and maximum participation	minimum of 12 students maximum of 30 students
Blok / lint en periode van uitvoering Fulltime / part-time and Term	Part 1: Full-time minor, period 1 (15 ECTS)
Themavelden (meerdere keuzes mogelijk) Subject themes (more than one possible)	Technology and Design / Software (Programming) / Hardware
Bijzonderheden Miscellaneous	The courses, project and all documents and reports will be in English. The members of the project groups will have different nationalities, which will prepare students to work in an international environment.
Code (voor OSIRIS) **OSIRIS code**	**E-HMVT16-EMB1 - Minor Embedded Systems 1**

Electrical Engineering - Minor Embedded Systems Part 2 (2016/2017)

Onderdelen minorbeschrijving	Tekst minorbeschrijving
Titel v.d. minor & taal Title & language	**Embedded Systems – part 2** English language minor, for national and international participation. This minor is part 2 of the 1 semester minor. Part 2 of the minor can only be followed after successful accomplishment of part 1.
Categorie Type	O In-depth minor (with entry requirements)
Aanbiedende academie / opleiding	Faculty: Technology, Innovation & Society / Electrical Engineering in cooperation with Applied Computer Science

Organising department/ program	
Contactpersoon Contactperson	ir. F. Theinert, tel. 015 – 260 6238, jftheinert@hhs.nl ir. D. Holt, tel. 015 – 260 6346, d.holt@hhs.nl drs. M. Dirksen, tel. 015 – 260 6357, c.f.m.dirksen@hhs.nl
Algemene doelstelling General objectives	Today Embedded Systems are found in many devices and are used in a large variety of instruments and applications. IMost users do not know that their device contains an embedded system. Examples of applications are washing machines, telephones, heating devices, automobiles, consumer devices, medical appliances, measuring devices, internet connected devices (IoT)... By following the minor Embedded Systems part 1 and part 2, the student will learn to design state-of-the-art microcontroller systems and will thereafter be able to apply this knowledge to realize embedded systems prototypes using professional and modern tools and components. **More specifically, the student will learn how to:** 1a) work with different microcontroller architectures (in part 1); 1b) convert customer requirements into hardware and software specifications (in part 1); 1c) create hardware design requirements (in part 1); 12a) examine and evaluate results from scientific literature and develop software on different development platforms (in part 1 and in part 2); 12b) apply this information in the project work (in part 1 and in part 2); 12c) carry out an engineering project using applicable group skills and project management skills (in part 1 and in part 2); 12d) design, implement and test algorithms and optimize their performance (in part 1 and in part 2); 2a) design software with 'state of the art' tools using open-source and commercial tool-chains (part 2); 2b) Specifically design and evaluate algorithms to implement complex behavior using data from different sensors (in part 2); 2c) design vision-systems and process images (in part 2); 2d) perform tests and verifications to guarantee the quality of the design and the realized product (in part 2);
Korte weergave inhoud Summary of contents	Part 2 of the minor consists of 2 courses with 2 corresponding practical lab-/ workshops and a project with preferably a company acting as customer. The theory and application of techniques and methods are offered in the courses and workshops. The project will offer the learning experience of integration of embedded systems as well as dealing with personal, group, project-management and customer management issues. **The following courses are offered in part 2:** **Course 1:** HM-ES2-th1, advanced driver programming (developing applications and drivers, accessing hardware) With the following learning goals: 1b, 1c, 12c, 12d, 2a, 2b, 2d **Workshop 1:** HM-ES2-pr1, advanced driver programming Implementing own drivers for external hardware components (working with interrupts and IO's)

	With the following learning goals: 12d, 2a, 2b, 2d **Course 2:** HM-ES2-th2, image processing Image acquisition and processing (basics of cameras, optics, sensors, developing imaging software) With the following learning goals: 12c, 12d, 2a, 2b, 2c, 2d **Workshop 2:** HM-ES2-pr2, image processing Implementing imaging software for digital cameras (writing algorithms to access and process still and live images from industrial cameras, ...) With the following learning goals: 12c, 12d, 2a, 2b, 2c **Project Embedded Systems:** HM-ES2-pj, project Developing an embedded system according to customer specifications. With the following learning goals: 12a, 12b, 12c, 2a, 2b **Note:** Students following both parts of the minor can participate in one project covering a whole semester.
Doelgroep Indication of target group	Third and fourth year students following a Bachelor of Science (BSc) study in the fields of electrical engineering, computer science, mechatronics, mechanical engineering or physics.
Ingangseisen Entry requirements	To start with this minor the student should have relevant experience in the following fields: Programming skills: basic experience in writing programs for a compiler or interpreter language, such as C, C++, Python, Pascal or Matlab; Mathematics: Matrix vector processing, solving sets of linear equations; Basics of control engineering: transfer functions, block schemes, system responses; Project management: experience with working in project groups, writing a plan of approach, parallel planning, goal oriented working. Basic skills in digital electronics, reading and drawing schematics Experience with real-time systems and/or data-communication is an advantage. In addition, the student should have obtained at least 60 ECTS of the bachelor (main) phase of the study The student has successfully completed part 1 of the minor.
Einddoelen / competenties Competency levels	The focus of this minor (part 1 and part 2) is on learning state-of-the-art technologies of microcontroller- and vision-systems and to develop intelligent solutions for the internet (internet of things, IoT), industrial or consumer appliances and applying the learned techniques to design new or to improve existing systems and products. **After successful completion of part 2 of the minor, the student is able to:** design the software for an embedded system learning goals 1a, 1c, 12a, 2a, 2b

