



**THUY LOI UNIVERSITY**  
**CIVIL ENGINEERING FACULTY**  
**HYDRAULIC STRUCTURE**  
**DIVISION**

**SYLLABUS**

Educated grade:  
Undergraduate

**HYDRAULIC STRUCTURES/SYSTEM**  
**Code: CVEG4149**

1. **Number of credits:** 3 [ 3.0.0 ]
2. **Class hours:** 45; in which Theory: 33; Assignments: 06; Field trip: 06
3. **Education program for:**
  - *Optional:* Civil Engineering specialized in Structural Engineering, Transportation Engineering, Geotechnical Engineering, Construction Management, Environmental Engineering, Water Resources Engineering, Hydraulic Engineering
4. **Assessment method:**

| Form                                       | No. of times | Description                                      | Time             | Weighted   |
|--------------------------------------------|--------------|--------------------------------------------------|------------------|------------|
| Assignment                                 | 2 times      | - No. 1: Chapter 3                               | - Week 6         | 10%        |
|                                            |              | - No. 2: Chapter 6                               | - Week 12        | 10%        |
| Quiz                                       | 5 times      | - 10÷15 mins<br>- Multiple choice/<br>written    | - Every 2 weeks  | 10%        |
| Field trip                                 | One time     | Visit a reservoir<br>headwork; writing<br>report | During 1<br>week | 10%        |
| Attendance                                 | All times    | Call name in lists                               | All time         | 10%        |
| <b>Summation of progressive assessment</b> |              |                                                  |                  | <b>50%</b> |

|            |   |                                        |                                        |     |
|------------|---|----------------------------------------|----------------------------------------|-----|
| Final test | 1 | - 90 mins<br>- Oral<br>defense/written | 1-2 weeks<br>after courses<br>finished | 50% |
|------------|---|----------------------------------------|----------------------------------------|-----|

### 5. Prerequisite conditions:

- *Prerequisite class*: Hydrology, Hydraulic Engineering, Structural Analysis, Soil Mechanics.
- *Prior class*: Mechanics of material, Structural Materials, Reinforced concrete design
- *Parallel class*: Hydraulic structures 1, Hydraulic structure design project
- *Others*: None

### 6. Brief content:

Introduction to the water resources utilization, definition and classification of hydraulic structures, hydraulic systems; introduction to structures on the hydraulic systems

Analyzing, describing and predicting flow conditions in hydraulic structures, including Sluice, Weir, and Barrages, Channel intake and outlet structures, Spillways, energy dissipators and the culvert under the dam or roads.

Applying these hydraulic principles to the analysis and design of structures in hydraulic systems

### 7. Teaching Staff:

| No | Name              | Academic degree  | Phone      | Email                 | Job title                                |
|----|-------------------|------------------|------------|-----------------------|------------------------------------------|
| 1  | Hồ Sỹ Tâm         | Assoc. Prof. Dr. | 0963725050 | tamhs.ctl@tlu.edu.vn  | Senior Lecturer, Head of division        |
| 2  | Nguyễn Quang Hùng | Assoc. Prof. Dr. | 0915091173 | hungwuhan@tlu.edu.vn  | Senior Lectureer , Vice head of division |
| 3  | Lê Xuân Khâm      | Assoc. Prof. Dr. | 0936133789 | lexuankham@tlu.edu.vn | Senior Lecturer                          |
| 4  | Lê Thanh Hùng     | Assoc. Prof. Dr. | 0976712389 | hungle@tlu.edu.vn     | Senior Lecturer                          |

