

1 Instructor Profile

Code IN-XX

Where XX is CM, SM1, SM2, SM3, SM4.

1. Swiss VET Instructor Course CM - Basics of Applied Didactics
2. Swiss VET Instructor Course SM1 - Specialization in Turning and Milling
3. Swiss VET Instructor Course SM2 - Specialization in CNC Machining
4. Swiss VET Instructor Course SM3 - Specialization in Mechatronics
5. Swiss VET Instructor Course SM4 - Specialization in Welding & Fabrication

1.1 Job description

Instructors provide practical training to apprentices either in the workshop or at the production floor. They make apprentices aware of health, safety and environment (HSE). Instructors commit themselves that apprentices develop the competencies for their future assignment "on the job". They ensure that the apprentices exercise and perform core activities of qualified production technicians on a daily basis. They help them to relate practical approach to theoretical concepts learnt in the classroom. Instructors look to it that apprentices can develop competencies by fulfilling real company mandates in quality and time. Based on their knowledge and experience as production technicians as well as pedagogues, Instructors plan, perform and assess practical learning at the shop floor. They know how to demonstrate and teach real-life work processes and work flows. They are patient and cautious enough to let apprentices learn safely and constructively. It is their mission to teach as well as to empower apprentices. They stick to defined procedures and high standards in work, in order to achieve outstanding quality and top-notch results. They are used to follow the syllabus outline whilst meeting the company's demands and dealing with scarce resources.

Instructors organize materials, machines and tasks on a daily, monthly and semester basis. Due to their craftsmanship and their flexibility, they are able to attain the competencies according to the apprentices' syllabus even under difficult conditions (e.g. if a certain working materials or tools are not available or in bad condition) by repairing machines and equipment, sharpening cutting tools or applying alternative methods or processes.

Instructors explain a certain principle by referring to another situation. They are able to develop training units, instruction examples. They are also able to maintain machines and equipment and to sharpen cutting tools.

1.2 Qualification & Experience

1.2.1 Qualification

Instructors hold a recognized VET diploma or a degree in engineering.

Formal requirement to be eligible for the job as instructor is a qualification as production technician.

1.2.2 Experience

A minimum of three years of work experience.

1.2.3. Entry Competencies

Didactics

Aptitude in instructing.

Fluency in spoken English (minimal language level B2).

Knowledge of local language so that they can explain to apprentices who may be poor in English language.

Competency to use computers.

Familiarity with MS Office and ability to use multi-media applications.

Ability to use internet and to search for information and show Didactics or instructional related material available on the internet to support their teaching.

Domain competencies

Basic knowledge and skill of Bench Work and Assembly

Sufficient practical experience in their specialization domain.

Hands on experience on production floor in assembling, manufacturing, or supervising the jobs.

Good understanding of the quality process and manufacturing techniques to improve productivity without sacrificing quality of the product. Well aware of domain related safety measures.

1.3 Working environment and target groups

Instructors may be production technicians working in a company and being assigned to work with apprentices as an additional mandate, or they may be hired exclusively for the task.

Instructors work typically with young apprentices between 16 and 22 years, coming from schools or Industrial Training Institutes (ITI).

It is their aim to educate production technicians whose knowledge, abilities and attitudes meet the demand of the labor market. Thus Instructors want to develop theoretical and practical competencies in engineering of the apprentices as well as support them in the process of personality development through passing on skills like communication, presentation, time- and self-management.

Instructors often bear the burden of juggling between the interests of the company (which expects apprentices to work and looks to it that the work is done) and the apprentices, which have been carefully chosen and have a right to a good education.

Instructors have to ensure that they have adequate materials and machines to teach their apprentices, although other persons may forward more pressing demands. The difficulty of this task will often depend on management support, as well as on Instructors' ability to negotiate and communicate openly with all partners and on all levels within a given organization. Instructors work on the shop floor.

1.4 Degree of autonomy and responsibility

Instructors are key figures in the VET process: They perform a new, so far unknown role in the education of apprentices. This role combines two challenges: preparing young people for the labor market (a pedagogic challenge) and responding to economic and seasonal needs of the company (an organizational and communicational challenge). Thus, Instructors need a certain

autonomy in order to “stick to the plan” and achieving their goals; whilst remaining flexible and open to management enquiries.

1.5 Competencies to be developed

1.5.1 Part 1: Didactics Competencies & Resources

Explain using the advanced modern methods of shop floor training.
Apply different methods of assessment and evaluation of shop floor activities
Master the knowledge of didactics.
Plan vocational trainings on shop floor level.

1.5.2 Part 2: Instructional Competencies & Resources

Apply the knowledge of modern methods of practical training.
Practice IPERCA.
Explain the importance of communication and conflict resolution in shop floor environment.
Explain the importance of health, safety and environment (HSE) concerns.
Undergo instructional training in common module (CM).

