**CURRICULUM**

For

**THREE YEARS’ DIPLOMA OF ASSOCIATE ENGINEER**

IN

**WATER RESOURCES AND HYDROPOWER CONSTRUCTION ENGINEERING**

**Entry Level:** Matriculation (Science)

**Duration of Course**: Three years

**Credit Hours**: 66.5 (Annual System)

**Methodology:**  Theory 40%

Practical 60%

**Examination And Certification Organizations:** Sindh Board of Technical Education

**Examination System:**  Annual System (same as for all the DAEs programs)

**Technical Education & Vocational Training Authority**

**TEVTA**

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**Scheme of Study**

**DAE in Water Resources and Hydropower Construction Engineering (3-year course)**

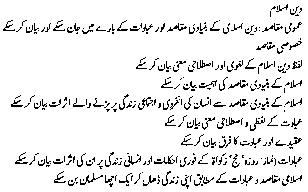
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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **First year** | | | | | | | | | | |
| **Serial number** | **Code** | | **Subject Name** | | **T** | | **P** | | **C** | |
| 1 | Gen 111 | | Islamiat and Pakistan Studies | | 1 | | 0 | | 1 | |
| 2 | GenC 112 | | Chinese I | | 2 | | 0 | | 2 | |
| 3 | Eng 112 | | English | | 2 | | 0 | | 2 | |
| 4 | Math 113 | | Applied Mathematics I | | 3 | | 0 | | 3 | |
| 5 | Ch 112 | | Applied Chemistry | | 1 | | 3 | | 2 | |
| 6 | Phy 122 | | Applied Physics | | 1 | | 3 | | 2 | |
| 7 | WRH 112 | | Engineering Mechanics | | 1 | | 1.5 | | 1.5 | |
| 8 | WRH 122 | | Building Materials and Testing | | 1.5 | | 1.5 | | 2 | |
| 9 | WRH 132 | | Water Resources Engineering Mapping and Drawing | | 1 | | 1.5 | | 1.5 | |
| 10 | WRH 142 | | Water Engineering Culture Education | | 1.5 | | 0 | | 1.5 | |
| 11 | WRH 152 | | Water Resources Engineering CAD Drawing Technology | | 1.5 | | 1.5 | | 2 | |
|  |  | | **Total** | | **16.5** | | **12** | | **20.5** | |
| **Second year** | | | | | | | | | | |
| **Serial number** | **Code** | | **Subject Name** | | **T** | | **P** | | **C** | |
| 1 | Gen 211 | | Islamiat and Pakistan Studies | | 1 | | 0 | | 1 | |
| 2 | Math 212 | | Applied Mathematics II | | 2 | | 0 | | 2 | |
| 3 | MgmC 212 | | Understanding China | | 2 | | 0 | | 2 | |
| 4 | GenC 212 | | Chinese II | | 3 | | 6 | | 5 | |
| 5 | WRH 212 | | Engineering Hydrology and Water Resources Calculation | | 1.5 | | 1.5 | | 2 | |
| 6 | WRH 223 | | Hydraulic Analysis and Calculation | | 2 | | 1.5 | | 2.5 | |
| 7 | WRH 232 | | Water-saving Technology | | 1.5 | | 1.5 | | 2 | |
| 8 | WRH 243 | | Hydraulic Reinforced Concrete Structure | | 2 | | 1.5 | | 2.5 | |
| 9 | WRH 252 | | Engineering Geology and Foundation Basis | | 1.5 | | 1.5 | | 2 | |
| 10 | WRH 262 | | Water Resources Engineering Supervision | | 1.5 | | 1.5 | | 2 | |
|  |  | | **Total** | | **18** | | **15** | | **23** | |
| **Third year** | | | | | | | | | | |
| **Serial number** | **Semester** | **Code** | | **Subject Name** | | **T** | | **P** | | **C** |
| 1 | **First semester** | Gen 311 | | Islamists and Pakistan Studies | | 1 | | 0 | | 1 |
| 2 | GenC322 | | Chinese Synthesis -1 | | 1 | | 3 | | 2 |
| 3 | GenC 311 | | Chinese Listening | | 0 | | 3 | | 1 |
| 4 | GenC 331 | | Spoken Chinese | | 0 | | 3 | | 1 |
| 5 | GenC 351 | | Chinese Reading and Writing | | 0 | | 3 | | 1 |
| 6 | GenC 341 | | Chinese Culture -1 | | 1 | | 0 | | 1 |
| 7 | GenC 361 | | Chinese Cultural Practice -1 | | 0 | | 1.5 | | 0.5 |
| 8 | WRH 312 | | Water Resources Engineering Survey | | 1 | | 3 | | 2 |
|  |  | | **Subtotal** | | **4** | | **16.5** | | **9.5** |
| 9 | **Second semester** | WRH 322 | | Water Resources Engineering Building | | 1.5 | | 1.5 | | 2 |
| 10 | WRH 332 | | Organization and Management of Water Resources Engineering Construction | | 1 | | 1.5 | | 1.5 |
| 11 | WRH 343 | | Water Resources Engineering Construction Technology | | 2 | | 1.5 | | 2.5 |
| 12 | WRH 353 | | Cost and Bidding of Water Resources Engineering | | 2 | | 1.5 | | 2.5 |
| 13 | WRH 362 | | Maintenance and Management of Water Resources Engineering | | 1 | | 1.5 | | 1.5 |
| 14 | GenC 332 | | Chinese Synthesis -2 | | 1.5 | | 1.5 | | 2 |
| 15 | GenC 371 | | Chinese Culture -2 | | 1 | | 0 | | 1 |
| 16 | GenC 381 | | Chinese Cultural Practice -2 | | 0 | | 1.5 | | 0.5 |
|  |  | | **Subtotal** | | **10** | | **10.5** | | **13.5** |
|  |  |  | | **Total for the third year** | | **14** | | **27** | | **23** |
|  |  |  | | **Total for three years** | | **48.5** | | **54** | | **66.5** |

