German Jordanian University

School of Natural Resources Engineering and Management
Department of Civil and Environmental Engineering
Master of Humanitarian Water, Sanitation, and Hygiene (WaSH)
Thesis Track

Study Plan 2024

I. Program Objectives

The main aim of the WaSH humanitarian master program is to educate and train students to access position of WaSH program coordination[1] by starting as Project Manager and to acquire enough knowledge/Hard and soft skills to evolve rapidly to a coordination position.

The program objectives rely on providing the students with the following solid operational, technical and managerial competencies:

1) **To understand humanitarian principles and international laws:**
    1) To understand the humanitarian global framework for defining the rights of the affected population.
    2) To understand and use international, national and local standards/laws appropriately.
    3) To acquire knowledge and experience to solicit feedback/guidance from local stakeholders with knowledge of the context.
    4) To understand the humanitarian coordination mechanisms and how to position their organisations within the humanitarian WaSH sector.

2) **To acquire knowledge and experience on the various steps of project cycle management (PCM) related to WaSH interventions.**
    1) To acquire knowledge and experience to mobilize resources.
    2) To acquire knowledge and experience to conduct qualitative and quantitative needs **assessments.**
    3) To acquire knowledge and experience to conduct a response analysis.
    4) To acquire knowledge and experience to **design** project with an effective planning and to develop a logical framework/ theory of changes.
    5) To acquire knowledge and experience to **design/ implement** behaviour changes activities for appropriate practice in Water, Sanitation and Hygiene
    6) To acquire knowledge and experience to **design/implement** adequate, efficient and effective **water** delivery systems while keeping in mind the importance of continuous functionality.
    7) To acquire knowledge and experience to **design/implement** adequate, efficient and effective **sanitation** systems while keeping in mind the importance of continuous functionality.
    8) To acquire knowledge and experience to **design/ implement** specific interventions (conflict, displacement, urban context, natural disaster, disease outbreak, WaSH in schools, health centre, etc.).
    9) To acquire knowledge and experience to **design/implement** projects for an emergency and protracted crisis context while considering an exit strategy.
    10) To acquire knowledge and experience to design/implement a preparedness and contingency plan
    11) To acquire knowledge and experience to **monitor, evaluate** the project progress and final impact and adapt methodologies and design through lessons learned.

3) **To acquire knowledge and experience to take into account humanitarian concepts and cross-cutting issues into programming:**
    1) To acquire knowledge and experience to integrate into a WaSH program issues such as: gender, protection, and inclusion of vulnerable and stigmatised groups taking into account their special needs.

[1] As name of position differs according to organisation. For this document, we consider as WaSH project manager, the person managing a WaSH project at field level (being in charge of the project, managing field staff and operation in the field). A WaSH coordinator is generally the person coordinating WaSH activities at a country/region level. She/ He is often based at capital level and can be responsible for a number of projects, country strategy and technical support. She/ He is generally the supervisor of the WaSH project manager. Those functions may be named differently in various organisation such as: Head of Department, WaSH coordinator, WaSH program manager, program director, WaSH expert, WaSH specialist, etc.

2) To acquire knowledge and experience to conduct a risk analysis of WaSH activities, and largely, the broader humanitarian activities and to take measure to prevent, control and ensure projects have no negative impact on the environment, local community, local market etc.
3) To acquire knowledge and experience to promote livelihoods and entrepreneurship activities in order to boost local economy, small markets, recovery and dignity of affected population.
4) To know how to interact with other sectors (education, health, shelter, humanitarian and development).
5) To acquire knowledge and experience to involve and support local authorities and stakeholders in WaSH programming and provide capacity building.
6) To acquire knowledge and experience to guarantee accountability towards beneficiaries, local authorities and donors in WaSH programming.
7) To understand how to manage programs remotely in areas with limited access
8) To acquire knowledge and experience to analyse the market, potential risks, put in place monitoring tools and ensure quality and achievement of WaSH outcome when using market based interventions, and evaluate the relevance of cash-based programing according to activities and context.