	optimize own or given algorithms learning goal 12d, 2a, 2d design a vision system for capturing and processing images learning goal 1b, 1c, 12c, 12d, 2c, 2d analyze the architecture of a given embedded system learning goal 12a, 2b **In addition the student will acquire at least one of the following competences by working on the project:** a) As a researcher: collecting know-how from relevant (engineering and/of scientific) literature for the project b) As a (project)manager: setting up a 'plan of approach', splitting up relevant tasks into work-packages and working out a budget proposal, control change c) As adviser: working out a requirements analysis
Toetsing en minimumeisen voor een voldoende Description of tests and minimum pass rate	To successfully pass part 2 of the minor the student has to 1) do a theoretical exam for course 1 in week 8 with a minimum score of 5.5 2) participate in a workshop assessment with a final report evaluated sufficiently deadline of submitting the report is week 8 3) do a theoretical exam for course 2 in week 8 with a minimum score of 5.5 4) participate in a workshop assessment with a final report evaluated sufficiently deadline of submitting the report is week 8 The student can participate in a reexamination for both theoretical exams of course 1 and/or course 2 in week 10 if necessary. The student can participate in a reassessment for both workshops of course 1 and/or course 2 in week 10 if required. 5) Project assessment for part 2 (in week 9, with optional reassessment in week 10) The student has to deliver the following items to successfully pass the assessment. All individual items are required to score sufficiently a) Plan of approach b) Design of prototype c) Presentation c1) content: problem description, global design, detailed explanation of approach chosen to accomplish job c2) answering questions about project-work adequately d) Documentation of project work: d1) including thorough description of assignment / problem d2) all schematics with detailed comments on chosen items

	d3) documented and commented source-code developed d4) detailed conclusion and recommendations on accomplished work. e) reflection Weighting: Plan of approach: 15% Prototype-design: 30% Presentation: 25% Documentation: 30% All individual items need to score at least 5.5 to successfully pass the project.
Werkvormen + verdeling van de studielast Teaching methods + studyload	**Course 1** (study load corresponds to 3 ECTS): each week one lecture of 90 minutes, accompanied by homework / independent learning of approximately 4 hours **Workshop 1** (study load corresponds to 2 ECTS): each week one practical lab-session of 90 minutes Students are required to prepare these sessions adequately **Course 2** (study load corresponds to 3 ECTS): each week one lecture of 90 minutes, accompanied by homework / independent learning of approximately 4 hour **Workshop 2** (study load corresponds to 2 ECTS): each week one practical lab-session of 90 minutes Students are required to prepare these sessions adequately **Project** organization (study load corresponds to 5 ECTS): at least one meeting per week with project-coach Students are supposed to workout the project-assignment within their group independently. Size of the group will be 4 to 6 students. Students have to follow additional guest-lectures and / or tutorials of 90 minutes if required.
Contacturen per week Contact hours	The minimal number of contact hours per week is: 8 clock hours
Leer(hulp)middelen Study aids	The teaching material will be announced before the summer holidays.
Samenwerkingspartners Partners	t.b.d.
Minimum- en maximum deelname Minimum- and maximum participation	minimum of 12 students maximum of 30 students
Blok / lint en periode van uitvoering Fulltime / part-time and Term	Part 2: Full-time minor, period 2 (15 ECTS)
Themavelden (meerdere keuzes mogelijk)	Technology and Design / Software (Programming) / Hardware

Subject themes (more than one possible)	
Bijzonderheden Miscellaneous	The courses, project and all documents and reports will be in English. The members of the project groups will have different nationalities, which will prepare students to work in an international environment.
Code (voor OSIRIS) **OSIRIS code**	**E-HMVT16-EMB2- Minor Embedded Systems 2**