1.6 Domain Specialization

After completing training in Swiss VET Instructor Training CM - Basic Applied Didactics (Bench Work and Assembly) instructors can optionally undergo training in specialization modules (SM1, SM2, SM3 or SM4). Instructors opting for specialization domain training should meet the entry competency criteria to qualify to join the course.

In specialization module training:

Instructors revisit the basic concepts, practice and understand the important domain related skills and good work practices. They also apply the latest trends or developments in the domain so that they provide effective training to their apprentices.
The details of domain specific competencies are given in Annexure A.

1.7. Competency Resource (CoRe) matrix

Competency	Resource
To plan vocational training at the shop floor	<ol style="list-style-type: none"> 1. To develop semester and full year schedules 2. To prepare an instruction unit including goals 3. To organize excursions and site visits 4. To prepare and test exams
To instruct apprentices at the shop floor	<ol style="list-style-type: none"> 1. To prepare work assignments and projects 2. To set goals for the instruction units 3. To instruct according to CoRe (KoRe) 4. To apply IPERCA teaching method 5. To give clear feedback 6. To respond to heterogeneity 7. To respond to conflicts
To evaluate vocational education at the shop floor	<ol style="list-style-type: none"> 1. To evaluate one's own and others' instructions 2. To evaluate apprentices performance according to the goals set 3. To define improvement plans for the shortfalls
To promote vocational education training arrangements	<ol style="list-style-type: none"> 1. To consider the interest of all vocational training partners 2. To advance the interests of the apprentices

1.8. Summary list of resources Instructors should have.

Resources		
Knowledge	Abilities	Attitudes
<ul style="list-style-type: none"> • Basics of CoRe, AVIVA IPERCA • Didactics Basis Alignment Classroom Management Time management Planning • Didactic reduction • Social Forms Single work, Partner Work, Group work, Plenum • Didactics – methods Testing, Heterogeneity Conflicts, Communication • Step of proximal development • Swiss VET system as implemented in India • Maintenance of logbook and learning documentation • Syllabus to be followed • Domain specific 	<ul style="list-style-type: none"> • Use Application of IPERCA and AVIVA, Cognitive Apprenticeship • Organize infrastructure for training • Plan lessons • Manage time • Communicate with apprentices and the VET managers • Apply methods and settings in classes • Anticipate problems • Respond to Heterogeneity • Solve conflicts (e.g. constructive questioning) • Give constructive Feedback • Assign realistic tasks • Respond to company needs • Demonstrate domain specific skills 	<ul style="list-style-type: none"> • Flexibility • Creativity • Patience • Encouraging self-esteem • Positive Reinforcement (reveal competences not mistakes) • Self-criticism • Taking into account possible contributions of apprentices • Conviction that practical experience is the foundation of the teaching process • Consciousness of safe shop floor work culture

Annexure A

Domain Resources

2. Swiss VET Instructor Training SM1 - Specialization in Turning and Milling

2.1. Qualification & Experience

2.1.1. Qualification

Have done the Swiss VET Instructor Course CM – Basics of applied didactics.

2.1.2. Experience

A minimum of three months of instructing experience after qualifying as Swiss VET Instructor.

2.1.3. Entry competencies

Didactics

Plan the work procedure.

Organize the workshop for the required work which includes machines, tools, material and teaching aides.

Demonstrate the task.

Apply didactics.

Domain competencies

Conventional Turning & Milling instructors should have the basic knowledge of engineering drawing, bench work, mechanical engineering and manufacturing methods.

Instructors should be familiar with Health, Safety & Environment (HSE) practices.

Instructors know conventional Lathe and Milling machines; their types, functions, machine parts, accessories & attachments.

Instructors are conversant with operations and maintenance of machines.

Instructors know cutting tools required for various operations and calculations of all parameters for machining. Instructors possess knowledge of work holding devices, cutter holding devices, machine attachments and different types of cutters and cutting tools and tool life involved for various operations; importance of proper Lubricants & coolants for Machining.

Instructors know basic Lathe and Milling machining operations.

2.2. Competencies to be developed

Didactic Competencies & Resources

Same as in Common Module, applied to Specialization.

Instructional Competencies & Resources

Same as in Common Module, applied to Specialization.

Domain Competencies

For a given job Instructors are able to plan the work procedure.

Instructors can organize the workshop for the required work which includes machines, tools, material and teaching aides. Instructors are able to demonstrate the task.

Instructors are able to do the truing/run out of work piece.

Instructors carry out machining of various operations like turning, facing, threading, grooving, undercuts, chamfering and drilling. These can be both internal & external operations.

Instructors have expertise in machining type and procedure.