4) To acquire skills in leadership, HR management, logistics, security, computer, reports writing, communication and networking needed in humanitarian projects management and coordination.

1) To acquire knowledge and experience to contribute to the different HR management processes needed in a Wash programs (recruitment, Training of Trainer, performance assessment …etc.)
2) To acquire knowledge and experience to collaborate with internal financial/ logistical procedures/supply chain
3) To acquire knowledge and experience to assess Security context and assess potential risks.
4) To acquire knowledge and experience to apply security and safety rules while implementing WaSH activities.
5) To acquire knowledge and experience to use statistics, mapping, survey, and hydraulic design tools in humanitarian projects.
6) To acquire knowledge and experience to write clear, concise, comprehensive and succinct reports

5) To understand the ethics of the humanitarian work

1) To understand commitment and social motivation
2) To respect ethical values
3) To show cultural sensitivity
4) To respect humanitarian principles
5) To be able to manage stress

II. Learning Outcomes

Upon completion of the program, graduates should have the following competencies:

1. Humanitarian infrastructure

1) Apply Humanitarian principles, International and domestic law into programming.
2) Design project according to national /humanitarian standards
3) Integrate Sustainable Development goals, the Grand bargain, Humanitarian-development nexus into programming

4) Advocate to make sure WaSH programming meet the needs of population and use continuous functional, cost-effective technically and institutionally sound solution as far as possible.
5) Participate in coordination of humanitarian actions
6) Be involved in national /regional contingency planning
7) Coordinate with others stakeholders, cluster/sector

2. WaSH Project cycle management

1) Mobilize resources.
2) Conduct needs assessment.
3) Conduct a response analysis.
4) Design WaSH project based on the needs assessment.
5) Design and implement contextually appropriate behaviour changes activities for appropriate practice in Water, Sanitation and Hygiene.
6) Design and implement contextually appropriate safe water supply interventions.
7) Design and implement contextually appropriate sanitation interventions.
8) Design and implement specific interventions (conflict, displacement, urban context, natural disaster, disease outbreak, WaSH in schools, health centre, etc.).
9) Design and implement a preparedness and contingency planning.
10) Monitor and evaluate projects by identifying SMART indicators, selecting tools to monitor the progress of the project and the impacts.
11) Integrate lesson learned.
12) Report, carry out administrative and budget management of WaSH projects.
13) Ensure project continuous functionality, cost effectiveness of project and include an exit strategy.
14) Coordinate with others stakeholders/ cluster/sector

3. Humanitarian concepts and cross-cutting programming

1) Support local partners in assessing their capacity building needs
2) Support investment (capacity building, accountability, materials, financial) in the institutional capacities of local and national actors
3) Work to remove/reduce barriers that prevent local stakeholders from partnering with local and national responders/ donors
4) Use local resources (materials and work force) from the beneficiary community and local institutions when appropriate
5) Include gender in WaSH programming
6) Include marginalized groups, people with disabilities, elders, special needs in WaSH programing
7) Mainstream Protection in WaSH programing
8) Reduce the impact of WaSH programming on the environment
9) Consider climate change and water scarcity situations and the energy nexus
10) Promote livelihoods activities
11) Guarantee accountability towards beneficiaries and participation
12) Guarantee accountability towards donors and authorities
13) Include rights based approach in WaSH programming
14) Assess and analyse the market, implement, and monitor cash based intervention tools and ensure quality and achievement of WaSH outcome when using cash base interventions.

