



الجامعة الألمانية الأردنية  
German Jordanian University

# **German Jordanian University**

## **Bachelor of Engineering in Hydrogen Technology (Transnational) Non-Granting Degree (Hosted Program)**

### **Study Plan 2024**

# I. Study Objective and Program Profile

The purpose of the program is to provide students with the ability to independently utilize scientific knowledge and methods in the field of hydrogen technology through practice-oriented teaching methods. In terms of content, the focus is on safe system technology and system operation, as well as on the processes for extraction, transport, distribution, and storage, including the associated physical foundations. This allows graduates to balance the hydrogen process chain and, on this basis, to develop approaches and technical concepts for improving the efficiency of hydrogen-based technologies. Their later professional employment is not limited to pure hydrogen technology; they can also work successfully in other areas of process engineering. The general principle is: "Anyone who can safely design and operate hydrogen plants can also do so with other media."

In consideration of the spectrum and diversity of hydrogen technology, which requires a comprehensive basic education, the curriculum is designed to provide the necessary technical, methodological, social, and personal competencies. This equips students to quickly familiarize themselves with one of the numerous fields of application and pursue a career as an engineer.

The study of hydrogen technology in the relevant modules should also enable students to recognize the effects of technology on the environment and society and to take responsible action accordingly. Additionally, students acquire social, intercultural, and foreign language skills alongside their specialist knowledge through integrated internships and projects. This approach ensures the development of their practical problem-solving skills in an international environment, preparing them to take on executive roles.

The bachelor's degree program in Hydrogen Technology is offered by THWS at GJU in Amman, Jordan. During the first four semesters, courses are held at the GJU. After that, students continue their studies at THWS in Schweinfurt until graduation. The students learn German simultaneously with the subject-related course content. The course content of the first and second semesters is taught entirely in English, while the course content of the third and fourth semesters is taught partly in German. In Schweinfurt, the students then attend German-language courses.

The program also offers the "Hydrogen Technology dual" study variant, which combines theory and practice more intensively, enhancing the competence profile of dual students. By regularly alternating between study and practical phases, students apply what they have learned directly in the respective partner company, fostering a high level of professional orientation and self-organization. This intensive course of study allows students to test, substantiate, reflect upon, and deepen problem-solving methods and specialist knowledge acquired during company practice. Moreover, practical experience is integrated into the courses, allowing for analysis and processing.

# II. Learning Outcomes

- a. An ability to apply knowledge of mathematics, science and engineering.
- b. An ability to design and conduct experiments, as well as to analyze and interpret data.
- c. An ability to design a system, component, or process to meet desired needs.
- d. An ability to function in teams.
- e. An ability to identify, formulate and solve engineering problems.
- f. An understanding of professional and ethical responsibility.
- g. An ability to communicate effectively.
- h. A broad education necessary to understand the impact of hydrogen engineering solutions in a global and societal context.
- i. A recognition of the need for an ability to engage in life-long learning.
- j. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.
- k. An ability to function in a culturally diverse environment.
- l. Improved reading and writing skills in the German Language.

### III. Course Delivery Methods

Courses are in one of the following three methods:

- **Face-to-Face (F2F) Method**

Courses that are taught through face-to-face learning are delivered at the university campus.

- **Blended (BLD) Method**

Courses in which teaching consists of face-to-face learning and asynchronous E-learning. The face-to-face learning takes place at the university campus. Asynchronous E-learning takes place through activities, tasks, educational duties, and assignments through the virtual E-learning platforms (Moodle and MyGJU) without direct meetings with course instructors.

### IV. Admission Requirements

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

- a. 80% General High School Examination (Tawjihi) or Equivalent
- b. Proven English Proficiency (at least B2 English certificate)

#### Placement Tests

Applicants must sit for placement tests in the English Language and Mathematics to determine whether the applicant may be required to take remedial courses in the mentioned subjects. Depending on or the applicant scores in the placement tests, some of the following 3-credit-hour remedial courses are required:

Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
				Lect.	Prac.		
ENGL0098	Elementary English	3	3	3	-	F2F	Placement test
ENGL0099	Intermediate English	3	3	3	-	F2F	ENGL0098
MATH0099	Pre-Math	3	3	3	-	OL	Placement test
<b>Total</b>		<b>9</b>	<b>9</b>	<b>9</b>	<b>-</b>		

- Remedial courses are to be completed and passed within the first year of enrollment.
- Passing grade of remedial courses is 60%.
- ECTS (B.Sc.): is the European Credit Transfer and Accumulation, One ECTS is equivalent to 30 actual workload hours.

