**THUY LOI UNIVERSITY**

FACULTY OF CHEMISTRY AND ENVIRONMENT

DIVISION: ENVIRONMENTAL ENGINEERING & MANAGEMENT

**Course syllabus**

Undergraduate – advanced program

# ENVIRONMENTAL ENGINEERING DESIGN

**CODE: CVEG 4149**

1. **Number of credits**: 3 (3-0-0)
2. **Class hours**: 45;

Of which: Theory: 28 Exercise: 15 Mid-term exam: 2 Field trip:

3. **Education program**

- *Compulsory course for:*
- *Optional course for: Civivl Engineering*

***4.*** **Course grade distribution**

| **Hình thức** | **Frequency** | **Description** | **Time** | **Grade distribution** |
|---|---|---|---|---|
| Attendance | 15 | | Weekly | 10% |
| Homework assignments | 4 | | 4th week | 10% |
| quizzes | 7 | 10 min/quiz | 4th week – 14th week | 14% |
| Mid-term exams | 1 – 2 | - 60 min | 5th week, 12th week | 30% |
| Field trip | 1 | Report | 12th week | 6% |

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| Final exam | 1 | - 90 min<br>- Multi-choice, short anwser, exercises | According to schedule | 30% |

**5. Binding conditions**

- *Course prerequisite: Completion of Topic "Environmental Engineering", "Environmental Chemistry"*

- *Course preparatory* :

- *Couse corequisite:*

- *Others:*

**6. Course description**

CVEG 4149 aims to provide undergraduate students the principles to design environmental engineering systems, focusing on water and wastewater engineering facilities. In the part of water engineering, students will be presented the components of water supply systems such as raw water intakes, pumping stations, drinking water treatment plants, public and private water supply network. Among those, designing drinking water treatment plant including selecting appropriate treatment technologies and devices, calculating the main operational parameters of facilities and some common issues and solutions for operation and maintenance are presented in lectures. In the part of wastewater engineering, designing biological treatment facilities is the main focus.

**7. Instructors:**

| No | Full name | Education Degree | Mobile | Email | Title/position |
|---|---|---|---|---|---|
| 1 | Bùi Thị Thủy | PhD | 0911 27 66 00 | thuybt@tlu.edu.vn | Lecturer/ Deputy Head |
| 2 | Phạm Nguyệt Ánh | PhD | 0913 832 442 | anhpn@tlu.edu.vn | Lecturer |

**8. Textbook**

Mackenzie L. Davis. Water and Wastewater Engineering: Design Principles and Practice. 2011, McGraw-Hill, ISBN 978-0-07-339786-3.

**9. Course schedule**

| No | Lecture content | Activities | Number of class hours |
|---|---|---|---|

| | | | Theory | Exercise | Others |
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| **1** | ***Introduce the subject and syllabus*** | * Lecturer:<br>- Self-introduction<br>- Subject and syllabus introduction<br>- Evaluation method introduction | **0.5** | | |
| 2 | **Chapter 1: Design and Construction Process**<br>- Overview of design process<br>- Overall construction process<br>**Chapter 2: General water supply design considerations**<br>- Water demand vs. water source<br>- Water quality<br>- Plant sizing and layout<br>*Reading: Textbook Chapter 3* | * Lecturer:<br>- Presentation<br>- Query<br>* Students:<br>- Answer the question from lecturer | **1,0** | 1,5 | |
| 3 | **Chapter 3: Coagulation and Flocculation facilities design**<br>Purposes coagulation and flocculation<br>Principles of coagulation and flocculation<br>Factors effecting the processes performance<br>Designing coagulation and flocculation facilities<br>Examples and drawings<br>- *Reading: Textbook Chapter 4 and 5* | * Lecturer:<br>- Presentation<br>- Query<br>* Students:<br>Answer the question from lecturer | **1,0** | 2,0 | |
| 4 | **Chaper 4 and 5: Lime-Soda softening and ion exchange**<br>Treatment Principles and chemical reactions<br>Calculating chemicals dose diagram<br>Designing softening facilities | * Lecturer:<br>- Presentation<br>- Query<br>* Students:<br>Answer the question from lecturer<br>* Quizz 1 | **3,0** | | |