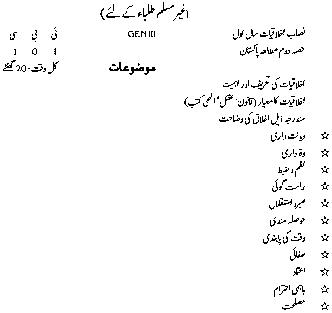
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| **2.1 Islamiat and Pakistan Studies**  **Three-year Higher Vocational Water Resources and Hydropower Construction Engineering Specialty**  **The First Year**  **Islamiat and Pakistan Studies**  **Course code: Gen 111** |

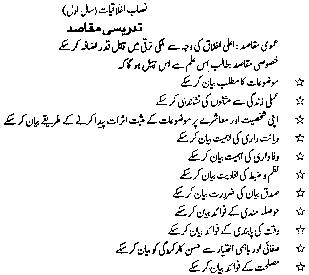


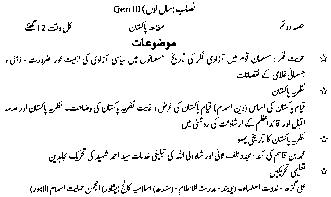




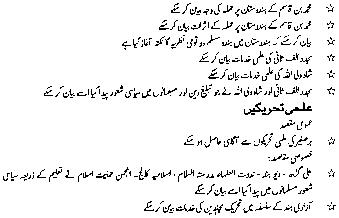












**2.2Chinese I**

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| **Three-year Higher Vocational Water Resources and Hydropower Construction Engineering Specialty**  **The First Year**  **Chinese I**  **Course code: GenC 112** |

