

# 28<sup>th</sup> Stralsund Spring School goes autumn

2021 August 30 – September 10

**schedule version-008**

## FUSES+

**FU**ture **S**ustainable **E**nergy **S**upply – based on renewable energy and hydrogen technology



faculty of  
electrical engineering  
+ computer science

University of Applied Sciences

Fakultät Elektrotechnik + Informatik

institute for renewable  
energy systems

Institut für Regenerative  
EnergieSysteme IRES



Date	time	Topic
<b>Information</b>		
You will find lecture materials at <a href="https://ilias.hochschule-stralsund.de/ilias">https://ilias.hochschule-stralsund.de/ilias</a> in Fak. ETI >> ETI-Studiengänge >> 2021 FUSES 28th... (list down) <b>PASSWORD: "xxxxx"</b>		
<b>29.08.</b>	<b>Sunday</b>	arrival / journey to Stralsund - Please send your arrival times – you will get the keys from Thanyarak Bogdanske for your accommodation in our guest houses upon arrival. On Sundays supermarkets are closed in Germany, only petrol stations, railw. stations work 24 h/day.
<b>Lecture rooms:</b>		<b>Lectures in H4 / HS 6</b> = lecture hall 6 in house 4 <b>Laboratories in KAE</b> = Komplexlabor Alternative Energien House 7 / near wind turbine <b>Laboratory 1 in H4 / room 217</b> <b>Online participation</b> via GoToMeeting: <a href="https://global.gotomeeting.com/join/987737349">https://global.gotomeeting.com/join/987737349</a>
<b>30.08.</b>	<b>Mo</b>	
	08:00 – 09:00	Registration at lecture hall 6 in house 4
	09:00 - 10:00	<b>Opening Session incl. group photo house 4 / lecture hall 6 &amp; GoToMeeting</b>
	10:00 - 11:00	Lecture Prof. Lehmann - Carbon free energy supply demands in the future
	11:15 - 13:00	Lecture Prof. Luschtinetz - Introduction into hydrogen technology
	13:00 – 14:00	Lunch
	14:00 - 15:00	KAE-Laboratory introduction + safety instruction - <b>house 7 / KAE at windturbine</b> – DI Sponholz / Luscht.
	15:30 - 17:30	<b>Walk to SuperMarkets and Visit of the the Hanseatic Town Stralsund</b> - T. Luschtinetz / T. Bogdanske Meeting Point: 15:30 BusStation of University between house 19 and house 4 (GoldenCube)
	15:00 - 19:00 (11:00 – 15:00 Brazilian time)	<b>Sessions for online participants from Brazil: videos from the morning</b> Lecture Prof. Lehmann / Gulden / Luschtinetz - Carbon free energy supply demands in the future Lecture Prof. Luschtinetz – Introduction into hydrogen technology
<b>31.08.</b>	<b>Tue</b>	
	08:00 - 12:00	<b>Laboratory 1 + 2</b>
	12:00 - 13:00	Lunch
	13:00 - 17:00	Lectures Prof. Middleton – Fuel cell technology
	17:30	<b>Welcome to participants in front of house 7 – get-together-barbecue with guest students and hosts + visit to the ThaiGer-H2-Racing team (supported by HOST International Office)</b>
	17:00 - 21:00 (13:00 - 17:00 Brazilian time)	<b>Sessions for online participants from Brazil: videos from the morning</b> Laboratory 1 +2
<b>01.09</b>	<b>Wed</b>	
	08:00 – 12:00	<b>Laboratory 3 + 4</b>
	12:00 - 13:00	Lunch
	13:00 - 15:00 15:00 - 17:00	Lecture – Prof. Middleton – Fuel cell technology / Thermoelectric devices and applications Lecture Prof. Z. Zapalowicz – Development in solar energy technics
	17:00 - 21:00 (13:00 - 17:00 Brazilian time)	<b>Sessions for online participants from Brazil: videos from the morning</b> Laboratory 3 + 4
	18:30	<b>Lecturers Dinner I – Restaurant Goldener Löwe</b>