THE HAGUE
UNIVERSITY OF
APPLIED SCIENCES

Block 2 (Nov 16 – Feb 17)

Minor The Many Faces of Globalization

Title & language	The Many Faces of Globalization
Type of minor	x Basisminor (geen ingangseisen) O Verdiepende minor (ingangseisen)
Organizing department/ programme	Climate & Management
Contact person	Godelieve Kodde 070-
General objectives	The goal of this minor is to provide an introduction to the many aspects and dimensions of globalization. The daily challenges faced today by a wide array of professionals are not entirely local or national, but are also connected to developments occurring in Europe and in the rest of the world. In the context of higher professional education, this means that future professionals are becoming critical world citizens. In order to become a critical world citizen, it is necessary to acquire specific knowledge, competences and skills. At the end of this minor students should be able: 1) To assume a conscious and critical position towards global developments; 2) To research and analyze problems of a global nature; To establish how specific issues (local, national, professional) are related to developments occurring on a global scale.
Summary of contents	Graduates of The Hague University of Applied Sciences (THUAS) will work in a globalized world and need to have an understanding of global processes and global development. Globalization is an irreversible process. Globalization comprises many processes that simultaneously affect different areas: economy, media, politics and identities, migration and the environment. Globalization is a complex process that is not yet complete; it continuously evolves at a fast pace. It remains difficult to fully grasp what globalization entails; especially to predict worldwide developments based on all-embracing theories and analyses of globalization. Everything is still open and far from determined: an unexpected event in one location can produce changes overnight throughout the globe. However, there are clear patterns and developments that deserve attention. Yet, in order to analyze and understand why a certain issue has specific characteristics it is necessary to bring in a multi-disciplinary perspective. Today's professionals possess knowledge from several disciplines, but it is her/his consciousness as world-citizens that allow her/him to look into a certain issue from different sides, perspectives and disciplines. In this minor, the following themes are dealt with: 1) What is globalization? Historical contextualization: what are the core characteristics of the current stage of globalization? Can current-day globalization processes be equated to a second modernization wave? Is the world converging towards a western-centred capitalist model? Or is this the beginning of the end of the power of Western countries, as alternative economic models and political systems spring up in other regions of the World, like South, East and Southeast Asia? 2) World Population and food security. There are about 6 billion people in the world and the predictions point to 9 or 10 billion in 30/50 years from now. Access to water and food is not the same everywhere and population growth

	threatens to widen the gap even more between those who have plenty and those who have none. Are we heading towards an catastrophic situation or are there sustainable alternatives? 3) Climate change, ecology and the environment. Current challenges and possible scenarios. 4) ICTs as agents of globalization processes. The characteristics of knowledge economies and their output. Network societies and globalization. 5) Global capitalist economy. Relations of production, distribution and consumption in the E-Economy. Cycles of economic growth and crisis. 6) Globalization and labour. World division of labour, migration and the re-location of industries and labour markets across the globe. 7) Globalization and poverty. The rise of the "fourth world" or the world's poorest nations. The gap between rich and poor is widening in every nation, as well as between rich and poor nations. 8) Global Cities. More than half of the world population lives now in cities or major urban areas. What is the impact of urban growth and development on rural areas, migration and the environment? 9) World Governance . Is international cooperation among states being replaced by cooperation networks located below the state-level and cutting across national boundaries? Is globalization bringing an end to the nation-state? What is its role in a context of more economic and financial interdependence among states? 10) Human Rights and global justice. Protection of Human Rights, the cause for war. The majority of armed conflicts in the world today are internal or civil conflicts. The role of international organizations such as the UN is re-evaluated in the current globalization era. 11) Globalization and Identities. Identities evolve and are contested in 4 major areas: religion (and the sharpening of fundamentalist doctrines); nationality (sharpening of nationalism and extremism), culture (migration and the multicultural society) and gender. 12) Globalization and the role of education, sports and music Globalization and Post-Modernity. Can we draw a parallel between the foundations of industrial modernization period with the current process of globalization? Are there any moral limits to processes of rationalization, and technological evolution?
Indication of target group	Due to the diversity of subjects offered by this minor, all 3rd and 4th year students from the HHS qualify, in principle, to attend this minor.
Entry requirements	No entry requirements
Competency levels	In this minor, students should become familiar with the following competencies: 1) Ability to operate from an international and multicultural perspective (HOP7); 2) Ability to cross over disciplinary and professional boundaries, languages and cultural backgrounds and ability to bring people together (HOP7); 3) Ability to define what globalization is and to differentiate the multiple processes that play a role in globalization. 4) Ability to make a critical use of the many disciplines that contribute to an understanding of globalization. 5) Ability to select a relevant subject matter and to conduct research and analysis in a case-study format. 6) Ability to connect specific issues and questions to global developments, from a perspective of world citizenship.