4. Communication, human resources, relation with administration, logistics, security and finance department.

1) Recruit competent staff

2) Manage staff, team and conflict
3) Promote staff training
4) Assess staff performance
5) Apply the code of conduct/Safe guarding
6) Manage staff remotely
7) Follow on procurement procedures and finances expenditures
8) Draft calls for tenders and manage contracts with suppliers/contractors
9) Supervise subcontractors' work
10) Assess Security context and risks
11) Apply security and safety rules while implementing activities
12) Use advance formulas and graphs in Ms Excel, mapping tools and statistics tools (KOBO, ODK)
13) Represent and position the organisation
14) Communicate appropriately
15) Organise meetings
16) Coordinate with other sectors, cluster, sector

5. Ethic and behaviour

1) Develop empathy towards beneficiaries.
2) Understand and apply the humanitarian principles and code of conducts into programming.
3) Show cultural sensitivity
4) Manage stress and adapt to the situation

Course Delivery Methods

Courses are in one of the following three methods:

- **Face-to-Face (F2F) Method**
  Courses using this method are delivered by faculty in person in regularly scheduled class sessions physically on campus.
- **Blended (BLD) Method**
  Courses are delivered in a hybrid mode of physical face-to-face class sessions and asynchronous material including online instructional videos, presentations, projects, and similar learning activities.
- **Online (OL) Method**
  Courses are delivered exclusively online. This method consists of a hybrid of synchronous regularly scheduled class sessions delivered via the Internet, and asynchronous material including online instructional videos, presentations, projects, and similar learning activities. Virtual classrooms utilizing different online platforms are used. No physical face-to-face meetings are required.

III. Admission Requirements

To apply for admission, the following minimum requirements must be met:

1. Be a holder of an undergraduate degree in any field of study from a recognized university with a minimum average of "Good" in one of the following programs:
2. Water and/or sanitation management
3. Public Health (hygiene promotion, behavior change, social work)
4. Hydraulics and Hydrology
5. Chemical Engineering
6. Epidemiology, agronomy, chemistry, Civil Engineering, Environmental Engineering or Environment Science.
7. Passing the English proficiency Exam.

8. Passing the personal interview.
9. Recommendation letter from a party operating in the field of the Master program.
10. Motivation letter
11. Professional experience in NGO or private sector related to Water, sanitation, and/or public health (Preferred)

IV. Degree Requirements (Credit hours)

Degree requirements 36 credit hours

Classification	Credit Hours
Compulsory courses	17
Elective courses	4
Internship	3
Thesis	9
Total	**33**

V. Curriculum (Credit hours)

1. Compulsory Requirements: (17 credit hours)

Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
				Lect	Lab		
HWaSH 711	Humanitarian System and concepts	3	5	2	3	F2F	
HWaSH 721	Technical essentials: Water and sanitation	4	6	3	3	F2F	
HWaSH 722	Technical essentials: Behaviour change in water, sanitation and hygiene practices	3	5	2	3	F2F / OL	
HWaSH 737	Humanitarian WaSH Project Cycle Management	5	8	3	6	F2F	
HWaSH 741	Human Resources, logistics, security of humanitarian WaSH programs	2	3	1	3	F2F	
	Total	**17**	**27**	**11**	**18**		

2. Elective Courses: (4 credit hours out of the following)

Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
				Lect	Lab		
HWaSH 733	Budgeting, reporting, communication and partnership management essentials	2	3	2	0	F2F	
HWaSH 734	Budgeting, reporting, communication and partnership management lab	1	1.5	0	3	F2F/ OL	HWaSH 733
HWaSH 751	Simulation exercise	1	1.5	0	3	F2F	
HWaSH 735	Advance cash based programming	3	5	3	0	F2F	

HWaSH 736	Disaster Risk Management	3	5	3	0	F2F	
ERE 742	Sustainability	3	5	3	0	F2F	
ERE 752	Water, Energy, and Environment Management	3	5	3	0	F2F	
ERE 743	Environmental Biotechnology and Bioenergy	3	5	3	0	F2F	
ERE 751	Advanced water and Wastewater Treatment	3	5	3	0	F2F	
ERE752	Water, Energy, and Environment Management	3	5	3	0	F2F	
ERE 734	Techno Economical Feasibility	3	5	3	0	F2F	
HWaSH 791	Special topics in Humanitarian WaSH	3	5	3	0	F2F	
	Minimum required	**04**	**06**	**01**	**06**		

