Introduction to Basic Theory on Pumps

(*Centrifugal Pumps*)

WBC Water Business College

Online DIY Course

Purpose of a Pump

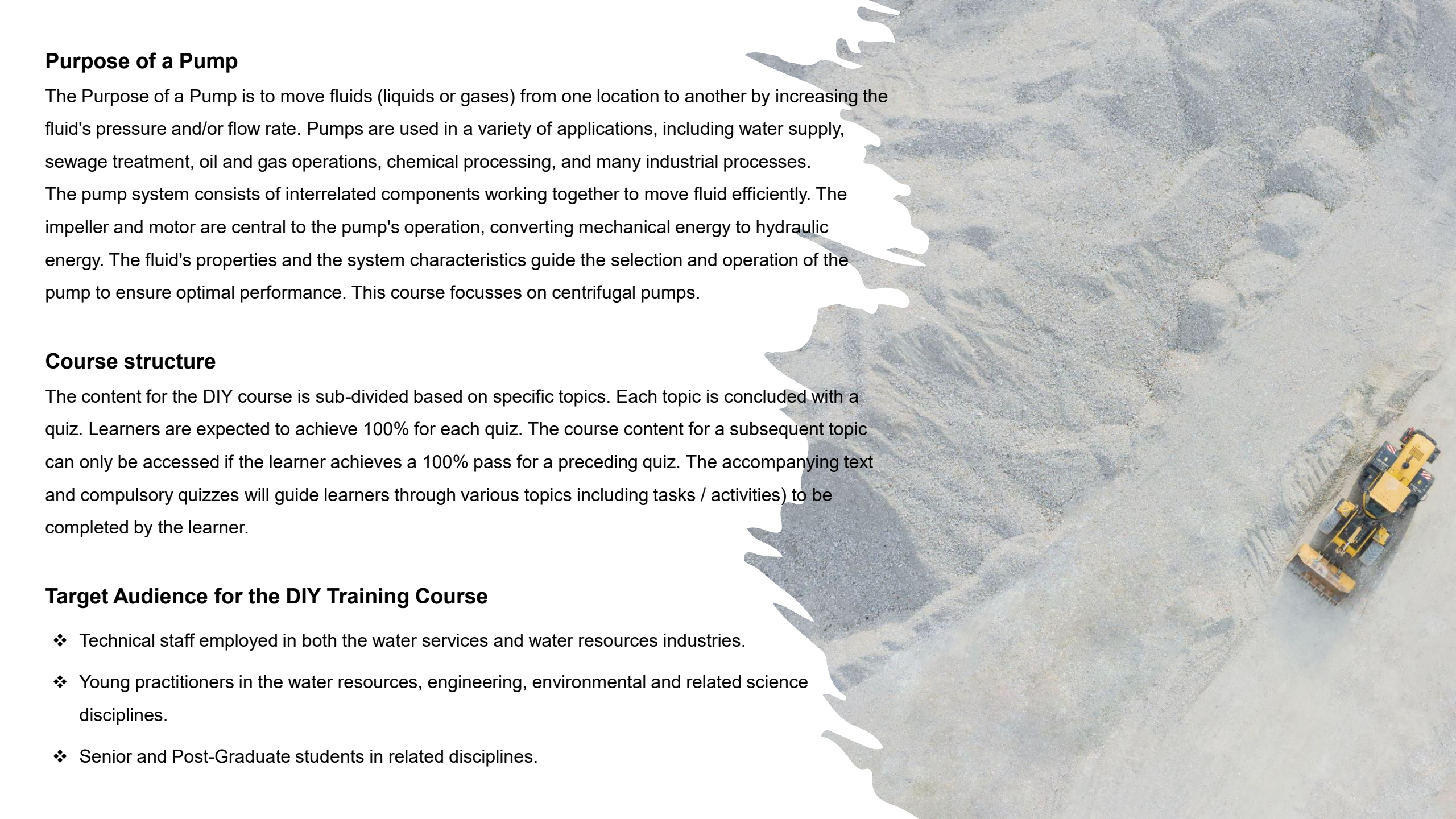
The Purpose of a Pump is to move fluids (liquids or gases) from one location to another by increasing the fluid's pressure and/or flow rate. Pumps are used in a variety of applications, including water supply, sewage treatment, oil and gas operations, chemical processing, and many industrial processes.
The pump system consists of interrelated components working together to move fluid efficiently. The impeller and motor are central to the pump's operation, converting mechanical energy to hydraulic energy. The fluid's properties and the system characteristics guide the selection and operation of the pump to ensure optimal performance. This course focusses on centrifugal pumps.