|    |                     |      |                |                                |               |
|----|---------------------|------|----------------|--------------------------------|---------------|
| 5  | Nguyễn Thế Điện     | Dr.  | 038347689<br>4 | nthdien@tlu.edu.vn             | Lecturer      |
| 6  | Nguyễn Mai Chi      | MSc. | 091526878<br>2 | maichi@tlu.edu.vn              | Main lecturer |
| 7  | Phạm Thị Hương      | Dr.  | 098939885<br>9 | phamhuong@tlu.edu.vn           | Main lecturer |
| 8  | Nguyễn Lan Hương    | Dr.  | 091331971<br>7 | lanhuong@tlu.edu.vn            | Lecturer      |
| 9  | Lê Văn Thịnh        | Dr.  | 086891372<br>9 | levanthinh@tlu.edu.vn          | Lecturer      |
| 10 | Nguyễn Hoàng Long   | MSc. | 090498800<br>5 | hoanglong@tlu.edu.vn           | Lecturer      |
| 11 | Nguyễn Phương Dung  | Dr.  | 098598288<br>5 | nguyenphuongdungn@tlu.edu.vn   | Lecturer      |
| 12 | Bùi Quang Cường     | Dr.  | 096323849<br>9 | cuongvlxd@tlu.edu.vn           | Lecturer      |
| 13 | Phạm Lan Anh        | MSc. | 098997958<br>4 | lananhct@tlu.edu.vn            | Lecturer      |
| 14 | Đào Tuấn Anh        | Dr.  | 094199767<br>1 | <u>daotuananh@tlu.edu.vn</u>   | Lecturer      |
| 15 | Lê Xuân Bảo         | Dr.  | 091997758<br>9 | <u>Lexuanbao@tlu.edu.vn</u>    | Lecturer      |
| 16 | Nguyễn T Phương Mai | MSc. | 091922477<br>7 | <u>maiswru@tlu.edu.vn</u>      | Main lecturer |
| 17 | Lã Bá Thiết         | MSc. | 091863993<br>5 | <u>lbthietcs2@tlu.edu.vn</u>   | Lecturer      |
| 18 | Phạm Ngọc Thịnh     | Dr.  | 094723118<br>6 | <u>thinhtls@tlu.edu.vn</u>     | Lecturer      |
| 19 | Lê Trung Thành      | MSc. | 098789787<br>8 | <u>letrungthanh@tlu.edu.vn</u> | Lecturer      |
| 20 | Trương Hồng Sơn     | Dr.  | 070330131<br>0 | truonghongson@tlu.edu.vn       | Lecturer      |
| 21 | Trần Duy Quân       | Dr.  | 097956955<br>8 | duyquan@tlu.edu.vn             | Lecturer      |

## 8. Text books & Reference books

**Text books:**

[1] Novak, P., et al. 2007. Hydraulic structures. 4th Ed. Taylor and Francis, London and Handouts. 2007.[ISBN 0203964632 (ebk.)] (#000014786)

**Reference books:**

[1] Thủy công Tập 1 //Ngô Trí Viêng chủ biên, Nguyễn Chiến...[và những người khác]. [Tài nguyên điện tử] - Hà Nội:Xây dựng, 2004. (#000000825)

[2] Thủy công Tập 2//Ngô Trí Viêng [chủ biên], Phạm Ngọc Quý...[và những người khác]. [Tài nguyên điện tử] - Hà Nội: Xây dựng, 2005. (#000000833)

[3] Đồ án môn học thủy công //Nguyễn Chiến [biên soạn], Nguyễn Văn Hạnh, Nguyễn Cảnh Thái. [Tài nguyên điện tử] - Hà Nội: Xây dựng, 2004. (#000000827)

[4] Các Quy chuẩn, tiêu chuẩn Ngành: QCVN 04 – 05:2012 (Công trình thủy lợi – Các quy định chủ yếu về thiết kế); TCVN 4253:2012 (Công trình thủy lợi – Nền các công trình thủy công – Yêu cầu thiết kế); TCVN 8421:2010 (Công trình thủy lợi – Tải trọng và lực tác dụng lên công trình do sóng và tàu); TCVN 8422:2010 (Công trình thủy lợi – Thiết kế tầng lọc ngược công trình thủy công); TCVN 9151:2012 (Quy trình tính toán thủy lực cống dưới sâu); TCVN 9901:2014 (Công trình thủy lợi - Yêu cầu thiết kế đê biển); TCVN 9902:2014 (Công trình thủy lợi - Yêu cầu thiết kế đê sông); TCVN 8419:2010 (Tiêu chuẩn Việt Nam TCVN 8419:2010 về công trình thủy lợi - thiết kế công trình bảo vệ bờ sông để chống lũ).