3. Thesis/Comprehensive Exam/Other: (09 credit hours)

Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
				Lect	Lab		
HWaSH799A	Master thesis	0	0	-	-		
HWaSH799B	Master thesis	3	5	-	-		
HWaSH799C	Master thesis	6	9	-	-		
HWaSH799D	Master thesis	9	15	-	-		
HWaSH7991	Master thesis	3	-	-	-		DGS approval
HWaSH7992	Master thesis	3	-	-	-		HWaSH7991co
HWaSH7993	Master thesis	3	-	-	-		HWaSH7992co
	Minimum required	**09**	**15**	**-**	**-**		

4. Internship: (03 credit hours)

Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
				Lect	Lab		
HWaSH 761	Internship	3	5	-	-	F2F	
	Minimum required	**03**	**5**	**-**	**-**		

VI. Study Plan Guide

First Year							
First Semester							
Course ID	**Course Name**	**Credit Hours**	**ECTS**	**Contact Hours**		**Type**	**Prerequisites / Corequisites**
				Lect	**Lab**		
HWaSH 711	Humanitarian System and concepts	3	5	2	3	F2F	
HWaSH 721	Technical essentials: Water and sanitation	4	6	3	3	F2F	
HWaSH 741	Human Resources, logistics, security of humanitarian WaSH programs	2	3	1	3	F2F	
	Total	**9**	**14**	**6**	**9**		

First Year							
Second Semester							
Course ID	**Course Name**	**Credit Hours**	**ECTS**	**Contact Hours**		**Type**	**Prerequisites / Corequisites**
				Lect	**Lab**		
HWaSH 733	Budgeting, reporting, communication and partnership management essentials	2	3	1	0	F2F	
HWaSH 734	Budgeting, reporting, communication and partnership management lab	1	1.5	0	3	F2F/ OL	HWASH 733
HWaSH 722	Technical essentials: Behaviour change in water, sanitation and hygiene practices	3	5	2	3	F2F / OL	
	Total	**6**	**9.5**	**3**	**6**		

First Year							
Summer Semester							
Course ID	**Course Name**	**Credit Hours**	**ECTS**	**Contact Hours**		**Type**	**Prerequisites / Corequisites**
				Lect	**Lab**		
HWaSH 737	Humanitarian WaSH Project Cycle Management	5	8	3	6	F2F	
	Total	**5**	**8**	**3**	**6**		

Second Year							
First Semester							
Course ID	**Course Name**	**Credit Hours**	**ECTS**	**Contact Hours**		**Type**	**Prerequisites / Corequisites**
				Lect	**Lab**		
HWaSH 761	Internship	3	5				
HWaSH 751	Simulation exercise	1	1.5	0	3	F2F	
HWaSH 799B	Master thesis	3	5				
	Total	**6**	**11.5**	**0**	**3**		

Second Year							
Second Semester							
Course ID	**Course Name**	**Credit Hours**	**ECTS**	**Contact Hours**		**Type**	**Prerequisites / Corequisites**
				Lect	**Lab**		
HWaSH799 C	Master thesis	6	9	-	-		
	Total	**6**	**9**	**-**	**-**		

VII. Course Descriptions

1. Compulsory Courses

HWaSH 711 Humanitarian system and concepts **3 Cr Hr** **05 ECTS**

This course aims to provide students with a thorough understanding of the framework, principles, standards and contexts of humanitarian aid, public health basic concepts, cross-cutting issues and approaches to WaSH in the ME.

