

Minor programme in Smart Sustainable Cities



Version 2

19-02-2015

Prepared by Martijn Rietbergen for review by ESSENCE Steering Committee

Please respond to erlijn.eweg@hu.nl before 5-March-2015

Version 0	12-12-2014	Description of the minor programme in project proposal	Erlijn Eweg
Version 1	16-1-2015	First draft of minor programme with purpose, characteristics, programme competences and learning objectives. The outline of this draft was based on Tuning Guide for Formulating Degree Programmes by the DG Education and Culture (2010).	Martijn Rietbergen
Version 2	19-2-2015	Course description added and learning objectives adapted by course developers of the HEI in the lead per course.	Martijn Rietbergen

Minor programme in Smart Sustainable Cities (Bachelor of Science)	
Type of degree & Length	Single / multiple / joint degree (30 ECTS credits)
Institutions	Hogeschool Utrecht Universitat Politecnica de Valencia The Manchester Metropolitan University Turku University of Applied Science Ammattikorkeakoulu oy HAW Hamburg
Accreditation Organisations	NVAO (The Netherlands) ... (Germany) ... (Finland) ... (United Kingdom) ... (Spain)
Period of Reference	Approved under the accredited BSc. Mechanical Engineering until 2016 (The Netherlands)
Level	EQF: level 6; QF for EHEA: First cycle = Bachelor

A	Purpose
1	In the coming decades important geographical, demographical and environmental changes will take place in the urban environment. The rate of urbanization will increase rapidly, the age structure of the urban population will shift towards more elderly people, and environmental pressures in especially urban areas will increase. The purpose of this minor programme is therefore to educate professionals in the field of engineering and natural science that are able to develop integrated sustainable solutions for economic, social and environment problems in urban areas.

B	Characteristics
1	Disciplines/subject areas: The minor is a multidisciplinary programme, combining various disciplines from social science, engineering and economics (1/3;1/3;1/3)
2	General/specialist focus: The programme provides general insight in the concept of Smart Sustainable Cities and its challenges; the programme focusses on specific social, physical and economic aspects of the transition towards more sustainable cities.
3	Orientation: The minor is a programme with a focus on applied research, problem solving, emphasis on written and oral communication skills
4	Distinctive features: - The programme can be offered at all CARPE universities - The programme is taught in English - New course-modules can be added in the future - The main target group are students with a major in engineering or natural science

C	Employability & further education
1	Employability: Positions at Bachelor level in the field of (urban) sustainability in public institutes or private companies, such as municipalities or consultancies.
2	Further studies: The minor programme may facilitate, in combination with the major, access to relevant MSc. Programmes.

D	Education style
1	Learning and teaching approach <ul style="list-style-type: none"> • The main learning and teaching approach of the course work is based on blended learning • Research/task based learning or problem based learning in groups of about 5-6 students • Case studies

	<ul style="list-style-type: none"> • Lectures • Assignments <p>The ESSENCE programme and the courses will be based on the ESSENCE Architecture (educational, functional, technical) to enable joint development and enactment and at the same time be open for development and enactment by local partners.</p>
2	<p>Main assessment strategy and approach: Presentations (e.g O1-A5, O1-A6), (research) Reports (e.g. O1-A4, O1-A5, O1-A6), assignments Tba ...</p>

E	Programme competences
1	<p>Generic (taken from Table 2)</p> <ol style="list-style-type: none"> 1. Ability to communicate in a second (foreign) language 11. Ability to apply knowledge in practical situations 12. Ability to make reasoned decisions 19. Ability for abstract and analytical thinking, and synthesis of ideas 20. Ability to interact constructively with others regardless of background and culture and respecting diversity 21. Ability to design and manage projects 25. Ability to take the initiative and to foster the spirit of entrepreneurship and intellectual curiosity 26. Ability to evaluate and maintain the quality of work produced 7. Capacity to generate new ideas (creativity) 10. Ability to identify, pose and resolve problems 31. Ability to work in an international context
2	<p>Specific:</p> <ol style="list-style-type: none"> 1. Ability to demonstrate knowledge / insight in (future) challenges of SSC from various disciplines 2. Ability to understand and discuss with a customer client practical real live situations in the context of SSC 3. Ability to put into practices a number of methods and techniques for analyzing SSC challenges in the field of social, engineering and business 4. Ability to research / design creative sustainable solutions for SSC 5. Ability to communicate these solutions effectively in written and orally