[5] Dam and appurtenant hydraulic structures – Tancev

**9. Detailed content:**

| Chapter | Content <sup>(1)</sup>                                                                                                                                                                                                                                    | Teaching & learning activities <sup>(2)</sup>                                       | Hours  |          |            |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------|----------|------------|
|         |                                                                                                                                                                                                                                                           |                                                                                     | Theory | Exercise | Field trip |
| 1       | <b>Introduction of hydraulic structures, headwork and hydraulic systems</b><br>1.1 Introduction of water resources utilization by means of hydraulic structures (Background and role of water, Natural disaster concerning water and roles of hydraulics) | * <u>Lecturer:</u><br>- Lecturing<br>- Query<br>- Use practical images and problems | 1      | 0        | 0          |

|   |                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |   |   |   |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|---|---|
|   | <p>1.2 Historical development of Viet Nam hydraulic structures</p> <p>1.3 Failures and lessons withdrawn</p>                                                                                                                            | <ul style="list-style-type: none"> <li>- Self introduction for further communication</li> <li>- Introduction of syllabus, assessment method, course content.</li> <li>- Conveying experiences and study methodology.</li> <li>- Work assignment.</li> </ul> <p>* <u>Student</u>:</p> <ul style="list-style-type: none"> <li>- Answer queries</li> <li>- Problem solving</li> <li>- Question on the course (if necessary)</li> </ul> <p>Implement of the work</p> |   |   |   |
| 2 | <p><b>Hydraulic structures and workability</b></p> <p>2.1 Hydraulic structures (definition and classification)</p> <p>2.2 Headwork and hydraulic systems</p> <p>2.3 Grade of structures</p> <p>2.4 Hydraulic structures workability</p> | <p>* <u>Lecturer</u>:</p> <ul style="list-style-type: none"> <li>- Lecturing</li> <li>- Query</li> <li>- Use practical images and problems</li> </ul>                                                                                                                                                                                                                                                                                                            | 2 | 0 | 0 |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                            |    |   |   |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|---|
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>- Conveying experiences and study methodology.</li> <li>- Work assignment.</li> </ul> <p>* <u>Student</u>:</p> <ul style="list-style-type: none"> <li>- Answer queries</li> <li>- Problem solving</li> <li>- Question on the course (if necessary)</li> <li>- Implementation of the work</li> </ul> |    |   |   |
| 3 | <p><b>Diversion works</b></p> <p><b>3.1 Intake structures and regulating structures</b></p> <p>3.1.1 Objectives, requirements &amp; classification</p> <p>3.1.2 River bend characteristics &amp; the best location of an intake</p> <p>3.1.3 Intakes without weirs/barrages</p> <p>3.1.4 Intakes with weirs/barrages</p> <p>3.1.5 River training for bends with intake structures</p> <p><b>3.2 Sluice</b></p> <p>3.2.1 Definition, classification &amp; composition</p> <p>3.2.2 Hydraulic calculation</p> <p>3.2.3 Energy dissipation calculation</p> <p>3.2.4 Seepage &amp; stability analysis</p> <p><b>3.3 Pillar barrier &amp; caisson barrier (summary)</b></p> | <p>* <u>Lecturer</u>:</p> <ul style="list-style-type: none"> <li>- Lecturing</li> <li>- Query</li> <li>- Use practical images and problems</li> <li>- Conveying experiences and study methodology.</li> <li>- Work assignment.</li> </ul> <p>* <u>Student</u>:</p> <ul style="list-style-type: none"> <li>- Answer queries</li> </ul>      | 15 | 3 | 0 |

|   |                                                                                                                                    |                                                                                                                                                                                                                                                                                                 |     |  |  |
|---|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--|--|
|   | 3.3.1 Pillar barrier<br>3.3.2 Caisson barrier<br><b>3.4 Assignment on Intake structures/sluiice</b>                                | - Problem solving<br>- Question on the course (if necessary)<br>Implement of the work                                                                                                                                                                                                           |     |  |  |
| 4 | <b>Culvert</b><br>4.1 Definition & classification<br>4.2 Culvert composition<br>4.3 Hydraulic calculation<br>4.4 Design principles | * <u>Lecturer</u> :<br>- Lecturing<br>- Query<br>- Use practical images and problems<br>- Conveying experiences and study methodology.<br>- Work assignment.<br>* <u>Student</u> :<br>- Answer queries<br>- Problem solving<br>- Question on the course (if necessary)<br>Implement of the work | 1.5 |  |  |
| 5 | <b>Channels and auxiliary structures (summary)</b><br>5.1 Channels<br>5.2 Aqueduct                                                 | * <u>Lecturer</u> :<br>- Lecturing<br>- Query                                                                                                                                                                                                                                                   | 1.5 |  |  |