Hands on skill in clamping of tools, inserts and work pieces along with work holding devices (chuck, vice) used for different operations (types of clamps and their back support , types of vice like machine vice/tilting vice etc.)

Instructors gain experience in performing operations like peripheral milling, front peripheral, angular milling, slots, grooves, pockets, chamfering, drilling, etc.

Instructors gain experience in controlling the parameters involved in manual and auto feed mechanisms for all operations (turning& milling).

Instructors apply coolants/lubricants for the particular operations (turning& milling) wherever necessary.

All above meets the standard tolerance class 8.

Instructors take immediate corrective action about machine breakdown and bad condition of tools (e.g. sharpness).

Advanced Domain Knowledge (Self-study references)

Knowledge of top slide mechanism and functions in a lathe.

Knowledge of accessories and attachments used for turning/milling like rests and supports.

3. Swiss VET Instructor Course SM2 - Specialization in CNC Machining

3.1. Qualification & Experience

3.1.1. Qualification

Have done the Swiss VET Instructor Course CM – Basics of applied didactics.

3.1.2. Experience

A minimum of three months of instructing experience after qualifying as Swiss VET Instructor.

3.1.3. Entry competencies

Didactics

Plan the work procedure.

Organize the workshop for the required work which includes machines, tools, material and teaching aides.

Demonstrate the task.

Apply didactics.

Domain competencies

Instructors explain Health, Safety & Environment (HSE) practices in the shop floor.

Instructors know bench work, conventional milling and turning operations.

Know CNC Geometric basics like Co-ordinate systems, Axis and axial direction, Reference points, working space.

Instructors know the basics of Hydraulics and pneumatics.

Know CNC machine type, construction and operations.

Have knowledge of materials, their properties and machinability.

Know the cutting tools, cutter parameter selection, clamping and work holding devices

Understand the tool path, tool life and cycle time.

Instructors have knowledge in CNC programming

Know G-codes, M-codes, canned cycles and sub programs

Have knowledge of tooling data: radius compensation and offset compensation.

Can program to optimize of tool path, reduce cycle time.

Instructors are able to use simulation software to check the written program.

Instructors are aware of CNC console operations like MDI (Manual Data Input), Jog, spindle on/off.

3.2. Competencies to be developed

Didactic Competencies & Resources

Same as in Common Module, applied to Specialization.

Instructional Competencies & Resources

Same as in Common Module, applied to Specialization.

Domain Competencies

For a given job Instructors can plan the work procedure.

Instructors can organize machines, tools, material and load right program for a job.

Instructors know to operate CNC machine and operate the control panel.

Can carry out basic maintenance activity on the CNC machine.

Instructors are aware of tools for CNC machine, their functions and limitations.

Instructors can set up a CNC machine for a particular job.

Instructors gain experience in working on different control systems like FANUC, Siemens etc.

Instructors can read, single step, restart and edit the program on the machine console.

Instructors can modify machining parameters like rpm, compensation and positioning.

Instructors gain experience in inspecting the manufactured parts for required specifications and quality.

Instructors take immediate corrective action about machine breakdown and bad condition of tools (e.g. sharpness)

Advanced Domain knowledge (Self-study references)

Working of 3.5, 4 & 5 Axis machining centers.

CAD/CAM software and its use in CNC production (Catia, Pro-E, Solidworks).

4. Swiss VET Instructor Course SM3 - Specialization in Mechatronics

4.1. Qualification & Experience

4.1.1. Qualification

Have done the Swiss VET Instructor Course CM – Basics of applied didactics.

4.1.2. Experience

A minimum of three months of instructing experience after qualifying as Swiss VET Instructor.

4.1.3. Entry competencies

Didactics

Plan the work procedure.

Organize the workshop for the required work which includes machines, tools, material and teaching aides.

Demonstrate the task.

Apply didactics.

Domain competencies

Instructors explain Health, Safety & Environment (HSE) practices in the shop floor.

Instructors should have the basic knowledge of engineering drawing, bench work, mechanical engineering and manufacturing methods. Instructors should be familiar with Health, Safety & Environment (HSE) practices related to mechatronics.

Mechatronics Instructors are engineers with multifaceted knowledge in Electrical, Electronics, Mechanical, Pneumatics and Hydraulics. Instructors should have knowledge on AC / DC Electrical Systems (Rotating machines, Electrical motor control, Electrical control wiring, and Power distribution).

Instructors can integrate different input devices, sensors and transducers.

Instructors can also connect the different output devices and actuators to PLC or CNC controllers.

Instructors should be familiar with Electro-mechanical assembling skills such as cabinet assembly, cable assembly, colour codes, electrical parts, mechanical parts, electronic parts and their wiring.

Know procedure followed to carry out insulation stripping, securing of cables and wires, cable routing, cable forming / bending, colour coding of wires and cables.