F	Programme learning outcomes
1	See learning outcomes of the courses below

Table 1: ESSENCE programme outline

<p>Introductory course on SSC 2.5 ECTS - O1-A1</p>		
<p>Methodology course on SSC 2.5 ECTS - O1-A2</p>		
<p>The social design 5 ECTS - O1-A3</p>	<p>Smart Sustainable Cities: energy and materials supply & demand in city environments 5 ECTS - O1-A4</p>	<p>Smart Sustainable Cities: new forms of entrepreneurship & open innovation accelerators 5 ECTS - O1-A5</p>
<p>The project / student competition 10 ECTS - O1-A6</p>		

Course title: Introductory course on SSC	
2.5 ECTS	
Code: O1-A1	
Contact person: Tessa Taefi	
Email: tessa.taefi@haw-hamburg.de	
Course description from proposal (from project proposal) Bundle the course material from the HEI partners, apt to use on an ICT workspace environment. Evolve material about the introduction on Smart Sustainable Cities.	
Updated course description: Achieving a 'smart' or 'sustainable' city is a goal perused by various disciplines, such as urban planning, economy, social sciences and engineering. In order to enable students to cooperate interdisciplinary, this course will create a common understanding of the definitions, state of the art, needs, challenges and disciplines interlinked in smart and sustainable cities. The course conveys an holistic view on the multi-criteria problem, by elaborating elements of the historical development, present and future sustainability deficits of metropolitan areas and the role of information and communication technology to encounter these deficits. The course reviews criteria to measure sustainability, and political guiding principles and action plans formulated in order to achieve smart sustainable cities. Structured in self-paced online learning modules and phases of presence, students will acquire the skills to master the topics in self-study, and communicate and discuss with a virtual and intercultural team. These skills will lay the foundation to successfully complete the following modules of the course, as well as future requirements in a working environment.	
Work package leader: HAW	
Involved partners: Utrecht, Turku, Manchester, Valencia	
Bloom taxonomy	Learning objectives:
Knowledge	<ol style="list-style-type: none"> 1. Define the concept Smart Sustainable Cities from the perspective of various disciplines and cultures. 2. Ability to name and structure key elements and fields interlinked in SSC, their coverage in further course modules and future employment options. 3. Know the general outline of the history and existing EU policy context on Smart Sustainable cities.
Comprehension	<ol style="list-style-type: none"> 4. Understand the general current economic, social and environmental trends that jeopardize sustainable growth of cities. 5. Describe critically the (future) sustainability challenges (needs) cities are/will be confronted with.
Application	<ol style="list-style-type: none"> 6. Apply various models, methods, techniques for measuring / monitoring smart sustainable cities
Analysis	<ol style="list-style-type: none"> 7. Analyze / compare sustainability / sustainability aspects of cities by applying models for measuring sustainable cities
Synthesis/creation	
Evaluation	
Suggested literature: <ul style="list-style-type: none"> • Höjer & Wangel (2014). Smart Sustainable Cities Definition and Challenges. Advances in Intelligent Systems and Computing Volume 310, 2015, pp 333-349 • P. Neirotti, A. De Marco, A.C. Cagliano, G. Mangano, F. Scorrano (2014). Current trends in Smart City initiatives: some stylised facts. In: CITIES, vol. 38, pp. 25-36. - ISSN 0264-2751 • www.sustainablecities.eu • Covenant of mayors • Benchmarking sustainable cities • World Commission on Environment and Development: Our common future, Oxford University Press, Oxford 1987 • Jorgen Randers: "2052: a global forecast for the next forty years ; a report to the Club of Rome commemorating the 40th anniversary of The limits to growth", Chelsea Green Publ., White River Junction 2012 	