	7) Ability to adopt a critical approach to global problems (e.g. climate change, poverty, migration, etc.) 8) Ability to differentiate among the local, national, European and global aspects of a given theme. Ability to contribute to the globalization debate by formulating and answering questions that are fundamentally linked to the process of globalization.
Description of tests and minimum pass rate	Written tests, oral presentations, reports and a research paper. Minimum pass rate is 5,5 for each element.
Teaching methods + study load	The successful completion of this minor is equivalent to 15 ECTS. Guest lectures: 8 hours Seminar: 2 hours Coaching: 2 hours Movie: 4 hours There will be one or two excursions as well during the period.
Contact hours	Approx. 20 hours per week
Study aids	A very short introduction to globalization, M. Steger Additional literature will be posted on blackboard
Partners	Lectorate International Cooperation Teachers from The Hague University Guest speakers from outside The Hague University (Like NGO's, ministry of foreign affairs, UvA)
Minimum- and maximum participation	Minimum students required: 20
Fulltime / part-time and Term	Fulltime: term 2
Subject themes (more than one possible)	O Economie en Markt O Gezondheid en Sport O ICT en Media x Internationale thema's O Management en Organisatie O Mens en Cultuur O Recht, Veiligheid en Maatschappij O Techniek en Design O Werk, Welzijn en Onderwijs
Miscellaneous	
OSIRIS code	**CLE-HMVT14-GLO**

Minor Description Advanced Product Optimization

Title & language	Advanced Design Optimization
Type	x Deepening minor and follow up program of the minor Product Realization
Organising department/ programme	/ Industrial Design Engineering, TIS
Contact person	Dhr. S.M. van Westreenen S.M.vanWestreenen@hhs.nl 06-12315212 Dhr. A. Aztouti
General objectives	Advanced engineering skills and knowledge to optimize a product design for series/mass production Learning objectives: - Use of state of the art 3D CAD/FEM simulation software - Be able to optimize costs and strength in the context of series/mass production - Be able to use techniques for production optimization (e.g. mold flow analysis) - Use of (certified) tests procedures - Translating results and conclusions in an optimized design Summary of content Lectures. Course lectures and workshops on topics in product optimization, FEM analysis and simulation. Guest lectures by work field specialists Integral Design projects to practice and test the acquired knowledge and skills
Summary of contents	Students will learn to use advanced tools to optimize a product design. Based on a thorough knowledge of materials, calculation methods and practical software skills

	(FEM, mold flow), students will learn to optimize products for production, costs and strength. Student will learn to master the dedicated software, understand the results and know how to optimize the design based on these results. The content of the course has a strong practical focus and link with the work field. Therefor the course will be in cooperation with leading partners in the engineering & design industry
Indication of target group	Industrial Design Engineering Mechanical Engineering International students with proven CAD and engineering skills (portfolio)
Entry requirements	Industrial Design Engineering – Minor Product Realization
Competency levels	Competence A general management A6 communication in English F Materialization (level 3) Sub competences F2 – Calculation modelling F5 - Testing F6 - Production preparation
Description of tests and minimum pass rate	Assignment carrying out an integrated product development project Minimum grade 5,5
Teaching methods + study load	Lectures: Workshops/ Integrated product development assignment
Contact hours	10
Study aids	Finite Element Modelling For Stress Analysis, R.D.Cook, ISBN 9780471107743 Reader Design optimization & simulations All other study materials will be made available digitally on blackboard
Partners	BPO

	Promolding Philips Drachten (to be confirmed)
Minimum- and maximum participation	Minimum 15 maximum 40
Fulltime / part-time and Term	Period 2 (full time)
Subject themes (more than one possible)	O Economie en Markt O Gezondheid en Sport O ICT en Media O Internationale thema's O Management en Organisatie O Mens en Cultuur O Recht, Veiligheid en Maatschappij x Techniek en Design O Werk, Welzijn en Onderwijs
Miscellaneous	International minor
Code OSIRIS	IPO-HMVT16-ADO

For the Industrial Design Engineering modules you need to get in contact with the

program manager: Mr. C.A.H.M. Dekkers, email address C.A.H.M.Dekkers@hhs.nl

Block 2 (Nov 2016 – Feb 2017)