Know PLC programming, can read electrical and electronic circuits. Understand the pneumatic and hydraulic circuit diagrams. Instructors have the knowledge of logic circuits, pneumatic

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displacement diagrams. Instructors know the functioning of electro-pneumatic, pneumatic and hydraulic components.

4.2. Competencies to be developed

Didactic Competencies & Resources

Same as in Common Module, applied to Specialization.

Instructional Competencies & Resources

Same as in Common Module, applied to Specialization.

Domain Competencies

For a given job Instructors are able to plan the work procedure. Instructors are exposed to electrical and electronic components used in equipment manufacturing and in-servicing of installed equipment.

Instructors are able to put together electrical assembly, check BOM list from the production documents. Instructors can identify different types of components, their specifications and be able to identify components in electrical circuit diagrams.

Instructors are familiar with the tools used in electrical equipment manufacturing. Instructors have hands on skills on crimping, soldering, joining techniques and mounting of components. Instructors know electrical and electronic measuring and testing instruments. Instructors are familiar with use of hand tools and hand-held machines.

Able to build the control panels for industrial automation. Prepare the production documents for building of control panels and carry out the task of assembling and testing the panels independently.

Can write and debug PLC program. Can read electrical, electronic, pneumatic or hydraulic circuit diagrams and check its functioning. Know how to fix sensors / transducers, carry out calibration and adjustment. Instructors know how to fix actuators, motors and their adjustment.

Can assemble the equipment and wire the electro-mechanical components and fix the pneumatic or hydraulic lines and components. Instructors carry out the necessary alignment and adjustment of equipment and components as per the assembly manual. Instructors are able to locate the problems systematically and replace the defective parts. Instructors have experience in building, understanding & assembling the pneumatic & electro pneumatic circuits, and integrating with PLC controller.

Instructors take immediate corrective action about machine breakdown and bad condition of tools.

Advanced Domain Knowledge (Self-study references)

Latest trends in mechatronics field.

Knowledge of robotics and its applications.

Applications of industrial automation

5. Swiss VET Instructor Course SM4 - Specialization in Welding & Fabrication

5.1. Qualification & Experience

5.1.1. Qualification

Have done the Swiss VET Instructor Course CM – Basics of applied didactics.

5.1.2. Experience

A minimum of three months of instructing experience after qualifying as Swiss VET Instructor.

5.1.3. Entry competencies

Didactics

Plan the work procedure.

Organize the workshop for the required work which includes machines, tools, material and teaching aides.

Demonstrate the task.

Apply didactics.

Domain competencies

Instructors explain Health, Safety & Environment (HSE) practices in the shop floor.

Instructors know the welding safety in particular.

Instructors have knowledge of engineering drawing, mechanical engineering and manufacturing methods and bench work.

Instructors can read engineering drawings for welding which includes codes, symbols & standards.

Instructors know materials, their properties and their weld qualities

Knows soldering, brazing and welding joining methods

Instructors are familiar with National & International standards for welding and fabrication.

Instructors know welding processes such as Gas welding, Manual Arc, MIG/MAG and TIG welding.

Know different types of weld joints, their specifications and use.

Know welding process: preparation for welding, actual welding and post weld operations.

Instructors know how to check weld for defects by visual examination and NDT.

Instructors have the knowledge of common weld defects and their probable causes.

Instructors can select electrode according to classification and specifications.

Instructors have the knowledge in different kinds of sheet metal operations.

Instructors know the calculation of different parameters in sheet metal (tensile strength, stress elongation, volume and density) and bench work (cutting speed, rpm and feed).

5.2. Competencies to be developed

Didactic Competencies & Resources

Same as in Common Module, applied to Specialization.

Instructional Competencies & Resources

Same as in Common Module, applied to Specialization.

Domain Competencies

Instructors follow the shop floor safety and welding safety.

Skilled in the selection of welding parameters like nozzle, electrodes selection, current setting, pressure setting, work area, proper earth, work holding devices.

Instructors carry out preparation of welded joints, root protection and cleaning.

Can calculate the parameters required for particular welding process and material to be welded.

Hands on in various welding process like MIG/MAG, TIG, Gas fusion, Manual Arc, etc.

Instructors can identify welding defects by visual inspection and provide remedies.

The Instructors can carry out sheet metal operations like bending, shearing, flanging and straightening.

Instructors take immediate corrective action about machine breakdown and bad condition of tools.

Advanced Domain knowledge (Self-Study references)

Welding inspection methods: visual inspection, NDT (radiography, ultra sonic, dye penetration, magnetic particle testing) and destructive testing.

Advanced welding techniques such as pipe welding, orbital welding, laser welding, pressure vessel welding.

CNC and robotics welding and cutting machines.

Development of sheet metal profiles.