**Total learning time 240**

Theory 96 T P C

Practice 144 2 0 2

|  |  |  |  |
| --- | --- | --- | --- |
| **Course objective:**To cultivate the basic Chinese language ability of foreign students in China, they can pass the HSK2 exam through this lesson.  **Course content** | | | |
| Learning situation | Learning content (specific work tasks) | Class hours | |
| Lesson 1  Hello Vs Nǐhǎo | This lesson briefly introduces pinyin and spelling methods. | 3 hours | |
| Lesson 2  Hello! | This lesson briefly introduces the sentence patterns used in greeting, such as dialogue, greeting and saying goodbye, and introducing one’s name. | 3 hours | |
| Lesson 3  I come from… | Students can understand basic classroom language, learn to use “country+people” for simple communication and dialogue, and can introduce which country they come from. | 3 hours | |
| Lesson 4  What’s the date today? | This lesson introduces the expressions of numbers, years, months and other dates, and teaches students to ask for a date and answer it. | 3 hours | |
| Lesson 5  This is my little brother. | After introducing the family members, students can understand the simple terms used when asking about the family situation and make a brief introduction. | 3 hours | |
| Lesson 6  I’m nineteen. | This lesson expands quantifiers and animal names, and introduces the expression of age, so that students can ask and answer each other’s age correctly. | 3 hours | |
| Lesson 7 What time is it now? | This lesson introduces the usage of hours, minutes and seconds, so that students can describe their lives in time. | 3 hours | |
| Lesson 8 What do you like to do on weekends? | This lesson introduces the expressions of related nouns such as hobbies, interests, activities, etc. to help students communicate with each other by using simple conjunctions. | 3 hours | |
| Lesson 9 Introduce yourself. | After explaining the expressions related to self-introduction, students can correctly introduce their names, families, ages, hobbies, school majors, etc. | 3 hours | |
| Lesson 10 My father is in Beijing. | This lesson introduces the names of major cities in China, Britain and Europe, and the use of “people+places” in sentences. | 3 hours | |
| Lesson 11 I came to Beijing by plane. | This lesson introduces the means of transportation, and how to express long sentences in combination with the time and place learned before. | 3 hours | |
| Lesson 12 I eat in the company. | This lesson introduces some polite expressions used in eating. | 3 hours | |
| Lesson 13 The weather is fine on Monday. | It shows the conversations and topics that may appear when you want to have a meal. | 3 hours | |
| Lesson 14 How much in total? | This lesson introduces the vocabulary and sentences commonly used in shopping and how to do daily shopping in Chinese. | 3 hours | |
| Lesson 15 What would you like to eat? | This lesson introduces the classic Chinese and Thai cuisine, the terms of treating guests, and the communicative terms of how to order food in a restaurant. | 3 hours | |
| Lesson 16 The bathroom is next to the pantry. | This lesson introduces the location and noun of locality, and how to use noun of locality to introduce the location of a place. | 3 hours | |
| Lesson 17 I’m still sleeping at 7: 00. | This lesson introduces the grammatical points of “still”, so that students can correctly understand the meaning of sentences related to “still” and use this sentence pattern correctly for communication. | 3 hours | |
| Lesson 18 Tomorrow will be cloudy. | By introducing the weather in several Chinese cities, it explains how to use temperature to answer weather questions. | 3 hours | |
| Lesson 19 That one is 500 yuan cheaper than this one. | This lesson explains comparative sentences and compares them in terms of price, height, temperature, etc., so that students can have a thorough understanding of comparative sentences. | 3 hours | |
| Lesson 20 This is a family album. | This lesson introduces family members in detail in terms of appearance, clothing and occupation, so that students can master more detailed description methods. | 3 hours | |
| Lesson 21 Photographs are forbidden here. | This lesson leads students to know the relevant knowledge points that express orders, such as forbid, prohibit, and enable students to correctly understand the meaning of words in daily life. | 3 hours | |
| Lesson 22 I can’t find something. | This lesson introduces the use of “V+De+resultative complement” language points, so that students can correctly use relevant sentence patterns in communication. | 3 hours | |
| Lesson 23 I have been to Sichuan and seen giant pandas. | This lesson introduces Chinese culture, such as the Great Wall, the Forbidden City and the National Treasure, through “V+Guo”, so that students can use this sentence pattern correctly in communication. | 3 hours | |
| Lesson 24 I hope you can come to my wedding. | By introducing Chinese weddings, this lesson enables students to master the verbal usage of banquet invitation, holiday blessing, emotional expression, euphemism refusal, etc. | 3 hours | |
| Lesson 25 If you are ill, take more rest. | It introduces the vocabulary related to illness and the advice of doctors on medication, so that students can correctly describe and understand the doctor’s meaning in the process of seeing a doctor. | 3 hours | |
| Lesson 26 The station is just across the road. | This lesson introduces the way of asking the place and the answers by asking for directions, which helps students to ask and answer questions in practical communication by using relevant sentence patterns. | 3 hours | |
| Lesson 27 She sings very well. | This lesson introduces the correct use of related words in sentences around hobbies. | 3 hours | |
| Lesson 28 Did you do well in the exam? | By describing the process of the examination and the situation of answering questions, students can correctly understand the instructions of the examination room, the distribution of questions and the analysis of questions in the examination paper. | 3 hours | |
| Lesson 29 Buy two boxes and get one free. | This lesson introduces the commodity names of supermarkets, as well as common terms such as promotions, discounts and price reductions. | 3 hours | |
| Lesson 30 We are a new restaurant. | This lesson helps students understand how to understand the waiter’s recommended dishes, and ask for dishes to order. | 3 hours | |
| Lesson 31 The girl is dressed in white. | Introduce others’ clothes through “V+ Zhe” and how to use grammatical points to describe the state of something. | 3 hours | |
| Lesson 32 You can be discharged from hospital next week. | This lesson introduces the expressions of hospitalization, visiting the sick, discharge and so on, so that students can understand hospital scene terms and strengthen students’ multi-scene communication ability. | 3 hours | |
| **Recommended/Reference Books:** | | |  |

