

VIU (Venice International University)
IWWG (International Waste Working Group)

DOCTORAL SCHOOL ON
“ANAEROBIC DIGESTION:
processes, technology, design and
research advancements”

San Servolo Island, Venice –
15-22 November 2014

PROGRAMME
...updated on 07/10/2014

School Coordinators

Raffaello Cossu, University of Padova, Italy

Rainer Stegmann, University of Hamburg-Harburg, Germany

Lecturers

Luca Alibardi, University of Padova, Italy

Werner Bidlingmaier, Bauhaus University, Weimer, Germany

William Clarke, University of Queensland, Australia

Luis Diaz, CalRecovery, USA (invited)

Piet Liens, UNESCO-IHE

Paolo Pavan, Ca'Foscari University of Venice, Italy

Pingjing HE, Tongji University, Shanghai, China

Marco Ritzkowski, University of Hamburg-Harburg, Germany

Cristina Trois, University of Kzulu-Natal, Durban, South Africa

Rainer Stegmann, University of Hamburg-Harburg, Germany

Jiane ZUO, Tsinghua University, China (invited)

General Programme

Friday, 14/1		Arrival and Get Together Cocktail	
Saturday, 15/11	<i>morning:</i>	Presentation of the School and Faculty	
		Lecture I	History, role and perspectives of AD in Waste Management Strategies
	<i>afternoon:</i>	Presentation of Participants	
		Description of Individual PhD Activities	
Sunday, 16/11	<i>morning:</i>	Lecture II	Anaerobic Processes: Theory
		Lecture III	Anaerobic Processes: Experimental assessment and results
		Lecture IV	Description and characteristics of different substrates for Anaerobic Digestion
Sunday, 16/11	<i>afternoon:</i>	Lecture V	Anaerobic Digestion Technologies
		Lecture VI	Anaerobic Digestion Plants Design
		Lecture VII	Operation of Anaerobic Dgestion Plants and Safety Issues
Monday, 17/11	<i>morning:</i>	Lecture VIII	Treatment and use of biogas
		Lecture IX	Digestate Management
		Symposium session A1	Organic Waste Collection and Biomass Inventory
	<i>afternoon:</i>	Symposium session A2	Pre-treatment for AD Optimization-Part I
		Symposium session A3	Pre-treatment for AD Optimization Part II
Tuesday, 18/11	<i>morning:</i>	Symposium session A4	AD of Different Substrates (I)
		Symposium session A5	AD of Different Substrates (II)
	<i>afternoon:</i>	Symposium session A6	Anaerobic Process Optimization (I)
		Symposium session A7	Anaerobic Process Optimization (II)
Wednesday, 19/11 :	<i>morning:</i>	Symposium session A8	Anaerobic/Aereobic Treatment
		Symposium session A9	LCA of Biological WtE Systems
	<i>afternoon:</i>	Lecture X	Biohydrogen Generation
		Lecture XI	Test Systems
			Lecture XII
Thursday, 20/11	<i>morning:</i>	Technical Tour (Plant 1)	AD plant in Bassano del Grappa (Etra Spa)
	<i>afternoon:</i>	Technical Tour (Plant 2)	AD plant in Camposampiero (Etra Spa)
			Visit of Padova University
Friday, 21/11	<i>morning:</i>	Doctoral Lecture XIII	Small ad plants for developing countries
		Team work	
	<i>afternoon:</i>	Team work	
Saturday, 22/11		Presentation of the Work Projects by the teams /Delivery of certificates/Closing	
Sunday 23/11		Departures	

List of Lectures:

Lecture I - History, role and perspectives of Anaerobic Digestion in Waste Management Strategies

Lecture II - Anaerobic Processes: Theory

Lecture III- Anaerobic Processes: Experimental assessment and results

Lecture IV - Description and characteristics of different substrates for Anaerobic Digestion