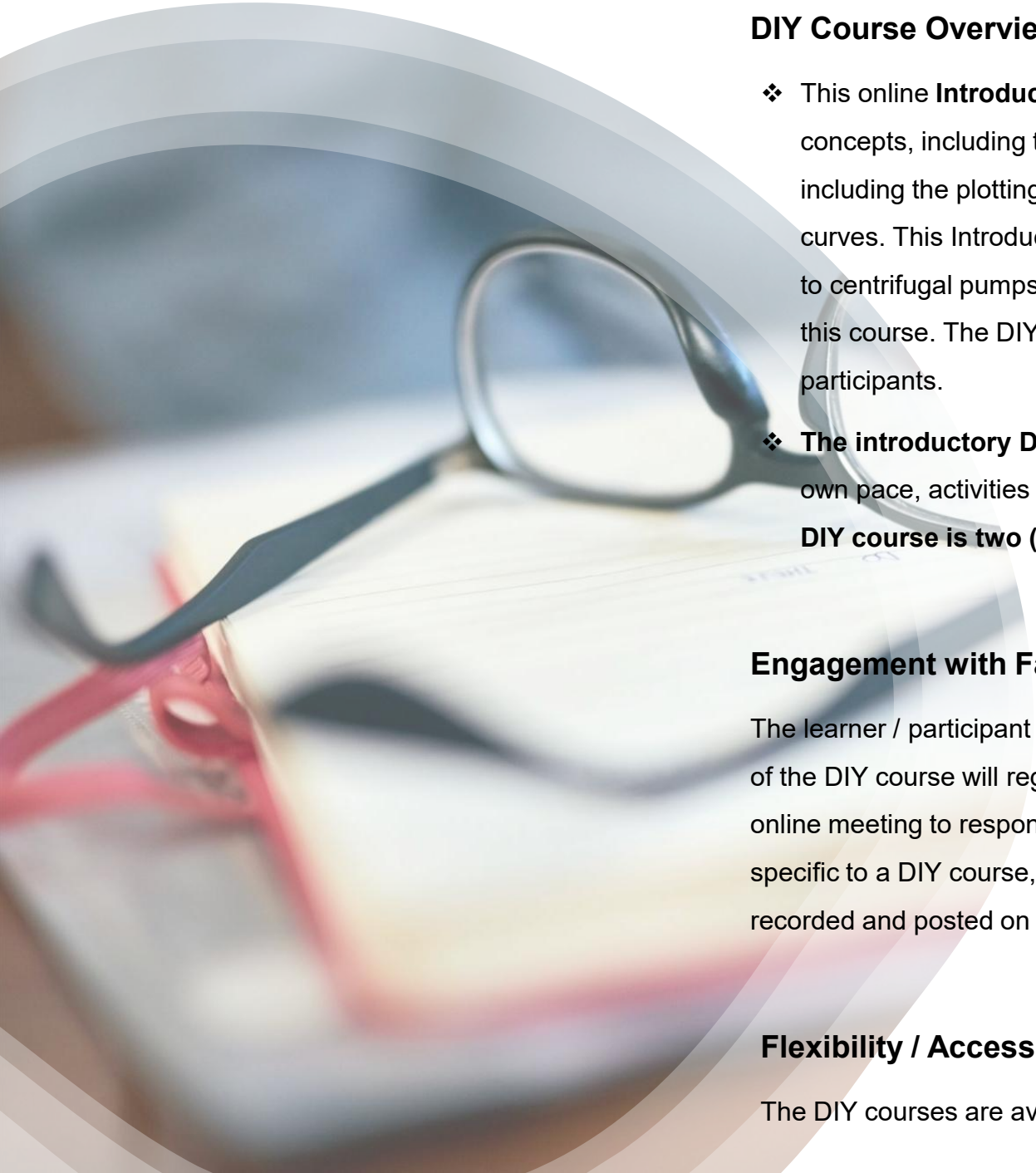
Course structure

The content for the DIY course is sub-divided based on specific topics. Each topic is concluded with a quiz. Learners are expected to achieve 100% for each quiz. The course content for a subsequent topic can only be accessed if the learner achieves a 100% pass for a preceding quiz. The accompanying text and compulsory quizzes will guide learners through various topics including tasks / activities) to be completed by the learner.