## V. Framework for B.Sc. Degree

“Bachelor of Engineering in Hydrogen Technology (Transnational)” program is hosted by GJU, and the degree is granted by THWS. The program is divided into two parts, the Pre-Year (College Preparatory Program) to prepare students with the required technical and language skills to succeed in the hosted program, which is taught by GJU, and the students are considered GJU students. The second part is the hosted program where the student is considered a THWS student and courses are taught by both GJU and THWS faculty.

Classification	Credit Hours			ECTS		
	Compulsory	Elective	Total	Compulsory	Elective	Total
Pre-Year Requirements	40	0	40	66	0	66
Program Requirements				192	15	207
<b>Total</b>				<b>258</b>	<b>15</b>	<b>273</b>

Course Delivery Method	ECTS	Percentage
Face-to-Face Courses	218	79.9%
Blended Courses	55	20.1%
<b>Total</b>	<b>273</b>	<b>100%</b>

### Course Coding and Numbering

Courses only taught to Hydrogen Technology Students after completion of the pre-year are designated a course code as in the following table:

Department	Year at GJU	Semester at THWS	THWS Course Sequence
HT	X (Number)	Y (Number)	ZZ (Number)

### 1. Pre-Year Requirements (40 credit hours, 66 ECTS)

Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
				Lect.	Prac.		
CHEM103	General Chemistry	3	4	3	-	F2F	-
CHEM106	General Chemistry Lab	1	1	-	3	F2F	CHEM103 <sup>co</sup>
CS116	Computational Fundamentals	3	5	3	-	F2F	-
CS1160	Computational Fundamentals Lab	1	1	-	3	F2F	CS116 <sup>co</sup>
GERL101HP	German I-HP	3	6	9	-	F2F	-
GERL102HP	German II-HP	3	6	9	-	F2F	GERL101HP
GERL201HP	German III-HP	3	4	6	-	F2F	GERL102HP
GERL202HP	German IV-HP	3	6	9	-	F2F	GERL201HP <sup>co</sup>
HT103	Basics of Electrochemical Systems	3	5	3	-		CHEM103
MATH101	Calculus I	3	5	3	-	F2F	-
MATH102	Calculus II	3	5	3	-	F2F	MATH101
MECH2102	Statics and Strength	3	5	3	-	F2F	PHYS103
MECH2103	Mechanics of Materials Lab	1	2	-	3	BLD	MECH2102 <sup>co</sup>
PHYS103	Physics I	3	5	3	-	F2F	-
PHYS104	Physics II	3	5	3	-	F2F	PHYS103
PHYS106	General Physics Lab	1	1	-	3	F2F	PHYS104 <sup>co</sup>
<b>Total</b>		<b>40</b>	<b>66</b>	<b>57</b>	<b>12</b>		

## 2. Program Hosted Requirements (207 ECTS)

Course ID	Course Name	ECTS	Contact Hours		Type	Prerequisites / Corequisites
			Lect.	Prac.		
GERL301HP	German V-HP	6	9	-	F2F	GERL202HP
GERL302HP	German VI-HP	6	9	-	F2F	GERL301HP
GERL401HP	German VII-HP	4	6	-	F2F	GERL302HP
GERL402HP	German VIII-HP	6	9	-	F2F	GERL401HP <sup>co</sup>
HT2102	Thermodynamics 1	5	4	-	F2F	MATH102
HT2104	Materials Technology 1	5	4	-	BLD	HT103
HT2112	Electrical Engineering	5	4	-	F2F	PHYS104
HT2207	Engineering Mathematics 2	5	6	-	F2F	MATH102
HT2208	Thermodynamics 2	5	4	-	F2F	HT2102
HT2210	Materials Technology 2	5	4	-	BLD	HT2104, HT105
HT2211	Plants and Vessels 1	5	4	-	BLD	HT105
HT3313	Renewable Energy and Energy Industry	5	4	-	F2F	ENE213, HT2208
HT3314	Fluid Mechanics	5	4	-	BLD	HT2102, HT105, HT2207
HT3315	Control and Feedback Control Systems in Hydrogen Plants	5	3	1	BLD	ENE213, HT2207
HT3316	Measuring in Hydrogen Plants	5	3	1	BLD	ENE213, HT2207
HT3317	Process Design and Simulation	5	2	2	BLD	HT2208
HT3318	Hydrogen Safety	5	4	-	F2F	ENE213, HT2208
HT3419	Hydrogen Production	5	4	-	BLD	HT103, HT3313
HT3420	Fuel Cell	5	4	-	F2F	HT103, HT3313
HT3421	Hydrogen Storage, Transport and Distribution	5	4	-	BLD	HT103, HT3313, HT3314, HT3315, HT3316
HT3422	Plants and Vessels 2	5	4	-	BLD	HT103, HT2211, HT3313, HT3314, HT3315, HT3316, HT3317
HT3423	Systematical Design of Plants	5	2	2	BLD	HT2102-HT3318
HT3424	Specialised Elective 1	5	4	-	F2F	*1
HT4525	Innovation and Development Processes and Founding	5	4	-	F2F	-
HT4526	Computational Fluid Dynamics (CFD)	5	4	-	F2F	HT2207, HT3314
HT4527	Chemical Conversion with Hydrogen	5	4	-	F2F	HT103, HT3317, HT3318
HT4528	Plant Operation	5	4	-	F2F	HT103, HT3317, HT3318
HT4529	General Elective	5	4	-	F2F	-
HT4530	Specialised Elective 2 / Transfer Seminar	5	4	-	F2F	*1, 2
HT4631	Seminar in Engineering	6	1	4	F2F	-
HT4632	Practical Module	24	*3		F2F	*4

