

COURSE OBJECTIVES  
& SYLLABUS

ONLINE COURSE ON  
FAECAL SLUDGE  
MANAGEMENT

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## **1. INTRODUCTION**

The sanitation needs of 2.7 billion people worldwide are served by onsite sanitation technologies. Even though it is felt that onsite technologies fulfil sanitation needs of the rural population, around one billion onsite facilities worldwide are in urban areas. Despite the fact that sanitation needs are met through onsite technologies for a vast number of people in urban areas of low and middle income countries, there is no management system in place for the resulting faecal sludge (FS) from these onsite technologies. It is evident that the management of FS is critical need that must be addressed and that it will continue to play an essential role in the management of global sanitation into the future.

This online course on faecal sludge management (FSM) has been designed with an objective to impart knowledge on all the important aspects of FS for the design and operation of a comprehensive FSM system. Upon completion, the participant should be able to:

1. Have an understanding of the treatment, management, and planning aspects related to FSM, and how they interact;
2. Comprehend the importance of proper sludge characterisation for optimal collection and transport, treatment and reuse;
3. Apply engineering fundamentals to design systems for management and treatment of faecal sludge;
4. Describe how valorisation of faecal sludge can be accomplished;
5. Place FSM in an urban waste management context for sustainable and feasible planning of FSM systems

The course targets professionals who deal with planning, promoting, designing, operating or managing FS for residents in urban, peri-urban, slum or rural areas, in low income countries and beyond. Background on physics and chemistry is essential to follow this course whereas a good understanding of wastewater and its (biological) treatment will strongly support the understanding of the course.

## **2. LEARNING OBJECTIVES (LO)**

The Module on faecal sludge management covers a number of topics, divided into 6 courses. Each course has its own units, and its own learning objectives. After successful completion of the module, the participant will be able to:

- Understand the importance of an integrated approach for faecal sludge management
- List and explain the social, procedural, technical and safety aspects related to the collection and transport of faecal sludge from onsite sanitation technologies
- Have an understanding of existing FS treatment technologies, their advantages, constraints and field of application
- Design selected technologies and know the appropriate level of operation, maintenance and monitoring necessary to achieve desired treatment goals
- Realize the very limited conditions under which faecal sludge can be co-treated in sewer based wastewater treatment systems, and be able to indicate potential impacts
- Indicate how regulations, contracts, stakeholders' roles and a proper institutional framework are essential for an effective faecal sludge management
- Understand the wide range of potential resource recovery opportunities from faecal sludge and key criteria in selecting the most appropriate options.
- Draw up the complexity involved in designing, implementing, monitoring and optimizing an entire FS management system that includes all stakeholders and financial interactions

### 3. MODULE SET-UP

The online course is divided in 6 courses (see Table 1): 1) Introduction into FSM, 2) Technological Fundamentals of FSM, 3) Methods and Means for Collection and Transport of Faecal Sludge, 4) Faecal Sludge Treatment Technologies, 5) Management and 6) Planning. Each course is divided up in one or more units, in which each unit covers one week of study load. In **Course 1** the concept of faecal sludge and its management is introduced to the participants. **Course 2** covers the technological fundamental of faecal sludge management. It deals with the characteristics and strength of faecal sludge and its analysis and with the various physical, chemical and biological treatment mechanisms. **Course 3** focuses on the methods and means for collection and transport of faecal sludge from the point of generation to the point of treatment. **Course 4** is the longest with 5 units and deals with technologies for treating faecal sludge. It provides an overview of existing and potential future faecal sludge treatment technologies including the advantages and constraints of field application. In addition, it provides the principles, key considerations and potential impacts of co-treatment of faecal sludge in sewer based wastewater treatment systems and potential resource recovery opportunities from faecal sludge. **Course 5** deals with management aspects of faecal sludge. It focuses on the important factors and roles of operation and maintenance for faecal sludge treatment plants; stakeholders' roles in institutional frameworks; and various institutional arrangements for the distribution of responsibilities in the service chain. **Course 6** is dedicated to the planning aspects and imparts knowledge

on methods and tools for collecting relevant data and developing a faecal sludge management project at a city level.

**Table 1: Overview of all Courses and Units within the Module on Faecal Sludge Management**

<b>Course 1</b>	<b>Introduction to FSM</b>		Book Chapter
	Unit 1.1	General intro into FSM	0, 1
<b>Course 2</b>	<b>Technological fundamentals of FSM</b>		
	Unit 2.1	Characterisation of FSM (quality, quantity, SOPs)	2
	Unit 2.2	Treatment mechanisms	3
<b>Course 3</b>	<b>Collection and Transport</b>		4
<b>Course 4</b>	<b>FS Treatment Technologies</b>		
	Unit 4.1	Overview of Technologies	5
	Unit 4.2	Settling – Thickening	6
	Unit 4.3	Drying beds	7, 8
	Unit 4.4	Co-treatment with FS	9
	Unit 4.5	End-use	10
<b>Course 5</b>	<b>Management</b>		
	Unit 5.1	Operation and Maintenance	11
	Unit 5.2	Institutional Frameworks	12
	Unit 5.3	Financial Transfers and Responsibility	13
<b>Course 6</b>	<b>Planning</b>		
	Unit 6.1	Assessment of the Initial Situation	14
	Unit 6.2	Planning of Integrated FSM Systems	17

