General knowledge

- Factual and theoretical knowledge of/ about
  - solar-energy
  - electric systems, on-grid-connection, off-grid-system and variants of electric storage
- Knowledge of/ about
  - facts and principles of technical drawings
  - the practical steps for the installation
  - environmental and safety protection
  - mathematics
  - PV installation plans
- Basic knowledge of
  - structural mechanics
  - electronics, automation and mechanics
  - physics
  - Astronomy

Skills

- To read and interpret the work plans of technical projects
- To always take into account health and safety measures

Competences

- Analytic competences
- To plan work processes and supervise other persons
- To be aware of the need for precise and accurate work
- Good Communication with other workers (and for small projects with the clients)
- Competences in Self-Management and Self-organisation
- To act reliable regarding the safety and environmental rules
## I Installation

<table>
<thead>
<tr>
<th>Competence Unit Assignments</th>
<th>Tasks Sub-Assignments</th>
<th>Knowledge of/about…</th>
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<td><strong>Planning</strong></td>
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| Analyses of needs and context | - To assess the needs of the users and determine the solar potential of an area | - Knowledge about optimisation of energy consumption  
- Knowledge about the relevant criteria for needs analyses | - to be able to analyze and calculate the monthly and annual irradiation considering orientation, shadowing, etc.  
- to be able to classify, quantify, analyze and optimize the energy needs of different types of users  
- to be able to analyze the needed connection to the grid or storage system | - being aware of the importance of calculations and forecasts  
- being competent at advising the customers according to their real needs | 4 |     |
| Planning of the PV-concept according to the needs analyses | - To define the characteristics of the PV-installation according to the user needs and the solar potential of an area  
- To select the equipment and necessary elements with their specifications | - Knowledge about the characteristic of the equipment and technical elements of the PV-system  
- Knowledge about topography | - To be able to define (possibly together with the designer) the best configuration of the PV-system  
- To be able to calculate the real costs considering the components, the installation and authorisation of the PV-system  
- Initiating projects according to the real needs of the client in narrow collaboration with the designers  
- Selecting the best system and way of realisation (ability for cooperation with the de- | | 4 |     |
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| Legal, formal and technical obligations | - To prepare the documents for the legal authorizations and possible subsidies  
- To apply for grid connection (if necessary) | - Knowledge about legislation on PV-system realisation and their authorisation procedures  
- Knowledge about the legislation and technical standards for grid connection (if necessary) | - To know how to prepare the documentation  
- To prepare and present the application | - Presenting and communicating to customers, stakeholder and legal bodies in an appropriate and understandable way  
- Reacting and solving possible arising problems | | 3 |
| Planning of the execution (for small installations) | - To plan the work stages for the installation  
- To develop detailed work and time tables for the installation  
- To plan a monitoring strategy for the installation process (review)  
- To plan the logistic process | - Knowledge about project and process management  
- Knowledge about environment and work safety  
- Knowledge about different delivery regulations, storage possibilities, the supplier market and types of materials | - To know about the needed resources for the implementation (e.g. time, people, budget, etc.) and the work safety rules  
- To plan and organise the eventually needed collaboration with experts/ workers from the same or other areas  
- To have an holistic view on the whole execution process and forecast all steps and possible problems | - Thinking abstractive and planning proactive  
- Taking responsibility for the planning and the supervision of the involved experts/ workers  
- Taking decisions concerning the procurement and delivery process | | 4 |
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| Safety and Environmental Protection | - To create a health and safety plan for the installation process  
- To accomplish the safety measures according to the plan  
- To control the implementation of the health and safety plan  
- To define the necessary environmental protection measures | - Knowledge about work safety regulations  
- Knowledge about individual work safety equipment  
- Knowledge about environmental protection legislation and concepts (e.g. recycling concepts) | - To prevent risks and minimize the consequences of possible accidents  
- To know how to undertake the risk assessment  
- To know how to act in case of an emergency (first aid)  
- To create and maintain a safety environment for himself and other workers  
- To put in place the necessary measures for environmental protection  
- To be able to choose and use the personal safety equipment and appropriate methods and other equipment to | - Being responsible that the work is carried out according to the safety plans  
- Making the team observe the safety rules | 3-4 |
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<td>prevent and minimize risks</td>
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**Execution**