Course title: Smart Sustainable Cities – methodologies	
2.5 ECTS	
Code: O1-A2	
Contact person: Jens Gijbels	
Email: jens.gijbels@hu.nl	
Course description from proposal: Creative techniques, persuasive techniques, system engineering, modelling (BIM), to develop course material apt to publish on OER with methodologies that helps to find of create innovative solutions for complex challenges, like a sustainable city.	
Updated course description: In the context of sustainable cities, we see more and more complex challenges. With a large number of stakeholders and influencers, it can be very difficult to solve the issues addressed. In order to come up with innovative solutions for these complex challenges we need a more creative and fundamental approach. This course will focus on knowing and applying the design process, including: reframing the initial question (challenge the task given), using generative techniques to come up with a variety of ideas (come up with new, fresh, and different ideas), and using co-design techniques to involve the user early in the design process (learn from their experiences, help validate your concepts). This approach will help students to better cope with the complex case issued in the final project of this program and will help to develop professional skills as a problem solver for future challenges.	
Work package leader: HU Utrecht	
Involved partners: Hamburg, Turku, Manchester and Valencia.	
Bloom taxonomy	Learning objectives:
Knowledge	1. Demonstrate knowledge about the design process. 2. Demonstrate knowledge on generative techniques, reframing, and co-design.
Comprehension	3. Understand how and why reframing, generative techniques, and co-design techniques work
Application	4. Apply reframing to define the challenge issues and to create a design brief. 5. Apply generative techniques to come up with a variety of ideas that are new and creative. 6. Apply co-design techniques for including users and stakeholders in the design process.
Analysis	7. Analyse the application of generative techniques
Synthesis/creation	8. Develop a reframed project brief. 9. Develop a generative session to come up with a variety of ideas, answering to the question posed.
Evaluation	
Suggested literature:	
<ul style="list-style-type: none"> Convivial Toolbox, Elizabeth B.-N. Sanders & Pieter Jan Stappers (ISBN 9789063692841) 	

Smart Sustainable Cities - the Social Design	
5 ECTS	
Code: O1-A3	
Contact person: Rien van Stigt	
Email: rien.vanstigt@hu.nl	
Course description from proposal: Social innovation, policy, citizen participation, find/develop course material apt to publish on OER and helps to find solutions for the Social challenges of a smart Sustainable City.	
Updated course description: This course is about the social building blocks of sustainable cities: what is needed to make sustainable communities prosper and how can people be involved in new sustainable initiatives? First, we briefly review the literature on how to steer people's behaviour: either through top-down regulation, through market mechanisms or through networked governance processes that allow for bottom-up initiatives. Next, from the literature on social design, we derive – and, if necessary, adapt – an analytical framework that we can use to analyse existing examples of thriving sustainable communities. Elements of such a framework include: amenities & social infrastructure; social & cultural life; voice & influence; and space to grow. To illustrate the framework, we will use it to analyse the social design in a successful sustainable urban development in Copenhagen. Next, students collect, describe and analyse other examples and publish these in the course's electronic learning environment in such a way that all other participants in the course may comment, articulate and review their contributions. Such a case analysis includes the actors, their needs and goals, the steering philosophy and policy instruments used, including the social support that was offered, political and societal context, plan economics, et cetera, all in terms of the developed analytical framework. Finally, students apply what they have learned and make a social design for the project they are involved in.	
Work package leader: HU Utrecht	
Involved partners: Manchester and Turku.	
Bloom taxonomy	Learning objectives:
Knowledge	<ol style="list-style-type: none"> 1. Identify stakeholders in sustainable urban development processes. 2. Describe three steering philosophies (market, government, network governance, including bottom-up initiatives) and associated policy instruments. 3. Identify techniques to involve people in sustainable urban development initiatives. 4. Identify building blocks necessary for social design (according to Young Foundation, 2011)
Comprehension	<ol style="list-style-type: none"> 5. Explain each stakeholder's interests/expertise/stakes (economic/other), within urban development processes. 6. Explain how stakeholders interrelate in multiple arena's, each involving multiple stakeholders (in a multi-level governance framework), including bottom-up approaches. 7. Explain the importance of social design for achieving sustainable urban development. 8. Understand how stakeholders can be reached effectively.
Application	<ol style="list-style-type: none"> 9. Make a case description of a sustainable urban development in terms of (at least) actors, interests, goals, steering philosophy, policy instruments, political and societal context and plan economics.
Analysis	<ol style="list-style-type: none"> 10. Analyze the bottlenecks and success factors of sustainable urban development processes (limited to social design and implementation)
Synthesis/creation	<ol style="list-style-type: none"> 11. Propose recommendations for successful completion of a sustainable urban development process.
Evaluation	
Literature:	
<ul style="list-style-type: none"> • Woodcraft S, Bacon N, Caistor-Arendar L & Hackett T, 2012. Design for social sustainability. A framework for creating thriving new communities. Social Life. ISBN 978-0-9576959-0-0 • Baker S, 2010. In Pursuit of Sustainable Development. New Governance Practices at the Sub-national Level in Europe. 	