The first part of the course includes an introduction to public health concepts, understanding basic of epidemiology and how to translate specific diseases into interventions, typology of crisis and WaSH sector characteristics and human rights related to water and sanitation

The second part of the course includes the following topics: applied geopolitics, humanitarian principles, standards and codes of conducts, the legal framework of humanitarian aid, stakeholders and coordination systems, and current challenges and developments in the humanitarian system.

The third part of this course deals with cross-cutting issues and humanitarian concepts such as protection, gender, participation of authorities and affected population, accountability, specific needs/marginalised groups, the environment and climate change, continuous functionality, localisation, livelihoods, and cash-based programming.

HWaSH 721 Technical essentials: Water and Sanitation **4 Cr Hr** **06 ECTS**

This course aims to provide students with the fundamental technical knowledge and skills to implement emergency, recovery water and sanitation activities and connection with development operations.

The contents include the basics of hydrogeology, topography, hydraulics, energy.

The course also includes the design, development, maintenance and/or operation of: water sources, water treatment, water supply systems, water quality control technics and methodology, integrated water resources management systems, drainage systems, liquid and solid waste management systems.

Theoretical concepts will be reinforced through practical exercises, labs and field simulations.

HWaSH 722 Technical essentials: Behaviour change in water, sanitation, and hygiene practices **3 Cr Hr** **05 ECTS**

This course aims to provide students with the fundamental technical knowledge and skills to implement behaviour change in water, sanitation and hygiene practices of affected and host populations.

The contents include applied anthropology, social norms adaptation, awareness raising methods and tools, barriers analysis, communication materials design, community engagement technics, community-based management technics, essentials of water conservation and good hygiene practices, hygiene related health risks and access to WaSH related Non Food Items.

HWaSH 737 Humanitarian WaSH Project cycle management 1 **5 Cr Hr** **08 ECTS**

The first part of the course aims to provide students with methods and tools to conduct comprehensive assessments and analysis of WaSH context and the needs of affected and host populations.

The contents include: strategic design, understanding, assessment and analysis of epidemiological data, sanitary surveys, mapping and analysis of hydrology/hydrogeology data, needs assessment methods and tools, data analysis methods and tools, coordination with authorities and other stakeholders, and consolidated data, and applying standards principles.

The second part of this courses focuses on methods and tools for monitoring, evaluating and learning for WaSH programs.

The content will include: monitoring and evaluation frameworks including data collection and processing systems, progress and evaluation reports and knowledge management for learning.

Theoretical concepts will be reinforced through practical exercises, labs and field simulations.

This course aims to provide students with methods and tools to plan, design and implement WaSH programs.

The first part of the course aims to provide students with method and tools to design and plan WaSH programs based on the results of the assessment and analysis data including integration with other sectors (health, education,

camp management, shelter, logistic, etc.).
This includes the selection and/or adaptation, and/or operation and maintenance procedures of appropriate technical solutions in terms of water sources, water treatment, water supply, water quality control, integrated water resources management, liquid and solid waste management, behaviour changes, awareness raising, communication materials design, WaSH Non Food Items and distribution strategy to fit the local and humanitarian context.
The second part of this course focuses on the operational application of WaSH activities, namely supervision of field work, organising delivery of materials, organising team work, adapting resources according to project needs in the implementation of the following types of activities: water sources, water treatment, water supply, water quality control, integrated water resources management, liquid and solid waste management, awareness raising, developing communication materials, WaSH Non Food Items distribution within the local and humanitarian context.
The content will also include the consideration of cross-cutting issues and humanitarian concepts in the implementation of WaSH activities and specific interventions such as interventions in conflict, displacement, urban context, natural disaster, disease outbreak, WaSH in schools, health centre, nutrition, etc.
The contents also include: operational strategy methodology, theory of change, the logical framework and indicators, resources planning technics, disaster risk reduction methods and tools.
The content also includes concept note and proposal writing.
Theoretical concepts will be reinforced through practical exercises, labs and field simulations.