## 4. UNIT SET-UP

Each Unit in the Module covers a study load of 8 hours, and is to be finished within one week. Each Unit is linked to a chapter in the book on faecal sludge management: Faecal Sludge Management, systems approach for implementation and operation (IWA Publishing, 2014). The study load is divided over:

- A unit plan: a one page document introducing the topic and materials of the unit. You can find these unit plans on the E-campus platform.
- A key note speech: a video of up to 50 minutes recorded by an expert in the field, showing the highlights, history and expected future developments of the topic.
- The corresponding book chapter
- If applicable, a case study video: a video showing a particular example or situation relevant for the field of FSM. These videos have been prepared by our delivering partners as well as other experts in the field. They cover between 15 and 30 minutes of video material, some reading, in some cases an assignment, and a take home

message. In the list with case studies on the platform you can see which case study is relevant for which unit.

- Suggested reading materials – these will be located under the Unit information on the platform.
- If applicable, an assignment in one form or another.
- **Future Developments:** This section features links to videos on future developments which can bring about sustainable sanitation. Most of the developments are linked to the Reinvent the Toilet Challenge (RTTC) but there are also developments outside this programme.

**Table 2: Time schedule for the Module Faecal Sludge Management**

Content	Chapter	Week number															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Introduction into the course																	
<b>Fundamentals of FSM</b>																	
1.1 - General intro to FSM	0, 1																
2.1 - Faecal Sludge Quantification, Characterisation and Treatment Objectives	2																
2.2 - Treatment Mechanisms	3																
Assessment Block I																	
<b>FSM Treatment Technologies</b>																	
3.1 - Methods and Means for Collection and Transport of Faecal Sludge	4																
4.1 - Overview of Treatment Technologies	5																
4.2 - Settling-Thickening Tanks	6																
4.3 - Drying Beds	7, 8																
4.4 - Co-treatment of Faecal Sludge in Municipal Wastewater Treatment Plants	9																
4.5 - Enduse of Treatment Products	10																
Assessment Block II																	
<b>FSM Planning</b>																	
5.1 - Operation, Maintenance and Monitoring of Faecal Sludge Treatment Plant	11																
5.2 - Institutional Frameworks for Faecal Sludge Management	12																
5.3 - Financial Transfers and Responsibility in Faecal Sludge Management Chains	13																
6.1 - Assessment of Initial situation	14																
6.2 - Planning Integrated Faecal Sludge Management	17																
Assessment Block III																	
<b>FINAL EXAM</b>																	

## 5. TEACHING APPROACH

For study load calculation the following factors are applied:

**Table 3: Time schedule for the Module Faecal Sludge Management**

Type of material	Study load	Study load per average unit
Unit introduction	20 min	0.3 hrs
Studying PowerPoint material	30 slides per hour	2-3 hrs
Reading text	8-10 pages per hour	3-4 hrs
Preparing group assignment	3 hours per assignment	3 hrs
Participation on the platform	30 min per unit	0.5 hrs

The online course consists of video-recorded lectures, PowerPoint presentations, 2-4 papers or documents for assigned reading (total ca 40 pages) and the FSM ebook for participant's self-study and assignments. The Virtual Learning Environment, "eCampus", which will be used for the course delivery is based on the free open source course management system "Moodle. A discussion forum set up by the course coordinators, enables participants to communicate online with each other and the course coordinators using text. Participants can receive posts by email, and/or log onto Moodle to view them. The course coordinators can also view the participation and activity per participant which is recorded on Moodle, and can act upon it, if necessary in case of limited activity, by contacting the participant. The course program will be taught over a period of 4 months (16 weeks). A participant will be expected to spend about 8 hours per week on average through reading, discussion and assignments. The discussions will take place on the forum, with fellow participants and/or teachers. The course is sub-divided into 5 chapters and one final assignment. Tables 1 and 2 above display the contents of the online course including the estimated period it will take to complete each course. Assessment takes place in the form of self-assessments (quizzes), written (group) assignments and a final oral exam. The oral exam at the end of the course discusses the content of the assignments and of the study material.

## **6. ASSESSMENT OF THE COURSE**

In order to verify whether the learning objectives have been achieved as well as to enhance the learning, several assignments have been designed as part of the material.

On the platform a list of assignments is presented, with the corresponding unit number(s), a description, expected output and assessment criteria, expected time span, and other relevant information.

In order to successfully complete the course, the participant needs to carry out:

- 6 self-assessment tests [20% of the total mark];
- 2 written assignments to design, reflect or study [40% of the total mark];
- Oral examination [40% of the total mark].

The final exam will be in form of an oral exam, and will be executed via Skype or comparable audio/video online program. If none of these programmes cannot function reliably due to limited internet access, a reliable alternative will be sought. The course is successfully completed when the average final mark is higher than or at least equal to a 6.0, and 5 ECTS can be awarded. However, recognizing that not all students may be interested in the ECTS and doing the final examination, a student who has an average mark higher than or at least equal to 5.0 for the assignments, is entitled to receive a Certificate of Participation. To get the right to carry out the final examination, the average mark for the assignments must be at least equal to 5.0.