1. *Tang Chinese Course 1*
2. *Tang Chinese Course 2*
3. *HSK Standard Course*, edited by Jiang Liping, Beijing Language and Culture University Press, ISBN978-7-5619-3809-9.
4. *HSK Test Syllabus*, compiled by the Office of Chinese Language Council International, People’s Education Press, ISBN978-7-107-30419-4.
5. *International Course for Chinese Language Education*, compiled by the Office of Chinese Language Council International, ISBN978-7-5600-7401-6.

|  |  |
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| **Teaching objectives** |  |
| 1.Quality objective: To cultivate students’ knowledge of Chinese culture, cultivate their interest in understanding and recognizing China, promote the friendship of overseas students in China, and be active communicators of Chinese culture.  2.Knowledge objective: Students can master basic Chinese knowledge such as character, words, phrases, sentences, paragraphs and discourses, and deepen their understanding of Chinese history and geography.  3.Ability objective: Through the study of this lesson, learners can acquire the learning and training of listening, speaking, reading, writing and translation skills. |  |
|  |
| **Practice list** |  |
| |  |  |  | | --- | --- | --- | | Serial number | Learning situation | Teaching hours | | 1 | Hello Vs Nǐhǎo | 4.5 hours | | 2 | Hello! | 4.5 hours | | 3 | I come from… | 4.5 hours | | 4 | What’s the date today? | 4.5 hours | | 5 | This is my little brother. | 4.5 hours | | 6 | I’m nineteen. | 4.5 hours | | 7 | What time is it now? | 4.5 hours | | 8 | What do you like to do on weekends? | 4.5 hours | | 9 | Introduce yourself. | 4.5 hours | | 10 | My father is in Beijing. | 4.5 hours | | 11 | I came to Beijing by plane. | 4.5 hours | | 12 | I eat in the company. | 4.5 hours | | 13 | The weather is fine on Monday. | 4.5 hours | | 14 | How much in total? | 4.5 hours | | 15 | What would you like to eat? | 4.5 hours | | 16 | The bathroom is next to the pantry. | 4.5 hours | | 17 | I’m still sleeping at 7: 00. | 4.5 hours | | 18 | Tomorrow will be cloudy. | 4.5 hours | | 19 | That one is 500 yuan cheaper than this one. | 4.5 hours | | 20 | This is a family album. | 4.5 hours | | 21 | Photographs are forbidden here. | 4.5 hours | | 22 | I can’t find something. | 4.5 hours | | 23 | I have been to Sichuan and seen giant pandas. | 4.5 hours | | 24 | I hope you can come to my wedding. | 4.5 hours | | 25 | If you are ill, take more rest. | 4.5 hours | | 26 | The station is just across the road. | 4.5 hours | | 27 | She sings very well. | 4.5 hours | | 28 | Did you do well in the exam? | 4.5 hours | | 29 | Buy two boxes and get one free. | 4.5 hours | | 30 | We are a new restaurant. | 4.5 hours | | 31 | The girl is dressed in white. | 4.5 hours | | 32 | You can be discharged from hospital next week. | 4.5 hours | |  |