Prerequisites: HWaSH 731

HWaSH 741 Human Resources, logistics and security management **2 Cr Hr** **03 ECTS**

This course aims to provide students with the fundamentals of humanitarian human resources, logistics and security management methodologies and tools.
The first part of the course includes topics related to humanitarian human resources: recruitment procedure, job description, appraisal and training and use human resources procedure and tools, code of conducts, leadership skills.
The second part of the course includes topics related to humanitarian logistics: basics of supply chain, procurement procedure, supplier contract types, tender and bidding procedure and quality control of contractor's performance, bill of quantities, delivery and transport planning.
The third part of the course includes topics related to applied security rules in the field: understanding and compliance with organisation security rules, analysis of the environment, context understanding, mitigation measure, staff monitoring in compliance to the security protocol and compliance with site safety conditions.
Theoretical concepts will be reinforced through practical exercises, labs and field simulations.

2. Elective Courses

HWaSH 733 Budgeting, reporting, communication and partnership management essentials **2 Cr Hr** **03 ECTS**

This course aims to provide students with the essential knowledge, practice and tools to comply with organisational procedures and donor guidelines in budget design, management and reporting, and to manage partnerships, and communication methodologies and tools.
The first part of the course includes topics related to the development of funding strategy, and humanitarian finance: abilities to understand budget structure and abilities to design, forecast and follow up budgets while respecting donor and organisation requirements.
The second part of the course focuses on reporting skills: activity report, technical report, donor report.
The third part of the course includes partnership: Memorandum of understanding, types of partnerships, partner capacity audit and knowledge and experience sharing needs identification, partner coordination and monitoring, partner accountability process and partner's performance evaluation.
The fourth part of this course focuses on the theoretical aspects of communication in multicultural context, negotiation skills, conflict management, advocacy, diplomacy, leadership and facilitation of meetings.

HWaSH 734 Budgeting, reporting, communication and partnership management practice **1 Cr Hr** **1.5 ECTS**

This course aims to allow students to practice their knowledge and skills in organisational procedures, donor guidelines, budget design, management and reporting, partnerships, and communication.

HWaSH 751 Simulation exercice **1 Cr Hr** **1.5 ECTS**

This simulation exercise aims to provide an opportunity for students to apply the full range of skills acquired in water, sanitation and behaviour change practices in a field situation. A part of this exercise will aim to develop the student's capacity to develop an understanding of situation of the affected population
The simulation exercise will bring together all the technical and management skills developed in the previous courses.

HWaSH 735 Advance cash base programming **3 Cr Hr** **05 ECTS**

This course aims to provide students enough knowledge to use market-based approaches (including cash transfer) to achieve WASH outcomes.
The contents include methodology and tools to evaluate the relevancy of using of market approaches and cash modalities in a WASH Humanitarian Response while maintaining or improving WASH market systems, to choose, implement and monitor the most appropriate distribution modalities in collaboration with logistic and finance departments and other sectors.

HWaSH 736 Disaster Risk Management **3 Cr Hr** **05 ECTS**

This course aims to provide students enough knowledge to assess, identify, and reduce the different risk factors involved in disaster risk management. This course will look at how DRR can be used in emergencies. The course will cover topics related to types of disasters, DRR and the environment, and resources.

ERE 742 Sustainability **3 Cr Hr** **05 ECTS**

Sustainability. Sustainable systems. Sustainable wastewater treatment by utilizing natural processes (aerobic digestion, photosynthesis, etc…), renewable sources of energy (e.g., sunlight, wind, geothermal, and biomass), etc. Assessment of current and potential future energy needs, with emphasis on meeting regional and global energy needs in this and coming century.