Program (indicative):

Week #	Subject	Teaching and learning method
1	Introduction: the importance of social design	Guest lecture; individual reading & presentation of summary; group discussion.
2	Steering towards sustainable urban development; steering philosophies and policy instruments	Lectures; individual reading & presentation of summary
3	Case study: Copenhagen	Group work
4	Sustainable urban development processes in more detail (yielding analytical frame for case studies)	Lectures; individual reading & presentation of summary
5	Case studies, yielding a (video) presentation of each case and short interviews with stakeholders. [formative assessment]	Group work (each group describes a case in its country of residence)
6		
7	Comparison of case studies	Group presentations (through Skype / internet)
8	Identification of bottlenecks and success factors	Group discussion (in class + internet)
9	Assessment (summative)	
10	Repair	

Assessment:
Both the formative and the summative assessment include the following: <ul style="list-style-type: none"> • Assessment of group products • Peer assessment of individual contribution • Self assessment of development of learning goals.

Course on Smart Sustainable Cities - the physical transition: energy and materials supply & demand in city environments	
5 ECTS	
Code: O1-A4	
Contact person: Javier Orozco	
Email: jaormes@cst.upv.es	
Course description from proposal: Energy, water, air quality, landscaping the urban environment, materials, aviation, find/develop course material apt to publish on OER and helps to find solutions for the Physical Transition of a Smart Sustainable City.	
Updated course description: This course integrates all the city stocks and flows related to the making, management and renovation of smart sustainable cities into a simulation model for evaluating the overall sustainable performance of the future smart city which will provide the basic criteria for the decision making processes. Basic material flows include: water, energy, transport, materials and environmental impact. Life cycle assessment will be the aim for this model integrating engineering trades into one joint evaluation. Through the right implementation of the already acquired methodologies key engineering disciplines (namely water management, energy supplies, building construction, materials, transport logistics and green infrastructure) are studied and analyzed both independently and as a whole for future resilient and smart sustainable cities.	
Work package leader: UPV	
Involved partners: Hamburg, Turku, Manchester, Utrecht	
Bloom taxonomy	Learning objectives:
Knowledge	<ol style="list-style-type: none"> 1. Define the concept of circular economy, urban metabolism, total cost of ownership, total cost of use, total cost of ownership, and material resources flow analysis 2. Know relevant energy and material flows in city environments (materials: construction materials, water, waste) 3. Build these elements from the perspective of Life Cycle Assessment 4. Design and evaluate the relevance of engineering solutions into the global integrated context of a city environment 5. Integrate all relevant impact into a Life Cycle Assessment model
Comprehension	6. Understand how the stocks and flows of relevant systems in city environments interact
Application	7. Apply engineering solutions within the city environment from an integrated perspective
Analysis	8. Analyze the overall impact of specific solutions from the perspective of Life Cycle Assessment in city environments
Synthesis/creation	9. Propose a model for a correct evaluation on the impact of engineering solutions in city environments
Evaluation	<ol style="list-style-type: none"> 10. Assessment of knowledge acquisition through concept maps development 11. Presentation of a group project for solving a real problem through the integrated evaluation of engineering solutions to a given city environment
Suggested literature: <ul style="list-style-type: none"> • Blok, K. (2009). Introduction to energy analysis. Techne Press, Amsterdam. • Ashby, M.F. (2012). Materials and the Environment, Eco-informed Material Choice. Butterworth Heinemann. • Tolley, R. (2003). Sustainable transport. Woodhead Publishing. • Droege, P. (2008). Urban Energy Transition, From Fossil Fuels to Renewable Power. Elsevier. • Ashby, M.F. (2015). Materials and sustainable development. Butterworth Heinemann. • Halliday, S. (2007). Sustainable construction. Butterworth Heinemann. • Zeman, F. (2012). Metropolitan Sustainability, understanding and improving the Urban Environment. Woodhead Publishing. 	