**2.3English**

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| **Three-year Higher Vocational Water Resources and Hydropower Construction Engineering Specialty**  **The First Year**  **English**  **Course code: Eng 112** |

**Total learning time 64**

Theory 64 T P C

Practice 0 2 0 2

Course objective: At the end of the course, students will have cognitive skills, enabling them to present facts in a systematic and logical way to meet the language needs of dynamic business and industrial fields for functional daily use, and will cultivate students’ reading, writing and comprehension skills.

**Course content**

**English discourse “A”**

**1. Prose/discourse 16 hours**

1.1The first eight intermediate discourses. English II

1. **Cloze test 4 hours**

1.2Choose a paragraph of 50-100 words from the discourse. Every 11th word or any word related to this will be omitted. The number of missing words will be between 5-10. The selected word may or may not be the word used in the text, but it should be an appropriate word.

**English discourse“B”**

**3. Grammar 26hours**

3.1Sentence structure

3.2Tense

3.3Partial speech

3.4 Punctuation

3.5Change of personal pronouns

3.6Polysemy

3.7Frequently confused words

**4. Composition 8 hours**

4.1Letters/short messages

4.2Job application letter

4.3Certificate of character for scholarship

4.4Telegrams, wireless telegrams and radiotelegrams, telex and fax

4.5Thesis writing

4.6Technical education, science and our life, computers, environmental pollution, students’ obligations. **4 hours**

**5. Translation 6 hours**

5.1Translation from Urdu into English.

For foreign students: a paragraph or a dialogue.

**Recommended books**

1. Technical English developed by Mr. Zia Sarwar, Mr. Habib-ur Rehman, Evaluated by Mr.Zafar Iqbal Khokhar, Mr. ZahidZahoor,Vol - I, National Book Foundation

**Teaching objectives**

**Discourse-A**

1. **Show better reading, comprehension and vocabulary**

1.1Manipulate, skim, and scan text

1.2Identify new ideas

1.3Re-explain facts and words in one’s own words

1.4Write a story summary

1. **Understand the facts of the text**

2.1Recall the text and rewrite the words to fill in the blanks.

2.2Fill in the blanks with your own words.

**Discourse-B**

1. **Applying grammar rules in writing and speaking**

3.1Use grammar rules to construct meaningful sentences with subjects and predicates.

3.2Classification of time states, that is, present, past and future, and correctly use verb tenses in different forms to represent relevant time.

3.3Identify functional words and content words.

3.4Use punctuation to make the meaning clear.

3.5 Describe what a person says in direct and indirect form.

3.6 Write a discourse

3.7Distinguish confusing words

1. **Applying the concept of composition writing to practical situations**

4.1Use concepts to construct employment applications and obtain the character certificate of scholarships.

4.2Define and write telegrams, telegrams and wireless telegrams, telex and fax.

4.3Describe the steps of a good composition writing.

4.4Describe the characteristics of a good idea

4.5Describe the methods of composition writing.

4.6Use these concepts to organize facts and systematically describe them in practical situations.

1. **Applying translation rules**

5.1Describe confusion

5.2Describe translation rules

5.3Use translation rules from Urdu to English in simple paragraphs and sentences

**2.4Applied Mathematics**

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| **Three-year Higher Vocational Water Resources and Hydropower Construction Engineering Specialty**  **The First Year**  **Applied mathematics**  **Course code: Math 113** |

**Total study time** 96

Theory 96 T P C

Practice 0 3 0 3

Prerequisite: Mathematics elective courses must be completed.