ERE752 Water, Energy, and Environment Management **3 Cr Hr** **05 ECTS**

This course addresses major topics such as water quantity, water quality, , and energy. It also addresses topics related to Middle East water/energy resources situation and management. Socioeconomic factors. Recycling and conservation of water. Aquifers and its over-pumping. Discharge of human and industrial wastewater. National and international institutions. Militarization of water. Politics and research as part of the solution. Integrated water resource management. Principles and practice of water resources planning and management. Protocols employed at local, state, regional and international levels. Plan formulation, evaluation, and implementation. Stakeholder involvement in planning processes. Analytical tools. Case studies with emphasis on the MENA region.

ERE743 Environmental Biotechnology and Bioenergy **3 Cr Hr** **05 ECTS**

Basic concepts of biotechnology: Biomass characterization, Biomass growth and kinetics. Bioconversion systems: types of biomass, which are currently considered for conversion
into bioenergy conversion pathways available to turn biomass into bio-products. Identify energy potentials of biomass and biogas. Biofuels and Combustions Engines.

ERE751 Advanced Water and Wastewater Treatment **3 Cr Hr** **05 ECTS**

Characteristics of wastewater. Principles of wastewater treatment process design, operation and economics. Unit operations. Biological treatment systems and oxidation kinetics. Advanced wastewater treatment and reuse. Sludge treatment processes, including public health engineering, wastewater disposal systems, and wastewater contamination indicators. Topics include wastewater quality parameters; unit operations in treatment of

wastewater. Experimental and practical projects are given to the students in the above topics. Wastewater treatment Plant design: case study. Use of renewable energy in water and wastewater treatment.

ERE752 Water, Energy, and Environment Management, 3 Cr Hr 05 ECTS

This course addresses major topics such as water quantity, water quality, , and energy. It also addresses topics related to Middle East water/energy resources situation and management. Socioeconomic factors. Recycling and conservation of water. Aquifers and its over-pumping. Discharge of human and industrial wastewater. National and international institutions. Militarization of water. Politics and research as part of the solution. Integrated water resource management. Principles and practice of water resources planning and management. Protocols employed at local, state, regional and international levels. Plan formulation, evaluation, and implementation. Stakeholder involvement in planning processes. Analytical tools. Case studies with emphasis on the MENA region.

HWaSH 791 Special Topics in Humanitarian WaSH 3 Cr Hr 05 ECTS

Covers specified cases with special interest for industry and modern technology in the areas of renewable energy technology.

ERE 734 Techno Economical Feasibility 3 Cr Hr 05 ECTS

Technological, cost, and environmental fundamentals of emerging renewable sources of energy and environmental systems; including solar, wind, biomass, geothermal, hydropower and fuel cell, water supply assessment and cost recovery options, water use efficiency measures, Pollution and remediation and treatment options assessments. The economics of source reduction, recycling, reuse, and recovery of wastes. Renewable energy sources commercialization and measurement. Economic and technical performance indicators of renewable energy and energy efficiency systems and environmental systems; LCOE and payback periods. This course include using softwares and projects to carry out real techno economic studies for real systems.

3. Thesis

HWASH 799A Master Thesis 00 Cr Hr 00 ECTS

HWASH 799B Master Thesis 03 Cr Hr 05 ECTS

HWASH 799C Master Thesis 06 Cr Hr 09 ECTS

HWASH 799D Master Thesis 09 Cr Hr 15 ECTS

HWASH 7991 Master Thesis 03 Cr Hr

HWASH 7992 Master Thesis 03 Cr Hr

HWASH 7993 Master Thesis 03 Cr Hr

4. Internship

HWaSH 761 Internship 3 Cr Hr 00 ECTS

All Master students will have to complete a 15 weeks internship with a partner organization (international or national NGO, UN agency, private sector or public institution). The internship will offer a unique opportunity to practice the knowledge, skills and concepts acquired during the lectures and practical courses of the Master. With the support of the academic advisor and upon agreement with a mentor from the host organization, students

could undertake research activities during the internship, as requested by the approved thesis proposal. Students will be encouraged to complete the placement in the region, but this could also be done anywhere a humanitarian context exists.