Lecture V - Anaerobic Digestion Technologies

Lecture VI - Anaerobic Digestion Plants Design

Lecture VII - Operation of Anaerobic Dgestion Plants and Safety Issues

Lecture VIII - Treatment and use of biogas

Lecture IX - Digestate Management

Lecture X - Biohydrogen Generation

Lecture XI - Test Systems

Lecture XII - Co-digestion : options and cases

Lecture XIII - Small ad plants for developing countries

Friday, November 14

All day long Arrivals

19:00 - 20:00 Welcome and get together

Saturday, November 15

OPENING

10:00 - 11:00 Presentation of VIU and IWWG

Presentation of the Doctoral School and Faculty

11:00 - 11:20 *Coffee break*

11:20- 13:00 Lecture I - History, role and perspectives of Anaerobic Digestion in Waste Management Strategies

Discussion

14:30-16:00 Individual self presentation of the participants (family life, hobbies, research activities) - I part

16:00 -16:30 *Coffee break*

16:30- 18:30 Individual self presentation of the participants (family life, hobbies, research activities) – II part

FOLLOWING. Organization of the different working teams

Sunday, November 16

09:00 - 10:15 Lecture II - Anaerobic Processes: Theory

10:15 - 11:30 Lecture III- Anaerobic Processes: Experimental assessment and results

11.30 - 11:45 Coffee break

11:45 - 13:00 Lecture IV - Description and characteristics of different substrates for Anaerobic Digestion

Discussion

14:30 – 15.45 Lecture V - Anaerobic Digestion Technologies

15.45 –17.00 Lecture VI - Anaerobic digestion plants design

17.00 – 17.15 Coffee break

17.15-18.30 Lecture VII - Operation of AD plants and safety issues

Discussion

Round Table Debriefing

Monday, November 17 - morning

SYMPOSIUM SESSION A1h. 11:40 - 13:10

Organic Waste Collection and Biomass Inventory

F. Ardente, M. Cellura, F. Di Blasi, M. Fontana, M. Mistretta (IT)

Energy and environmental management protocols of an agro-combined system of biogas production from biomass waste

F. Laureri, R. Minciardi, M. Robba (IT)

Optimal planning of wet waste collection for large scale material and energy recovery: the case of Genova Municipality

S. Kusch, C.C. Udenigwe, C. Cavinato, M. Gottardo, F. Micolucci (De)

First and second generation valorisation of wastes and residues occurring in the food supply chain

P. Giudicianni, P. Bozza, R. Ragucci (IT)

Grinding and drying treatment for better disposal of MSW organic fraction

M. Kułczyński, S. Jabłoński, J. Kaczmarczyk, Ł. Świątek, K. Pstrowska, M.

I. Krustok, J.G.D. Nieto, M. Odlare, E. Nehrenheim (SE)

Algae biomass cultivation with ammonium rich reject water - The potential for simultaneous wastewater treatment and energy recovery

J. Olsson, T. Forkman, E. Nehrenheim, S. Schwede, E. Thorin (SE)

Semi-continuous co-digestion of microalgae and representative mix of sewage sludge

Monday, November 17 - afternoon

SYMPOSIUM SESSION A2..... h. 14:30 - 16:10

Pretreatment for AD Optimization-Part I

I. Pecorini, F. Baldi, E.A. Carnevale, A. Corti (IT)

Autoclave and microwave pre-treatments to enhance anaerobic digestion of different lignocellulosic organic fractions of municipal solid waste. A pilot scale study

M.R. Boni, E. D'Amato, A. Poletini, R. Pomi, A. Rossi, L. Tuccinardi (IT)

Effects of ultrasonic treatment on anaerobic digestion of organic solid waste

J. Bandelin, K. Koch (DE)

Effect of ultrasonic pre-treatment with tube-reactors on the biogas yield

F.-M. Peller, E. Gidakos (GR)

Effect of microwave pretreatment on methane potential of lignocellulosic materials

16:10 - 16:40 Coffee break

SYMPOSIUM SESSION A3 h. 16:40 - 18:20

Pretreatment for AD Optimization Part II

J. Roussel, N. Bartlett, C. Carliell-Marquet (GB)

Enhancing first-stage hydrolysis in anaerobic digesters through an electric pre-digestion process: manure sludge feasibility test