**Course objective** After completing this lesson, students will be able to

1. Solve algebra, trigonometry, vector problems, mechanics, matrix and determinant.
2. According to the requirements of the technical field, cultivate skills, mathematical attitude and logical perception when using mathematical instruments.
3. Gain mathematical clarity and insight when solving technical problems.

**Course content**

**1 .Quadratic equation 6 hours**

1.1 Standard form

1.2 Find the solution

1.3Nature of root

1.4Sum and product of roots

1.5 Formula

1.6 Question

**2 .Arithmetic progression and series 3 hours**

2.1 Ordered series of numbers

2.2 Series

2.3 Term n

2.4Sum of the preceding n terms

2.5 Term

2.6 Question

**3 .Geometric progression and series 3 hours**

3.1 Term n

3.2 Sum of the preceding n terms

3.3 Term

3.4Infinite geometric progression

3.5 Question

**4 . Binomial theorem 6 hours**

4.1 Key element

4.2Binomial expression

4.3Binomial coefficient

4.4 Statement

4.5General terms

4.6Binomial progression

4.7 Question

**5 .Partial fraction 6 hours**

5.1 Brief introduction

5.2 Linear different factorsCase I

5.3Linear repetition factors Case II

5.4Quadratic different factors Case III

5.5Quadratic repetition factors Case IV

5.6 Question

**6 .Principle of trigonometry 6 hours**

6.1 Angle

6.2 Quadrant

6.3 Measurement of angle

6.4Relationship between hex and cyclic system

6.5 Relationship between the length of arc and the arc measurement of its center angle

6.6 Question

**7. Trigonometric function and ratio 6 hours**

7.1 Friction function of arbitrary angle

7.2Signs of trigonometric function

7.3 Trigonometric ratio of a specific angle

7.4Basic

7.5 Question

**8General identity 6 hours**

8.1Basic law

8.2Debugging

8.3Sum and difference formula

8.4Double-angle identity

8.5Half-angle identity

8.6Total or difference conversion of products

8.7 Question

**9Triangle resolution 6 hours**

9.1Sine law

9.2Cosine law

9.3Measurement of height and distance

9.4 Question

**10Solid measurement 30 hours**

10.1Review the ordinary plane graph and Simpson’s law.

10.2Prism

10.3Propeller

10.4Pyramid

10.5Cone

10.6Frusta

10.7Sphere

**11Vector 9 hours**

11.1Sealers & Vectors

11.2Addition and subtraction

11.3 Unit vector i, j, k

11.4Directional cosine

11.5Scalar or dot product

11.6Deductions

11.7Scalar product of orthogonal components

11.8Deductions

11.9 Analytic expression of a × b

11.10 Question

**12Matrices and determinants 9 hours**

12.1Definition of matrices

12.2Rows and columns

12.3Order of matrices

12.4Algebra of matrices

12.5Certainty

12.6Attributes of determinants

12.7Solutions of linear equations

12.8 Question

**Reference books**

Applied Mathematics Math-113, by Nasir -ud-Din Mahmood, Sana-ullah Khan, Tahir Hameed, Syed Tanvir Haider, Javed Iqbal, Vol - I, National Book Foundation

**Teaching objectives**

**1Using different methods to solve quadratic equations**

1.1Define standard quadratic equations

1.2Solve the equation using factorization method and complete square method

1.3Quadratic formula

1.4Discrimination expression

1.5Explanatory properties of roots of quadratic equations

1.6Calculate the sum and product of roots

1.7 Form a quadratic equation from a given root

1.8Solve problems involving quadratic equations

**2Understand the application concept of arithmetic progression**

2.1Defining the series of arithmetics and series

2.2Approximate formula of AP term n

2.3Explain the arithmetic mean between two given numbers

2.4Insert an arithmetic representation between N numbers

2.5The agent formula of arithmetic progression summation

2.6Solving the problem of arithmetic progression

**3Understanding geometric progression**

3.1Definition of geometric progression

3.2Factorial formula of the nth termof GP

3.3Explain the geometric progression between two numbers

3.4Insert n geometric progression between two numbers

3.5Complete the formula of geometric progression summation

3.6Derive the formula of infinite GP summation

3.7Use these formulas to solve the problem

**4Expanding and extracting the root of binomial**

4.1Binomial theorem of positive integral exponent

4.2Explain binomial coefficient: (n,0), (n,1), ...........(n,r), ..........(n,n)