**Preparation of the installation**

- To analyze the installation plan and define the installation process
- To prepare and organize the installation
- Knowledge about different materials, tools and equipment used during the installation process
- Knowledge about reading project plans and technical drawings
- To interpret PV installation projects
- To identify the equipment needed, also considering the safety rules and the physical conditions being required for the installation of the PV-system
- To identify the different work stages and the appropriate work methods
- To prepare the installation site
- Defining autonomously the appropriate working methods
- Being responsible to check if the work place is prepared
- Being responsible to promote a good collaboration process with other workers

**Practical Execution**

- To install the system with regard to all safety rules
- To commission and operate the test
- Knowledge about safety rules
- Knowledge about quality principles and functional controls
- Knowledge on measurement equipment
- Knowledge about ICT, communication protocol and monitoring system
- To use the appropriate techniques to install all the equipment according to the state of the art
- To be able to choose and use the personal safety equipment and appropriate methods and other equipment to
- Being self-responsible for the own physical and psychological conditions for undertaking the practical execution
- Maintaining a high quality and helping colleagues to meet the standards

4
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<td>Documentation</td>
<td>- To develop the operational and maintenance manual</td>
<td>- Knowledge about the minimum requirements for the manual (all documentations of installed components, report of the first commission and test, users guide)</td>
<td>- To understand the documentation and technical standards</td>
<td>- Working honesty and accuracy to focus the important points for the manual</td>
<td>3</td>
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| Maintaining, inspecting, trouble-shooting | - To identify tools and equipment required for maintaining and trouble-shooting  
- To identify maintenance needs on site | - Knowledge about measurement equipment and working tools  
- Knowledge about typical maintenance needs and activities related to the different types of installation  
- Knowledge on work planning and organisation of maintenance work | - To design a typical periodical maintenance plan for that kind of plant and select the typical needed equipments and tools  
- To analyse the technical documentation of PV installations, determining the activities and resources, to plan the maintenance process  
- To read and understand the operational and maintenance manual made by the installer  
- To analyse the past production report and fault reports  
- To know about possible ways to increase the performance of the PV-system | - Taking responsibility for the planning  
- Seeing the linkages in a system and think and act in a holistic way | 4   |     |
| Safety and Environmental Protection | See in the installation, with special attention to electrical hazards |                                                                                  |                                                                                              |                                                                               |     |     |
| Execution of maintenance         | - To implement service  
- Knowledge about typical energy consumption  
- To use the maintenance manual  
- Having the ability to understand and use the documentation  
- To analyse the past production report and fault reports |                                                                                  | - To use the maintenance manual  
- Having the ability to understand and use the documentation  
- To analyse the past production report and fault reports |                                                                               |     | 4   |
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<td></td>
<td>procedures</td>
<td>- To perform diagnostic procedures and interpret results</td>
<td>- To identify performance and safety issues and implement corrective measures</td>
<td>- Test the systems after the maintenance measures</td>
<td>analyse the attitudes of the executing experts and taking the right measures (information, communication, influence-taking, etc.) for a successful maintenance process</td>
<td>- Having a “problem-solving-attitude”</td>
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<td></td>
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<td>cal mistakes and faults that can effect performance and safety of the plants and the corrective measures</td>
<td>nance and corrective techniques of the PV-system</td>
<td>- To use the appropriate measurement techniques</td>
<td>- Taking the responsibility to keep or improve the performance of the system</td>
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<td>- Knowledge about ways of undertaking tests and diagnoses</td>
<td>- To make the tests of the performance of the system</td>
<td>- Having a “problem-solving-attitude”</td>
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<td>- Knowledge on ICT, communication protocols and monitoring systems</td>
<td>- To analyse the performance and define the problems of the PV-system</td>
