**Exercise for Environmental Biotechnology 2020-2021**

**To be delivered by email till 10th January 2021**

You have to handle a wastewater stream with the following characteristics:

Q = 30000 m3/d, SS = 400 mg/l, VSS = 280 mg/l, inert VSS=20 mg/l,

PO43- -P = 14 mg/l, Water and air temp = 15oC

The influent concentrations of BODL and TKN are given in the Table at the end.

It’s requested to treat the wastewater aiming to reach the following effluent quality limits :

BOD5 = 15 mg/l

SS = 10 mg/l

NH4+-N = 0.1 mg/l

NO3--N = 5 mg N/l

PO43- -P = 1 mg/l

You can consider an appropriate configuration for biological carbon and nitrogen removal, whereas chemical precipitation may follow for phosphorus removal, if needed.

You should design your overall system in terms of number of reactors, reactor volume, recycling ratios, type and amount of chemicals used etc including anaerobic digestion of produced sludge (mixture of primary and secondary sludge). The calculated concentrations using mass balances in the inlet and outlet of each reactor should include at minimum the following variables: BODL, SS, Xi, Xv, NH4+-N, NO3--N, PO43- -P. Aeration needs should also be calculated for the aerobic reactors.

Assume that the feeding influent in your proposed configuration has been pretreated passing through a primary settling tank where 25% of BODL, 40% of SS and 24% of TKN is removed and transferred to the primary sludge.

You should use appropriate kinetic parameters for any proposed process, selected from the relevant book chapters, and precise references should be given (page from the book etc). Any assumptions made should be clearly explained and, if available, references should be used.

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| **Student** | **Feed Characteristics** |
| Χριστίνα Βασιλακοπούλου | BODL = 450 mg/l, TKN = 50 mg/l |
| Χαρά Ζαμπέτα | BODL = 550 mg/l, TKN = 60 mg/l |

Good Luck!