Program (indicative):

Week #	Subject	Teaching and learning method
1	Introduction: City stocks and flows and information architecture	Presentation lecture; individual reading; concept map through

		group discussion.
2	Life Cycle Analysis implementation for modelling Smart Sustainable Cities	Lectures; concept map (CM) summary
3	Case study: City model implementation	Guest lecture
4	Engineering solutions for water management	Group work; CM summary
5	Engineering solutions for energy supplies	Group work; CM summary
6	Engineering solutions for building construction	Group work; CM summary
7	Engineering solutions for architectural materials	Group work; CM summary
8	Engineering solutions for urban transport	Group work; CM summary
9	Engineering solutions for green infrastructure	Group work; CM summary
10	Project	Group presentation

Course on Smart Sustainable Cities, new forms of Entrepreneurship & open innovation accelerators	
5 ECTS	
Code: O1-A5	
Contact person: Jennie Shorley Carling, Susan Baines	
Email: J.Shorley@mmu.ac.uk, S.Baines@mmu.ac.uk	
Course description from proposal: Business models, new forms of entrepreneurship, a start-up competition in a pressure cooker model. Find/develop course material apt to publish on OER and helps to realize start-ups, new forms of entrepreneurship to realize a Smart Sustainable City. This module will be tried out during ESSENCE, as a separate activity, called C1.	
Updated course description: Achieving a 'smart' or 'sustainable' city demands innovative contributions from the public and private sectors and the social economy. This module is about new forms of entrepreneurship and innovation to contribute to realizing a Smart Sustainable City. The overall aim is to improve the level of skills in students for employability and new business creation in a sustainability context. This is a practical, hands-on module in which students will work in teams to create a strategic business plan for an enterprise that will make a real contribution to sustainability. Their practical learning will be underpinned with knowledge of key concepts associated with entrepreneurship and social innovation, delivered on-line. At the end there will be the opportunity for selected students to participate in a five day intensive "boot camp" and start-up competition which will take place in Manchester.	
Work package leader: MMU	
Involved partners: Turku, Utrecht	
Bloom taxonomy	Learning objectives:
Knowledge	1. Define the key concepts of business models, social business models, Corporate Social Responsibility, the 'triple bottom line', co-operatives, social enterprise, open innovation and social innovation. 2. Knowledge of entrepreneurial capacities that can make up an entrepreneurial "mindset".
Comprehension	3. Understand critical perspectives and theoretical underpinnings of social and environmental enterprise.
Application	4. Work in teams to apply the business model canvas around areas such as value proposition and customer segments. Thus develop your own business model relevant for realizing a SSC.
Analysis	5. Analyze key organizational features around impacts, performance management, measurement and accountability, social accounting and evidencing value. 6. Analyze the selection of a; for-profit business, co-operative or social enterprise and explain your reasoning. 7. Analyze the business models / plans of competitors and incumbents.
Synthesis/creation	8. Create a business model for your team's innovative business start-up. 9. Write a business plan which should include Mission, Vision and Values, Business Format, Income and Finance, Market, and Operations Management 10. Development of products where applicable including for example; 3D modelling, video and/ or app development
Evaluation	11. Start-up competition group presentation and idea implementation to be evaluated at the end of the 'pressure-cooker'. 12. Critically evaluate the quality of the business proposed and its contribution to sustainability. 13. Reflect upon your individual contribution to the start-up plan, and upon group decision making and team working
Suggested literature:	
<ul style="list-style-type: none"> • Osterwalder et al. (2010). Canvas Business Modelling. • McKinsey. Starting up. http://public-files.prbb.org/intervals/docs/4505824-Mckinsey-Starting-Up-Business-Planning-Manual.pdf • Bovee, Thill (2014). Business in action • http://eu-smartcities.eu/business-models • Ridley-Duff, R., and Bull, M., (2011) Social Enterprise: Theory and Practice, London: Sage • Zokaei, K., Lovins, H., Wood, A. and Hines, P. (2013) Creating a Lean and Green Business 	