M. Koyama, S. Yamamoto, K. Ishikawa, S. Ban, T. Toda (JP)

Anaerobic digestion of submerged macrophytes: biomethane potential, pre-treatment and the drawback

X. Liu, R. Bayard, R. Gourdon (FR)

Anaerobic digestion of lignocellulosic biomass pretreated with *Ceriporiopsis Subvermispora*

S. Santos, N. Lapa, J. Santos, P. Lemos, B. Mendes (PT)

Effect of thermal pretreatments on mesophilic and thermophilic anaerobic digestion of potato peel waste

Tuesday, November 18 - morning

SYMPOSIUM SESSION A4.....h. 9:00 - 10:40

AD of Different Substrates (I)

H. Adwiraah, K. Kuchta, R. Stegmann (DE)

Anaerobic digestion of autumn leaves

A. De Vocht, R. Pasmans (BE)

Assessment of available grass residues and biogas potential from roadside and landscape management in Flanders (Belgium)

T. Cestonaro, M. Sarolli Silva de Mendonça Costa, L.A. de Mendonça Costa, M.A. Teofilo Rozatti, D. Ceri Pereira, H. Eisten Francisconi Lorin, L. José Carneiro (BR)

The anaerobic co-digestion of sheep bedding

H. Hashim, W.S. Ho, J.S. Lim, C.T. Lee, M.F. Mohamad Shukery, S. Ashina, S. Diego, C.S. Ho (MY)

Palm oil waste as a source of green energy

Y. Arij, S. Fatihah, A. R. Rakmi, Y. Sarifah (MY)

Preliminary work on the pilot scale optimization of an anaerobic digester treating

10:40 - 11:10 Coffee break and Poster discussion

SYMPOSIUM SESSION A5..... h. 11:40 - 13:10

AD of Different Substrates (II)

K. Rugele, G. Bumanis, D. Bajare, L. Mezule, P. Pitk (LV)

Effect of glass additive in alkaline granules in anaerobic treatment of whey

B. Ruffino, S. Fiore, C. Roati, G. Campo, M. C. Zanetti (IT)

Valorization of wastes from a vegetable processing plant by anaerobic digestion: scale effect

O.K. Choi, K.H. Lee, D.K. Cha, J.W. Lee (KR)

Enhancement of anaerobic degradability of wastewater sludge by pre-extraction of biodiesel

J. Wen, Y. Jin, Y. Nie, H. Chen (CN)

Comparative study of acidogenic fermentation on fermentative biogas production from degreased food waste using two-phase anaerobic digestion

T. Emms, G. Davis, B. Dearman (AU)

The start-up and operation of an upflow anaerobic sludge blanket (UASB) reactor treating unamended slaughterhouse effluent using onsite inoculums

Tuesday, November 18 – afternoon

SYMPOSIUM SESSION A6 h. 14:30 - 16:10

Anaerobic Process Optimization (I)

J. Moestedt, E. Nordell, S. Shakeri Yekta, J. Lundgren, M. Genero Marti, C. Sundberg, J. Ejlertsson, B.H. Svensson, A. Björn (SE)

Effects of trace element addition on process stability during anaerobic co-digestion of food waste and slaughterhouse waste

N. Engler, K. Loewe, K. Elberg, M. Nelles (DE)

Interaction of different feedstocks for biogas plants: superposition effects on biogas yield and kinetics of biogas formation

P.C. Benito, M. Greger, M. Schlienz (LU)

Digestion of grass silage in a semi-continuously fed reactor at increasing loading rates - Process stability and kinetics evaluation

C. Akyol, G. Ozbayram, O. Ince, S. Kleinstaubler, Z. Cetecioglu, D. Kaya, V. Coban, B. Ince (TR)
Evaluation of the effect of mixing ratio on methane generation during the anaerobic co-digestion of cow manure and *hordeum vulgare*

16:10 - 16:40 Coffee break

SYMPOSIUM SESSION A7h. 16:40 - 18:20

Anaerobic Process Optimization (II)