|          |                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                       |    |   |   |
|----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|---|---|
|          | 5.3 Inverted siphon<br>5.4 Culvert<br>5.5 Cascade, chutes                                                                                                                                                             | <ul style="list-style-type: none"> <li>- Use practical images and problems</li> <li>- Conveying experiences and study methodology.</li> <li>- Work assignment.</li> </ul> <p><b>* <u>Student:</u></b></p> <ul style="list-style-type: none"> <li>- Answer queries</li> <li>- Problem solving</li> <li>- Question on the course (if necessary)</li> </ul> <p>Implement of the work</p> |    |   |   |
| <b>6</b> | <b>Dam outlet works</b><br>6.1 Definition & classification<br>6.2 Flood routing<br>6.3 Gravity spillway<br>6.4 Side spillway<br>6.5 Chute spillway<br>6.6 Energy dissipators<br><b>6.7 Assignment on outlet works</b> |                                                                                                                                                                                                                                                                                                                                                                                       | 12 | 3 |   |
| <b>7</b> | <b>Field trip</b>                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                       |    |   | 6 |
|          | Total                                                                                                                                                                                                                 | 45                                                                                                                                                                                                                                                                                                                                                                                    | 33 | 6 | 6 |

<sup>(1)</sup> Detailed content for heading 2 of every chapter.

<sup>(2)</sup> Preparation work for students and teaching and learning activities

## 10. Learning outcomes:

| No<br>. | Learning outcomes of the course                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Learning outcomes of corresponding education program <sup>(3)</sup> |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| 1       | <p>Knowledge:</p> <ul style="list-style-type: none"> <li>- Understanding the definition, the important role of hydraulic sectors and hydraulic structures; Hydraulic structure classification and workability.</li> <li>- Master the fundamentals to calculate: seepage, loads and impacts, stability and strength.</li> <li>- Master many types of intake structures, weirs, barrages, culvert, sluice... design principle and application</li> </ul>                                                                        | 2,3,4                                                               |
| 2       | <p>Skills:</p> <ul style="list-style-type: none"> <li>- Capability to recognize many hydraulic structure types, structure design and calculation</li> <li>- Capability to propose and solve hydraulic structure problem (seepage calculation, loads and impacts, stability and strength).</li> <li>- Team work skills in data collection and structure design</li> </ul>                                                                                                                                                      | 10,12,14                                                            |
| 3       | Independent and responsible capability (if any):                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 14,16                                                               |
| 4       | <p>Individual ethics for profession, society (if any):</p> <ul style="list-style-type: none"> <li>- Be moral, be conscience, be disciplinary, be responsible for works, community and society .</li> <li>- Master and implement the State and Party's policy</li> <li>- High responsibility in working and group work</li> <li>- Seriously implement the copy rights laws and intellectual possession</li> <li>- Having acquisitiveness, striving to study and upgrade the degree, creativeness in specialisation.</li> </ul> | 14,15,16                                                            |

<sup>(3)</sup> Learning outcomes of Corresponding Education Program was proposed by Head of specialisation.

## 11. Contacts

A. Address: Room 412 – Building A1, Thuy loi University

B. Head of division: *(responsible for answering the queries from students and related partners)*

- Name: Assoc. Prof. Dr. Hồ Sỹ Tâm

- Phone: 0963725050
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*Hà Nội, Dated July, 26<sup>th</sup> 2021*

**DEAN**

*(In charge of education  
specialisation)*

**DEAN**

*(In charge of course)*

**HEAD OF DIVISION**

**Assoc. Prof. Hồ Sỹ Tâm**