HT5733	Application Project	10	*5		F2F	*6
HT5734	Technical Lab Training	3	*7		F2F	*7
HT5735	Cost Accounting and Ethics for Engineers	5	4	-	F2F	-
HT5736	Bachelor Thesis	12	*8		F2F	*9
<b>Total</b>		<b>207</b>				

\*<sup>1</sup> Total Workload: 150 h, 60 contact hours ((4 semester periods per week), 60 hours self-study, 30 hours exam preparation). Refer to the catalogue of the individual specialised elective courses. Two of the electable courses from the catalogue specified in the curriculum must be selected for this module.

\*<sup>2</sup> Transfer Seminar 2nd Semester (1 Semester Hour per Week), Transfer Seminar 3rd Semester (1.5 Semester Hours per Week), Transfer Seminar 5th Semester (1.5 Semester Hours per Week)

\*<sup>3</sup> Total Workload: 720 h, 700 hours attendance at the practical training company 20 hours Preparation for the industrial internship.

\*<sup>4</sup> At least 90 ECTS points from modules 1-30. must have been achieved at the time of entry. Submission of an internship contract to the University Service Studies before the start of the internship

\*<sup>5</sup> Total Workload: 300 h, 60 contact hours (4 semester periods per week) 240 hours self-study.

\*<sup>6</sup> All modules from the first to the sixth semester

\*<sup>7</sup> Attendance at a total of 9 experiments during the degree programme, of which a maximum of four experiments in the first three semesters

\*<sup>8</sup> Total Workload: 360 h Approx. 6 contact hours at THWS for meetings with the lecturer 354 hours self-study.

\*<sup>9</sup> a) has reached at least 150 CP, b) successfully finished all modules of the first three study semesters (modules 1 to 18), c) successfully completed the practical module (32)

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<sup>c</sup> The following study plan guide does not take into account possible remedial courses.

German language summer courses are governed by Deans Council decision number (338/2023/2024).

## Study Plan<sup>c</sup> Guide for a B.Eng. Degree in (Hydrogen Technology)

Pre-Year							
First Semester							
Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
				Lect.	Prac.		
GERL101HP	German I-HP	3	5	9	-	F2F	-
CHEM103	General Chemistry	3	4	3	-	F2F	-
CHEM106	General Chemistry Lab	1	1	-	3	F2F	CHEM103 <sup>co</sup>
CS116	Computational Fundamentals	3	5	3	-	F2F	-
CS1160	Computational Fundamentals Lab	1	1	-	3	F2F	CS116 <sup>co</sup>
MATH101	Calculus I	3	5	3	-	F2F	-
PHYS103	Physics I	3	5	3	-	F2F	-
<b>Total</b>		<b>17</b>	<b>26</b>	<b>21</b>	<b>6</b>		

Second Semester							
Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
				Lect.	Prac.		
GERL102HP	German II-HP	3	5	9	-	F2F	GERL101-HP
MECH2102	Statics and Strength	3	5	3	-	F2F	PHYS103
MECH2103	Mechanics of Materials Lab	1	1	-	3	BLD	MECH2102 <sup>co</sup>
PHYS104	Physics II	3	5	3	-	F2F	PHYS103
PHYS106	General Physics Lab	1	1	-	3	F2F	PHYS104 <sup>co</sup>
MATH102	Calculus II	3	5	3	-	F2F	MATH101
HT103	Basics of Electrochemical Systems	3	5	3	-	F2F	CHEM103
<b>Total</b>		<b>17</b>	<b>27</b>	<b>21</b>	<b>6</b>		