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| | Fundamental concept of Ion exchange<br>Ion exchange practice<br>Operation and Maintenance<br>Examples and drawings<br>- *Reading: textbook Chapter 7* | | | | |
| 5 | **Chapter 7: Sedimentation**<br>Theory of sedimentation<br>Sedimentation basin design<br>Modified and advanced sedimentation tank<br>Operation and Maintenance<br>Examples and drawings<br>- *Reading: Textbook Chapter 8* | * Lecturer:<br>- Presentation<br>- Query<br>* Students:<br>Answer the question from lecturer<br>* Quizz 2 | 3,0 | | |
| 6 | **Chapter 8: Granular filtration**<br>Filter media characteristics<br>Theory of granular filter hydraulics<br>Granular filtration practice<br>Modified and advance filter tanks<br>*Reading: textbook Chapter 10* | * Lecturer:<br>- Presentation<br>- Query<br>* Students:<br>Answer the question from lecturer<br>* Quizz 3 | 2,0 | 1,0 | |
| 7 | **Chapter 8: Granular filtration (continued):**<br>Wash troughs<br>Operation and Maintenance<br>Examples and drawings<br>**Chapter 10: Disinfection and fluoridation**<br>Mechanisms of disinfection<br>Disinfection kinetics<br>Factors effecting chlorine disinfection<br>Operation and Maintenance<br>Examples and drawings | * Lecturer:<br>- Presentation<br>- Query<br>* Students:<br>Answer the question from lecturer | **2,0** | 1,0 | |

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| 8 | **Chapter 11: Water plant residuals management**<br>Solids computation<br>Solids productions and characteristics<br>Minimization of residuals generation<br>Recovery of treatment chemicals<br>Management of liquid residuals<br>- *Part 1 review: Questions and answers including HW correction* | * Lecturer:<br>- Presentation<br>- Query<br>* Students:<br>Answer the question from lecturer<br>* Quizz 4 | 0,5 | 2,5 | |
| 9 | Midterm exam 1 | Mid-term exam 1 | 1 | | |
| 10 | **Chapter 12: General WW collection and treatment design considerations**<br>W.W sources and flow rates<br>WW characteristics<br>WW treatment standards<br>Sludge disposal regulations<br>Plant sizing and layout<br>- Plant location | * Lecturer:<br>- Presentation<br>- Query<br>* Students:<br>Answer the question from lecturer | **3** | | |
| 11 | **Chapter 13: Headworks and Preliminary treatment**<br>Pump station<br>Flow measurement<br>Bar racks and screens<br>Coarse solids reduction<br>Grit removal<br>Flow equalization<br>- Alternative preliminary process arrangements | * Lecturer:<br>- Presentation<br>- Query<br>* Students:<br>Answer the question from lecturer | **1,0** | 2,0 | |
| 12 | **Chapter 14: Primary treatment**<br>Sedimentation theory<br>Sedimentation practice<br>Sedimentation basin design<br>- Other primary treatment alternatives | * Lecturer:<br>- Presentation<br>- Query<br>* Students:<br>Answer the question from lecturer<br>* Quizz 5 | 1,0 | 2,0 | |

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| 13 | **Chapter 15 Wastewater microbiology**<br>Role of microorganisms, Classification of microorganisms<br>Microbial biochemistry, Population dynamics<br>Decomposition of waste<br>Microbiology of secondary treatment unit processes<br>Operation and maintenance<br>**Chapter 16: Secondary treatment by suspended growth biological processes**<br>For BOD removal and nitrification<br>- Processes for denitrification | * Lecturer:<br>- Presentation<br>- Query<br>* Students:<br>Answer the question from lecturer<br>* Quizz 6 | 3,0 | | |
| 14 | **Chapter 16: Secondary treatment by suspended growth biological processes**<br>Processes for phosphorous removal<br>Suspended growth design principles<br>- Suspended growth design practice | * Lecturer:<br>- Presentation<br>- Query<br>* Students:<br>Answer the question from lecturer | **1,0** | 2,0 | |
| 15 | **Chapter 17: Secondary treatment by attached growth**<br>Attached growth processes<br>Attached growth design principles<br>Attached growth design practice<br>Hybrid processes<br>**Chapter 18: Secondary setting, disinfection**<br>Secondary settling | * Lecturer:<br>- Presentation<br>- Query<br>* Students:<br>Answer the question from lecturer<br>* Quizz 7 | **2,0** | 1,0 | |
| 16 | **Chapter 18: Secondary setting, disinfection**<br>Disinfection<br>Postaeration<br>**Chapter 19: Tertiary treatment** | * Lecturer:<br>- Presentation<br>- Query<br>* Students:<br>Answer the question from | **2,0** | | |

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| | Chemical precipitation of phosphorous<br>- Carbon adsorption | lecturer | | | |
| 17 | **Chapter 20: Wastewater plant residuals management**<br>Sludge handling alternatives<br>Source and characteristics of solids and biosolids<br>Grit handling and sludge pumping<br>Storage and thickening of sludges<br>Alkaline stabilization<br>Aerobic and anaerobic digestion<br>Dewatering<br>Alternatives disposal techniques<br>- *Review for exam 2* | * Lecturer:<br>- Presentation<br>- Query<br>* Students:<br>Answer the question from lecturer<br>Mid-term exam 2 | **3,0** | | |

**10. Contact information**

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B. Head of division

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*Hanoi, date on*

**Head of faculty** **Head of division**

**PGS. TS. Nguyễn Thị Thế Nguyên**