



## On-Line Training Class Descriptions

**Chlorine Disinfection:** This **60 minute** course walks the participant through chlorine chemistry, the different forms of chlorine available for disinfection, and chlorine safety. This class devotes time to the safe handling of gaseous and liquid chlorine and reporting requirements under SARA Title III. The class covers recommended doses and contact times for various applications as well as the impact of water chemistry and temperature on disinfection.

**Hydraulics Basics:** This **60-minute** course discusses basic properties of water including weight, density, pressure, and specific gravity. Conversion of pressure to feet of head in various units is demonstrated. Multiple examples of why pressure is so important in water and wastewater systems are presented including: determining pressures due to elevation changes in distribution systems, high groundwater and floating tanks, surcharging of sewers, and using pressure to do work with hydraulic jacks. The concepts of velocity and water hammer are introduced. The presentation closes with a description and demonstration of a ram pump whose operation is based on pressure, velocity, and water hammer.

**Hydraulics and Pumps:** This **150-minute** (2.5 hour) course discusses hydraulic principles as they relate to pump operation. The presentation begins with a thorough discussion of total dynamic head and each of its components, the difference between suction lift and suction head, and how to calculate major and minor losses in a system. The second portion of the talk discusses work, power, and energy, how each is calculated, and the cost of running a piece of equipment. The presentation continues with a discussion of discharge velocity from a centrifugal pump, calculating impeller diameter, and the pump affinity laws. Attendees will learn to predict pump discharge, brake horsepower, amp draw, and discharge head from changes to either the pump speed or impeller diameter. The presentation ends with a discussion of cavitation, net positive suction head, and how to read both system curves and pump curves.

**Lagoons and Fixed Film Processes:** This **75-minute** class presents the method of operation for lagoons and various fixed film processes including trickling filters, rotating biological contactors, biological aerated filters, and others. Basic design principals are discussed for lagoons as well as biological processes taking place in aerobic, facultative, and anaerobic ponds. Differences between fixed film systems and suspended growth / hybrid systems are discussed as well as typical operating ranges for each system type including hydraulic and organic loading rates. This course is supplemented with many photographs showing different technologies with descriptions of the functions of various pieces such as the plenum, underdrain, and distributors.

**Lift Stations:** This **60-minute** course discusses dry pit and wet pit lift stations, pump arrangement, level indicator equipment, and basic lift station operation and maintenance. It includes a brief discussion of confined space entry and the safety hazards that may be present in lift stations.

**Nitrogen Removal:** This **90-minute** course covers ammonia removal by non-biological methods, biological nitrification, and denitrification. Topics that are covered include: the organisms responsible for nitrification and denitrification, stoichiometry, variables that impact performance, the different types of unit processes (fixed films and activated sludge) that can be used for nitrogen removal, ion exchange, and breakpoint chlorination.

**Phosphorus Removal:** This **60-minute** course covers the basics of biological and chemical phosphorus removal. Topics include: regulatory drivers, Phosphate Accumulating Organisms (PAOs), luxury uptake of phosphorus, the effect of various operational variables on phosphorus uptake, chemical phosphorus removal through precipitation, and the need for tertiary filtration.

**Pretreatment and Pollution Prevention:** This **two and a half hour** course discusses the industrial pretreatment and pollution prevention programs. It focuses on how effluent limits for indirect dischargers are determined. The impact of various types of discharges on the collection system, especially FOG, will be discussed. Topics to be covered include: legal authority and the sewer ordinance, setting local limits, categorical limits, types of users connecting to the collection system, and pollution prevention at the source. The pollution prevention portion of the course focusses on how industrial users can decrease water usage and wastewater strength by implementing simple changes on the factory floor. The use of screens, water audits, and other methods is discussed.

**Pumps:** This **60-minute** class discusses the different kinds of pumps used in water and wastewater treatment including centrifugal, positive displacement, peristaltic, and more. Components of each pump and mechanism of action are discussed as well as typical uses. Other topics include: cavitation, pump curves, the pump affinity laws, and total dynamic head. This presentation is supplemented with many wonderful pump animations provided by various pump manufacturers that are linked to through youtube.