F. Lü, Y. H. Liu, L. M. Shao, P. J. He (CN)

Steady methanization with high efficiency at pH low to 5.5

O.F. Eze, R. Blanchard, A.D. Wheatley (NG)

An investigation into the potential for improving anaerobic digestion process using solar thermal enhancement

Z. Liu, Y. Dang, C. Li, D. Sun (CN)

Inhibitory effect of high NH₄-N concentration on anaerobic biotreatment of fresh leachate from MSW incineration plants

D. Al-Sanioura, S. Ghanimeh, P. Saikaly, M. El-Fadel (LB)

Startup of thermophilic anaerobic digestion systems with high solids food waste

Wednesday, November 19 - morning

SYMPOSIUM SESSION A8 h. 9:00 - 10:40

Anaerobic/Aerobic Treatment

W. Bidlingmaier, C. Springer (DE)

Energy efficiency and CO₂-balance of aerobic and anaerobic biological waste treatment

A. Borello (IT)

Environmental and economical sustainability of OFMSW treatment systems: anaerobic digestion for the production of biomethane versus composting

S. Akizuki, C. Niwa, T. Toda (JP)

Simultaneous methanogenesis and denitrification of marine biofouling organisms in anaerobic-aerobic batch reactors with effluent recirculation

A. Bayrakdar, E.T. Mohammed, B. Çalli (TR)
Hydrogen sulfide removal from biogas by autotrophic denitrification

10:40 - 11:10 *Coffee break and Poster discussion*

SYMPOSIUM SESSION A9..... h. 11:40 - 13:10

LCA of Biological WtE Systems

J. Yano, T. Aoki, K. Nakamura, H. Hori, S. Sakai (JP)
Life Cycle Assessment of biodiesel fuel production using the catalytic cracking and hydrogenation method

M. Collotta, P. Champagne, W. Mabee, M. Alberti, G. Tomasoni (IT)
Use of wastewater and CO in biodiesel from microalgae process: a LCA analysis

C. Cuhls (DE)
Emission of greenhouse gases from composting and fermentation of biowaste in Germany

B.G. Oliveira, J.L.N. Carvalho, C.E.P. Cerri, C.C.Cerri, B.J. Feig (BR)
Emission of CH₄ and N₂O by sugarcane vinasse: implications in ethanol's carbon footprint

M. de Barros Miranda Gomes, J. Benedito Sacomano, A. Formigoni, I. Persio de Arruda Campos (BR)
Lifecycle production electricity in landfills: considerations about the Bandeirantes Landfill

Thursday, November 20

TECHNICAL TOUR I

8:00 - 13:00 Visit to the Anaerobic Digestion plant in Bassano del Grappa managed by Etra Spa (approx. 1hr from Venice)

TECHNICAL TOUR II

14:30 - 19:00 Visit to the Anaerobic Digestion plant in Camposampiero managed by Etra Spa
Visit of The University of Padua (optional)

Friday, November 21

DOCTORATE ACTIVITY

9:00 - 10:15 Lecture XIII - Small ad plants for developing countries
Discussion

Team work for elaborating the Project Research Proposal

10:40 - 11:10 Coffee break

11:10 - 13:00 Team work for elaborating the Project Research Proposal

Friday, November 21 - afternoon

DOCTORATE ACTIVITY

14:30 - 16:00 Team work for elaborating the Project Research Proposal

16:00 - 16:30 *Coffee break*

16:30- 18:30 Team work for elaborating the Project Research Proposal
Round Table Debriefing

Saturday, November 22 - morning

DOCTORATE ACTIVITY

09:00 - 10:30 Presentation and Discussion of the Project Works by each Team

10:40 - 11:10 *Coffee break*

11:10- 13:00 Presentation and Discussion of the Project Works by each Team

Saturday, November 22 - afternoon

DOCTORATE ACTIVITY

14:30 - 17:00 Evaluation of the Doctorate School and lecturer performance by the students

Evaluation reports and presentation of certificates

General final discussion

Closure of the school