Summer Semester							
Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
				Lect.	Prac.		
GERL201HP	German III-HP	3	4	6	-	F2F	GERL102HP
GERL202HP	German IV-HP	3	6	9	-	F2F	GERL201HP <sup>co</sup>
<b>Total</b>		<b>6</b>	<b>10</b>	<b>15</b>	<b>-</b>		

THWS Program							
First Semester							
Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
				Lect.	Prac.		
HT2102	Thermodynamics 1		5	4	-	F2F	MATH102
HT2104	Materials Technology 1		5	4	-	BLD	HT103
HT2112	Electrical Engineering		5	4	-	F2F	PHYS104
GERL301HP	German V-HP		6	9	-	F2F	GERL202HP
<b>Total</b>				<b>21</b>			

Second Semester							
Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
				Lect.	Prac.		
HT2207	Thermodynamics 2		5	6	-	F2F	MATH102
HT2208	Materials Technology 2		5	4	-	F2F	HT2102
HT2210	Engineering Mathematics 2		5	4	-	BLD	HT2104, HT105
HT2211	Plants and Vessels 1		5	4	-	BLD	HT105
GERL302HP	German VI-HP		6	9	-	F2F	GERL301HP
<b>Total</b>				<b>26</b>			

Summer Semester							
Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
				Lect.	Prac.		
GERL401HP	German VII-HP		4	6	-	F2F	GERL302HP
GERL402HP	German VIII-HP		6	9	-	F2F	GERL401HP <sup>co</sup>
<b>Total</b>				<b>10</b>			

Third Semester							
Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
				Lect.	Prac.		
HT3313	Renewable Energy and Energy Industry		5	4	-	F2F	ENE213, HT2208
HT3314	Fluid Mechanics		5	4	-	BLD	HT2102, HT105, HT2207
HT3315	Control and Feedback Control Systems in Hydrogen Plants		5	3	1	BLD	ENE213, HT2207
HT3316	Measuring in Hydrogen Plants		5	3	1	BLD	ENE213, HT2207
HT3317	Process Design and Simulation		5	2	2	BLD	HT2208
HT3318	Hydrogen Safety		5	4	-	F2F	ENE213, HT2208
<b>Total</b>				<b>30</b>			

Fourth Semester							
Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
				Lect.	Prac.		
HT3419	Hydrogen Production		5	4	-	BLD	HT103, HT3313
HT3420	Fuel Cell		5	4	-	F2F	HT103, HT3313
HT3421	Hydrogen Storage, Transport and Distribution		5	4	-	BLD	HT103, HT3313- HT3316
HT3422	Plants and Vessels 2		5	4	-	BLD	HT103, HT2211, HT3313- HT3317
HT3423	Systematical Design of Plants		5	2	2	BLD	HT2102-HT3318
HT3424	Specialised Elective 1		5	4	-	F2F	*1
<b>Total</b>				<b>30</b>			

Fifth Semester							
Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
				Lect.	Prac.		
HT4525	Innovation and Development Processes and Founding		5	4	-	F2F	-
HT4526	Computational Fluid Dynamics (CFD)		5	4	-	F2F	HT2207, HT3314
HT4527	Chemical Conversion with Hydrogen		5	4	-	F2F	HT103, HT3317, HT3318
HT4528	Plant Operation		5	4	-	F2F	HT103, HT3317, HT3318
HT4529	General Elective		5	4	-	F2F	-
HT4530	Specialised Elective 2 / Transfer Seminar		5	4	-	F2F	*1, 2
<b>Total</b>				<b>30</b>			

Sixth Semester							
Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
				Lect.	Prac.		
HT4631	Seminar in Engineering		6	1	4	F2F	-
HT4632	Practical Module		24	*3		F2F	*4
<b>Total</b>				<b>30</b>			

Seventh Semester							
Course ID	Course Name	Credit Hours	ECTS	Contact Hours		Type	Prerequisites / Corequisites
				Lect.	Prac.		
HT5733	Application Project		10	*5		F2F	*6
HT5734	Technical Lab Training		3	*7		F2F	*7
HT5735	Cost Accounting and Ethics for Engineers		5	4	-	F2F	-
HT5736	Bachelor Thesis		12	*8		F2F	*9
<b>Total</b>				<b>30</b>			