<td>- Taking the responsibility to keep or improve the performance of the system</td>
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<td>- Knowledge about environment and safety rules</td>
<td>- To be able to choose and use the personal safety equipment and appropriate methods and other equipment to prevent and minimize risks</td>
<td>- Taking the responsibility to keep or improve the performance of the system</td>
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<tr>
<td>Maintenance documentation</td>
<td>- To demonstrate complete functionality and performance of the system</td>
<td>- Knowledge about the forms of documentation</td>
<td>- To be able to write the technical report taking into account all implemented measures and steps</td>
<td>- Working honesty and accuracy in the documentation process</td>
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<td>- To document of work process</td>
<td>- Knowledge about documentation procedures and tools</td>
<td>- To be able to document the work performance</td>
<td>- Writing in an understandable and correct way</td>
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<td>- To be able to make suggestions and recommendations for the further management of the system</td>
<td>- Taking the responsibility to give all the needed information to manage and maintain the plant in a good way</td>
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<tr>
<td>Repairing</td>
<td></td>
<td>To diagnose the anomalies in the PV-system</td>
<td>To be able to read “old” or not complete documents and find alternative ways of assessment</td>
<td>Having the ability to discover the critical factors (human, technical, etc.) to regain the functionality and performance of the system</td>
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<td>Planning of repair activities</td>
<td>- To organise the process of repairing</td>
<td>To check manufacturer warranty details before exchange of components</td>
<td>Having a “problem-solving-attitude”</td>
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<td></td>
<td>- Knowledge about ways of undertaking tests and diagnoses</td>
<td>To read and understand the production and error records and select a proper troubleshooting procedures</td>
<td>Taking the responsibility to regain and keep the performance of the system in the future</td>
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<td>- Knowledge about error records</td>
<td>To calculate the costs adequately</td>
<td>Taking the responsibility of use the appropriate repair techniques in accordance with all environmental and safety procedures</td>
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<td>- Knowledge about quality standards required for the executed products</td>
<td>To select and involve the eventually needed experts</td>
<td>Taking the responsibility for the supervision of the work carried out by other people involved and their safety</td>
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<td>- Knowledge about new technologies and their compatibility with old technologies</td>
<td>To negotiate and order new components, taking into account the different delivery regulations</td>
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<td>- Knowledge about safety and environmental rules (e. g. systems of recycling old components)</td>
<td>To be able to choose and use the personal safety and environmental equipment and</td>
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<td>- Knowledge on ICT, communication protocols and monitoring systems</td>
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| Safety and Environmental Protection | See in the installation, with special attention to electrical hazards | - Knowledge about repair techniques of PV-systems
- Knowledge about measurements and tools for repairing
- Knowledge about the repairing process
- Knowledge about safety and environmental rules (e.g. systems of recycling old components) | - To be able to repair the damaged equipment
- To use (computer-assisted) tools and equipment
- To be able to choose and use the personal safety and environmental equipment and appropriate methods and other equipment to prevent and minimize risks
- To be able to act in an ecologically sound manner | - Having the attitude to undertake all measures to prevent predictable malfunctions in the future
- Taking the responsibility of use the appropriate repair techniques in accordance with all environmental and safety procedures
- Taking the responsibility for the supervision of the work carried out by other people involved and their safety
- Working honesty and accuracy and to declare any mistakes and unexpected problems which can compromise the functionality and efficiency of the system | 4 |
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</table>
| Documentation               | - To document the repair | - Knowledge about the forms of documentation  
- Knowledge about documentation procedures and tools | - To be able to write the technical report taking into account all implemented measures and steps  
- To be able to document the work performance  
- To be able to make suggestions and recommendations for the further management of the system | - Working honesty and accuracy in the documentation process  
- Writing in an understandable, structured and correct way  
- Taking the responsibility to give all the needed information to manage and maintain the plant in a good way | 3 |