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<b>02.09. Thu</b>	
((:))	08:00 - 09:00 Lecture Prof. M. Zenczak - Methods of Energy Storage in Electric Power Systems 09:00 - 10:00 Lecture Prof. W. Zenczak – Alternative fuels in shipping 10:15 - 11:15 Lecture Prof. Zapalowicz – Waste energy - basic information 11:15 – 12:15 Lecture Prof. W. Zenczak – The use of renewable energy on water transport means
12:15 - 13:15 Lunch	
((:))	13:15 – 15:15 <b>Laboratory 5</b> 15:30 – 17:00 Lecture Johannes Gulden - current research project
((:))	17:00 - 19:00 <b>Sessions for online participants from Brazil: videos from the morning</b> (13:00 – 15:00 Brazilian time) Lecture Prof. M. Zenczak - Methods of Energy Storage in Electric Power Systems Lecture Prof. W. Zenczak – Alternative fuels in shipping Lecture Prof. Zapalowicz – Waste energy - basic information Lecture Prof. W. Zenczak – The use of renewable energy on water transport means
<b>03.09. Fri</b>	
((:))	09:00 - 12:00 Lectures Prof. Mäkelä: - Introduction to the simulation of energy and storage systems - Process control systems in renewable energy production Lecture Prof. Sarvelainen - Utilization of renewable energy in efficient residential heating
12:00 - 13:00 Lunch	
((:))	13:00 - 13:45 Lecture Prof. Dobrovolski – Hydrogen Applications and Usage 14:00 - 15:30 Lecture Sergio Henrique Lopes Cabral - basic analysis on power line transmission - Electrical project (Electric and magnetic field evaluation and line parameters evaluation) 15:45 - 17:15 Lecture Stéfano Frizzo Stefenon - applying artificial intelligence to identify faults in the electrical power system and forecast time series
((:))	17:00 - 20:00 <b>Sessions for online participants from Brazil: videos from the morning</b> (13:00 – 16:00 Brazilian time) Lectures Prof. Mäkelä: - Introduction to the simulation of energy and storage systems - Process control systems in renewable energy production Lecture Prof. Hannu Sarvelainen - Utilization of renewable energy in efficient residential heating
<b>04.- 05.09. Saturday &amp; Sunday</b> free time – time for individual excursions to Stralsund and surroundings	
<b>06.09. Mo</b>	
((:))	09:00 - 11:00 Lectures Prof. Kilter – Grid connection of power generation units (foss. + ren. PP) – System stability of electric grid 11:00 - 12:00 Lecture Prof. Luschnitz - Grid stability – grid connection of renewable source
12:00 - 13:00 Lunch	
((:))	13:00 - 16:00 Seminar Prof. Gulden / Luschnitz. - Home universities and energy situation / renewable energy situation in the home countries of students - <b>short presentations of participants</b>
	16:00 - 18:30 <b>Participation in international welcome week:</b> Town rally through the Hanseatic City of Stralsund together with the international exchange students of Stralsund (Meet in front of House 3)

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	16:00 - 19:00 (12:00 – 15:00 Brazilian time)	<b>Sessions for online participants from Brazil: videos from the morning</b> Lectures Prof. Kilter – Grid connection of power generation units (foss. + ren. PP) – System stability of electric grid Lecture Prof. Luschinetz - Grid stability – grid connection of renewable source
<b>07.09. Tue</b>		
	09:00 – 19:00	<b>Excursion to Rügen island</b> 09:00 departure at the Golden Cube (please be there 15 minutes before departure!) 10:00 – 12:00 Sewage sludge recycling plant in Bergen / 12:30 – 15:00 Kluis (solar plant, wind farm, energy-efficient building exhibition) / 15:30 – 16:30 Rambin / Biogas plant Rothenkirchen / 17:30 – 18:30 Ampership
<b>08.09. Wed</b>		
	09:00 – 09:30 09:30 – 10:15 10:30 – 11:15 11:30 – 12:00	Lecture Krzysztof Tomczuk, Electrotechnical Institute Gdansk – Hybrid drive systems Lecture Hubert Gawiński, Electrotechnical Institute Gdansk - Battery charging infrastructure Lecture Michał Gajewski, Electrotechnical Institute Gdansk - Electric motors for propulsion of watercrafts Lecture Krzysztof Tomczuk, Electrotechnical Institute Gdansk - Power converters in hybrid drive systems for water electromobility
12:00 - 13:00 Lunch		
	13:00 - 15:00 15:15 – 16:15 16:15 - 17:15	Lecture Vasilij Djackov - Refitting of ships: environmental, technological and design aspects Lecture Audrius Senulis - Energy storage for Marine vessels Lecture Prof. Gulden – Applications of hydrogen technology in mobility
	<b>18:00</b>	<b>German Evening – getting to know the German culture – location: Canteen / house 3 (organised by the International Event Point)</b>
	17:00 - 20:00 (13:00 – 16:00 Brazilian time)	<b>Sessions for online participants from Brazil: videos from the morning</b> Lecture Krzysztof Tomczuk, Electrotechnical Institute Gdansk – Hybrid drive systems Lecture H. Gawiński, Electrotechnical Institute Gdansk: Battery charging infrastructure, Electric motors for propulsion of watercrafts, Reciprocating engines in watercraft propulsion systems Lecture Krzysztof Tomczuk, Electrotechnical Institute Gdansk - Power converters in hybrid drive systems for water electromobility
<b>09.09. Thu</b>		
	09:00 – 10:45 11:00 - 13:00	Presentations of lab results of student teams with discussion – DI Sponholz / Martin Hayduk Individual preparation time for exam
13:00 – 14:00 Lunch		
	14:00 – 16:00	Online Examination for all participants (attendees can take the exam in the computer-room 324 in house 4 or use their own notebook in the lecture hall 6 or at the guest house)
	<b>17:00</b>	<b>Farewell event incl. barbecue with international students and hosts near house 7 (supported by the International Event Point)</b>
<b>10.09. Fri</b>		
	09:45 – 11:15 11:30 – 13:00	Lecture Prof. Gulden - current trends in renewable energy systems & hydrogen technology Handing-over of certificates / evaluation and farewell