Course title: International and Innovative Smart Sustainable City Competition	
Code: O1-A6	
10 ECTS	
Contact person: Henna knuutila	
Email: Henna.knuutila@turkuamk.fi	
Course description from proposal: To prepare an international student competition the real life case must be made explicit. Meetings with the stake-holders from municipality are needed. Indications must be developed for the description of the Sustainable City competition. A communication plan has to be delivered.	
Updated course description: The needs and the competencies needed in the working life are in a continuous change. In addition to substance, customer-based thinking, creativity, co-operation skills and tolerating dissimilarity and uncertainty is needed. Also networking, innovation and business skills will be emphasized in the future. During this course the students will be competing in multidisciplinary and multicultural groups in the International Smart Sustainable City (SSC) Competition. Municipalities will provide the real life assignments related on SSC. The students will be working in close interaction with the municipalities to be able to respond the needs and expectations of the representatives. The needs and expectations of municipalities will specify the assignment topics and content. The competition lasts three weeks (21 days) and will take place in three different cities: Turku, Alcoi and Utrecht. Competition will consist of virtual meetings between the groups, research, excursions, pitching sessions and reflecting own learning. The competition will climax in to the Innovation Camp (partly virtual). The course will be based on innovative learning and teaching methods that will combine close co-operation between the students and the working life operators. During the course students will develop their innovation competences needed in working life: students are able to utilize their field of expertise and share their existing know-how. Students will learn by asking and refining questions, debating ideas, making predictions, designing plans, collecting and analyzing data, drawing conclusions, communicating their ideas and findings to others and asking new questions.	
Work package leader: Turku	
Involved partners: Utrecht, Valencia, Municipalities Alcoy, Utrecht, Turku	
Bloom taxonomy	Learning objectives:
Knowledge	1. Define the terms innovation, creativity and project-based working. 2. Define, identify and describe a smart sustainable city.
Comprehension	3. Understand the complexity of Smart Sustainable City: which actors are connected to the topic and how different sectors of the city are linked together. 4. Understand the role and the needs of the customer (customer-oriented thinking). 5. Understand the principles and value of team working in multidisciplinary and multicultural groups. 6. Understand and adjust to different viewpoints of the persons from different fields of expertise and background. 7. Understand how the group is being managed and how the group can tackle conflicts. 8. Understand the importance of creative thinking, project management and co-operative skills.
Application	9. Apply the right set of project management skills to successfully complete the project. 10. Apply the knowledge gained from the previous courses and studies. 11. Apply the information given by the client and the team members. 12. Share own knowledge to other people.
Analysis	13. Analyse the sustainability challenge by using various relevant methods and techniques 14. Analyze the information given by the client and the group members. 15. Compare, analyze and combine own and others ideas and solutions.
Synthesis/creation	16. Propose the municipality hands-on, creative and innovative solutions and recommendations for creating a smart sustainable city environment. 17. Run and manage a project.
Evaluation	18. Critically evaluate the quality of the solutions proposed. 19. Evaluate own actions and behavior relatively.

Literature:

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Other:

- Work package leader must analyze the conditions for relevant cases for the sustainable city competition that can be investigated. Examples include: making a energy neutral city district
- Work package leader should analyze the current level of research and project management skills among CARPE partners and develop workshops or trainings to improve / tune research and project management skills

Table 2: generic competences (taken from TUNING)

Competence	Importance
1. Ability to communicate in a second (foreign) language	XXXXX
2. Capacity to learn and stay up-to-date with learning	XX
3. Ability to communicate both orally and through the written word in first language	0
4. Ability to be critical and self-critical	XXXX
5. Ability to plan and manage time	X
6. Ability to act on the basis of ethical reasoning	XX
7. Capacity to generate new ideas (creativity)	XXXXXX
8. Ability to search for, process and analyse information from a variety of sources	XXXX
9. Ability to work autonomously	XX
10. Ability to identify, pose and resolve problems	XXXXXX
11. Ability to apply knowledge in practical situations	XXXXX
12. Ability to make reasoned decisions	XXXXX
13. Ability to undertake research at an appropriate level	XXXX
14. Ability to work in a team	XXX
15. Knowledge and understanding of the subject area and understanding of the profession	XXX
16. Ability to motivate people and move toward common goals	XXX
17. Commitment to conservation of the environment	XX
18. Ability to communicate key information from one's discipline or field to non-experts	XX
19. Ability for abstract and analytical thinking, and synthesis of ideas	XXXXX
20. Ability to interact constructively with others regardless of background and culture and respecting diversity	XXXXX
21. Ability to design and manage projects	XXXXX
22. Ability to interact with others in a constructive manner, even when dealing with difficult issues	XXX
23. Ability to show awareness of equal opportunities and gender issues	XX
24. Commitment to health, well-being and safety	XXX
25. Ability to take the initiative and to foster the spirit of entrepreneurship and intellectual curiosity	XXXXX
26. Ability to evaluate and maintain the quality of work produced	XXXXX
27. Ability to use information and communications technologies	XX
28. Commitment to tasks and responsibilities	XX
29. Ability to adapt to and act in new situations and cope under pressure	XXX
30. Ability to act with social responsibility and civic awareness	XXX
31. Ability to work in an international context	XXXXXX

Two experts judged the importance of the above mentioned generic programme competence. XXX = very relevant, XX = relevant, X = not so relevant. Competences marked with XXXXX or XXXXXX have been selected as generic ESSENCE programme competences.