Target Audience for the DIY Training Course

- Technical staff employed in both the water services and water resources industries.
- Young practitioners in the water resources, engineering, environmental and related science disciplines.
- Senior and Post-Graduate students in related disciplines.





DIY Course Overview

- This online **Introduction to Centrifugal Pumps** DIY course introduces the learners to numerous topics / concepts, including the naming of pumps, pumping rates, pressure and pressure head, pump curves including the plotting of pump curves, pump selection process, pumps in parallel and in series and system curves. This Introduction to Centrifugal Pumps DIY course includes examples and exercises with reference to centrifugal pumps and submersible pumps. Terms and concepts are often repeated due to the nature of this course. The DIY course will be continuously updated and expanded based on feedback from participants.
- **The introductory DIY courses are self-study courses**. The learner / participant completes, at his/her own pace, activities / tasks related to a specific topic. However, **the total time allocated to complete the DIY course is two (2) months**.

Engagement with Facilitator

The learner / participant will be able to post questions and/or comments on the activities / tasks. The developer of the DIY course will regularly respond to the questions and comments. The developer may also arrange an online meeting to respond to the questions and/or comments. The date and time for such an online meeting, specific to a DIY course, will be posted on the WBC LMS. All online meetings / forums, etc may / will be recorded and posted on the WBC LMS for the benefit of all learners / participants registered for the DIY course.

Flexibility / Accessibility of Course Material

The DIY courses are available 24/7 and the learner / participant can start at any time once registered!

Topics included in the DIY Course

- Reading the pump nameplate.
- A pump converts mechanical energy from a motor into hydraulic energy in the fluid. This increases the fluid's pressure and/or velocity.
- Pumps operate by various mechanical actions, such as reciprocating (piston), rotary (gear, vane), or centrifugal forces (impeller). **This course focusses on the basic theory of pumps (with reference to centrifugal pumps)**.

- The impeller is a rotating component of a centrifugal pump. It transfers energy from the motor to the fluid by accelerating the fluid outward from the center of rotation. The design and speed of the impeller determine the flow rate and pressure increase of the fluid.
- The motor provides the mechanical power necessary to drive the pump. It can be electric, hydraulic, or powered by an internal combustion engine. The motor's power rating must match the requirements of the pump to ensure efficient operation.
- The type of fluid being pumped (water, oil, chemicals, etc.) affects the pump's design and materials of construction. For example, corrosive fluids require pumps made from resistant materials like stainless steel. The fluid's properties (viscosity, density, temperature) influence the pump's performance and efficiency. **This course focusses on water as the fluid to be conveyed**.
- The total head or pressure head required to move the fluid through the system includes the static suction lift, static discharge head, system friction losses, and head and flow requirements at the (free) discharge point.
- The required flow rate is the volume of fluid the pump must move per unit of time.
- Understanding net positive suction head available (NPSHA) versus net positive suction head required (NPSR).
- Understanding friction head and friction losses and calculating heads.
- The power requirements for pumps and basic calculations of the power requirements for pumps.
- Plotting pump curves, understanding pumps series as well as the pump selection process.
- Pumps in series and pumps in parallel configurations.
- System curves - The pump must be selected and sized based on the system's head-capacity curve, ensuring it operates efficiently within the desired flow rate and head range.