0	**IDE/Module 1.2: Futuring** [4]	**The Hague**	**15**
	Project Future		6
	Basics of Technology		3
	Mechanics & Maths		3
	Visualization & Communication 2		3
0	**IDE/Module 2.2.:Design Project 2** [4]	**The Hague**	**15**
	Design Project 2		6
	Construction & Requirements		3
	Prototyping & Craftsmanship 2		3
	User involvement		3

Block 3 (Feb 2017 – Apr 2017)

0	**IDE/Module 1.3.: People** [4]	**The Hague**	**15**
	Project Society & You		6
	Design Exploration		3
	User research		3
	Visualization & Communication 3		3
0	**IDE/Module 2.3.: Design Project 3** [4]	**The Hague**	**15**
	Design Project 3		9
	Production preparation		3
	Prototyping & Craftsmanship 3		3

Block 4 (Apr 2017 – Jul 2017)

Mark choice	**Study /** course [1]	**Location** [2]	**Credits (ECTS)**
0	**IDE/Module 1.4.: Solutions** [4]	**The Hague**	**15**
	Project Create the Solution		9
	Implementing Business & Products		3
	Visualization & Communication 4		3

Minor Climate Change in international perspective

Block 4

Title	Climate Change in international perspective
Organising faculty	Climate & Management
Contact person	Ms. Godelieve Kodde +31 70-4458760
General objectives	The main outcome of this teaching module will be a publication about Indonesia and climate change. The purpose of the publication is: • Access to knowledge about Indonesia and Climate Change • A front piece of you and CLE The publication is intended for junior professionals who wish to deepen their understanding of climate issues in Indonesia. At the end of the teaching module there will be a seminar. During the seminar every student presents his or her research and presents a few questions or theses to discuss. This discussion will be included in the publication. Apart from this you will get courses on globalisation and climate change in general and international environmental policy.
Summary of contents	The problems concerning the future-proof design of the built environment do not stop at the Dutch borders. Many world problems arise in conjunction with each other. Consider the demand for nutrients that serve as fuel. Countries that have signed the Kyoto Protocol, have committed to reduce their CO_2 emissions. The use of biofuels is one way to reduce them. Often, however, crops for biofuels grow in places where otherwise food crops could grow. Often, the solution for one problem yields problems in other areas. In this international module you gain knowledge about Indonesia and Climate Change. Mayer, Ryan and Aspinall have written an interesting article about Climate Change and Indonesia in which they state that *"Indonesia is both victim and source of climate change. As an archipelago nation with a population concentrated along coastlines, Indonesia's major cities and coastal communities are vulnerable to rising sea levels, worsening floods and unpredictable storms. Droughts*

	and fires, aggravated by changing weather patterns, ravage both farmers' hopes and remaining natural forests. But Indonesia is also a major source of greenhouse gas emissions from deforestation, peatland draining, forest and land fires, as well being as a significant producer, exporter and consumer of fossil fuels. Recent international initiatives also assert that the country can play a central role in mitigating global climate change, by conserving and replanting forests, protecting peatlands, and managing fires." (Mayer, J, Ryan, A and Aspinall, E, climate change in Indonesia. Retrieved from http://www.insideindonesia.org) Enough reasons to broaden your horizon and gain knowledge about Indonesia and climate change.
Competency levels	Ability to do a literature research: define research questions, conduct research properly and define clear conclusions Ability to write an article Ability to communicate and cooperate: with the commissioner and your colleagues (students) Ability to learn, to reflect and improve yourself Ability to gain knowledge about globalisation, climate change and international environmental policy
Indication of target group	Students interested in climate change and globalisation.
Partners	Research Group International cooperation
Entry requirements	Students must be 3rd or 4th year students in order to participate in this minor.
Teaching methods + study load	The successful completion of this minor is equivalent to 15 ECTS.
Contact hours	About 20 hours per week (guest lectures on Indonesia, coaching on writing, lectures, the seminar)
Description of tests and minimum pass rate	The project will be examined by an article and a portfolio assessment. Minimum pass rate is 5.5. The courses will be examined by written tests. Minimum pass rate is 4.5, but in average the course's results should be a minimum of 5.5
Study aids	Steger, a very short introduction to globalisation

	Literature on Indonesia which will be posted on Blackboard
Minimum- and maximum participation	To be determined
Fulltime / part-time and Term	Fulltime: term 4
Miscellaneous	This minor is part of the study Climate & Management. Third year students Climate & Management are cooperating with international students, to optimally exchange knowledge and experience.
Code	CLE-HMVT13-CCIP