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**Laboratory work:** In each of the 5 teams are members of different universities/countries. Preparation of a presentation (.ppt) and / or a short film sequence by each team:

Team 1	FC-1 H-Box	Team 3	FC-2 Screener	Team 5	Ely-1 Electrolyzer
Team 2	FC-4 Nexa	Team 4	FC-3 50 W		

### Division of the groups into laboratory work:

In preparation	Tue	Tue	Wed	Wed	Thu	Room
	<b>31.08.</b>		<b>01.09.</b>		<b>02.09.</b>	
	<b>08:00-10:00</b>	<b>10:00-12:00</b>	<b>08:00-10:00</b>	<b>10:00-12:00</b>	<b>08:00 - 10:00</b>	
	Lab 1	Lab 2	Lab 3	Lab 4	Lab 5	
<b>FC-1 H-Box</b>	<b>1+2</b>	<b>3+4</b>	<b>5</b>			<b>4/217</b>
<b>FC-2 Screener</b>		<b>1</b>	<b>2</b>	<b>4</b>	<b>3</b>	<b>H7/KAE</b>
<b>FC-3 50 W</b>	<b>5</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>4</b>	<b>H7/KAE</b>
<b>FC-4 Nexa</b>			<b>4</b>	<b>2</b>	<b>5</b>	<b>H7/KAE</b>
<b>Ely-1 Electrolyzer</b>	<b>3</b>	<b>5</b>		<b>1</b>	<b>2</b>	<b>H7/KAE</b>
<b>HCC1 Buderus</b>	<b>4</b>		<b>3</b>	<b>5</b>	<b>1</b>	<b>H7/KAE</b>

### Locations of the labs: KAE = Komplexlabor = near Windturbine / H4 = house 4 / xxx= room

<b>FC 1 – Heliocentris Box H4 / 217</b>	Micro Electrolyzer / PV and FC	Liane Voss, Martin Hayduk
<b>FC 2 – Screener / KAE</b>	Testing of single membranes with an Hydrogenics Screener	Andreas Sklarow
<b>FC 3 - 50W / KAE</b>	Automation of a 50W-FC using a PLC	Thomas Luschtinetz
<b>FC 4 – Nexa / KAE</b>	Nexa 1,2 kW UPS	Martin Hayduk
<b>ELY 1 – Electrolyser / KAE</b>	Modell electrolyser and windturbine-electrolyser-system (20kW type)	Jochen Lehmann, Johannes Gulden
<b>HCC 1 - H2-combustion / KAE</b>	Catalytic burner (Buderus)	Christian Sponholz

### Organisation:

Stud. <b>Thanyarak Bogdanske</b> <a href="mailto:Thanyarak.bogdanske@fh-stralsund.de">Thanyarak.bogdanske@fh-stralsund.de</a> <b>Tel.: +49 176 62819962</b>	<b>Ba.Sc. Liane Voss</b> <a href="mailto:Liane.Voss@hochschule-stralsund.de">Liane.Voss@hochschule-stralsund.de</a> <b>Tel.: +49 1515 2606 927 /</b>
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