Please Note

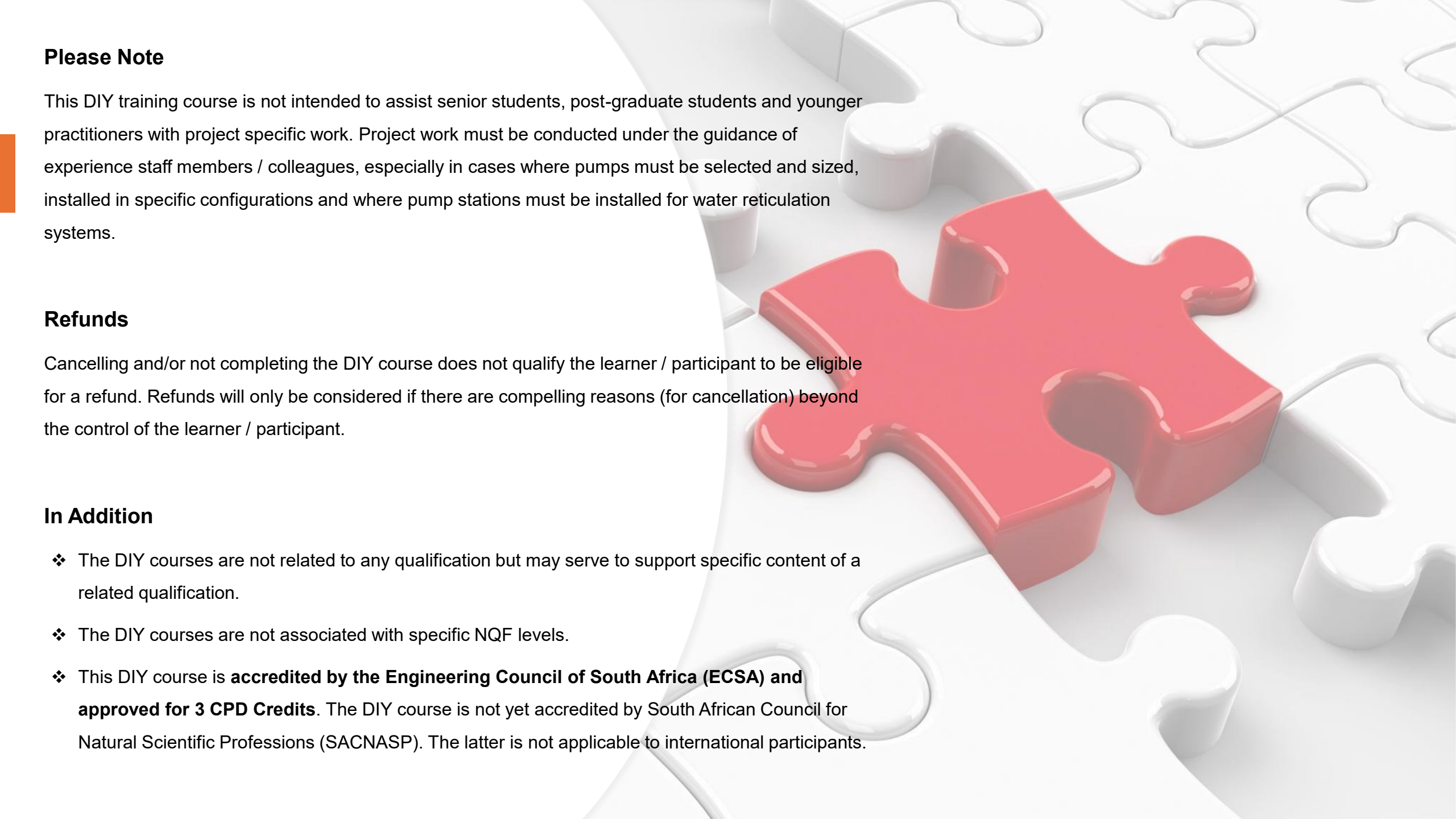
This DIY training course is not intended to assist senior students, post-graduate students and younger practitioners with project specific work. Project work must be conducted under the guidance of experience staff members / colleagues, especially in cases where pumps must be selected and sized, installed in specific configurations and where pump stations must be installed for water reticulation systems.

Refunds

Cancelling and/or not completing the DIY course does not qualify the learner / participant to be eligible for a refund. Refunds will only be considered if there are compelling reasons (for cancellation) beyond the control of the learner / participant.

In Addition

- The DIY courses are not related to any qualification but may serve to support specific content of a related qualification.
- The DIY courses are not associated with specific NQF levels.
- This DIY course is **accredited by the Engineering Council of South Africa (ECSA) and approved for 3 CPD Credits**. The DIY course is not yet accredited by South African Council for Natural Scientific Professions (SACNASP). The latter is not applicable to international participants.



Course Fees

The **introductory fee** for the online DIY course is **R 2 500**.

Further information on the DIY course can be accessed on the WBC website at: https://waterbusinesscollege.co.za/

Registration for the DIY course can be done online at: https://waterbusinesscollege.co.za/. Locate the relevant DIY course on the WBC website.

Full-Time and Part-Time Students (Current Registrations)

The significantly reduced fee for **registered (current registrations) full-time and part-time students** at any tertiary institution is **R 350**. Students will be required to provide a copy of their annual registration form (current year) issued by the tertiary institution. **Participants opting for the student course (with reduced course fee) will not receive CPD points**.

Please submit your documentation to: students@waterbusinesscollege.co.za.

Contact Information

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