4.3Expression of general terms

4.4Calculate specified terms

4.5Expand binomial of given index

4.6Extract the specified root

4.7Calculate approximation to given decimal places

4.8Solve problems involving binomial

**5Using different methods to decompose a single fraction into partial fraction**

5.1Define partial fraction, appropriate and inappropriate fraction

5.2Explain partial fraction for all four types

5.3Set an equivalent partial fraction for each type

5.4Explain how to find constants involved

5.5Split a single fraction into partial fraction

5.6Solve problems involving all four types

**6Understanding the angle measurement system**

6.1Definition of angles and related terms

6.2Explain the generation of angles

6.3Explain the hex and cyclic system used for angle measurement

6.4Relationship between radian and degree

6.5Convert radians to degrees and vice versa

6.6Circle measurement formula of center angle

6.7 Use this formula to solve the problem

**7Basic concepts and principles of applied trigonometric functions**

7.1Define the basic trigonometric function / ratio of an angle as the ratio of the sides of a right triangle

7.2Find the most basic function

7.3Find trigonometric ratio for a specific angle

7.4Draw trigonometric function diagram

7.5Solve problems involving trigonometric functions

**8 Using trigonometric identities in solving technical problems**

8.1List basic equations

8.2Prove basic equations

8.3Infer results

8.4Different formulas for summation

8.5Establish half angle, double angle and triangle formulas

8.6Convert sums or differences to products and vice versa

8.7Solve the problem

**9Using the concept, properties and laws of trigonometric functions to solve triangles**

9.1Define elevation angle and depression angle

9.2Prove sine and cosine

9.3Explain the elements of a triangle

9.4Solve triangles and problems involving height and distance

**10Using mechanical principles to find the surface, volume and weight of solids**

10.1Mechanics for defining planar and solid numbers

10.2Formulas for listing the perimeter and area of a plane figure

10.3Define pyramids and cones

10.4Define the pillars of pyramids and cones

10.5Define spheres and shells

10.6Calculate the total surface and volume of each type of solid

10.7Calculate solid weight

10.8Solve the problem of these solids

**11.Using the concept and principle of vector to solve technical problems**

11.1Define vectors

11.2Explain addition and subtraction of vectors

11.3Describe unit vector i, j, k

11.4Represent vectors as components

11.5Explain magnitude, unit vector, vector direction coefficient

11.6The analytic expression of scalar product and cross product of two vectors

11.7Perpendicularity and parallelism conditions attributed to two vectors

11.8Solve the problem

**12.Using the concepts of matrices and determinants to solve technical problems**

12.1Define matrices and determinants

12.2List matrix types

12.3Define transposes, ad joints, and inversions of matrices

12.4Status attribute of determinant

12.5 Explain basic concepts

12.6Interpretive algebra of matrix

12.7Solving linear equation with matrix

12.8Explain the solution of determinant

12.9Solve linear equations using word filling rules

**2.5Applied Chemistry**

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| **Three-year Higher Vocational Water Resources and Hydropower Construction Engineering Specialty**  **The First Year**  **Applied Chemistry**  **Course code: Ch 112** |

**Total learning time 128 T P C**

Theory **32 1 3 2**

Practice 96

Prerequisite: Students must have studied the elective chemistry course in middle school.

**Course objective:**After studying this lesson, students will be able to

1.Understand the significance and role of chemistry in the development of modern technology.

2.Be familiar with the basic principles of chemistry applied to relevant technical research.

3.Understand the scientific methods for production, performance and use of materials with industrial and technical significance.

4.Acquire the skills to practice effectively in the chemical laboratory.

**Course content**

**1Introduction and basic concepts 2 hours**

1.1Positioning with reference to this technology

1.2Terms and units of measurement used in chemical research

1.3Chemical reactions and their types

**2Atomic structure 2 hours**

2.1Subatomic particle

2.2Atomic structure, atomic number and atomic weight of elements

2.3Periodic classification of elements

2.4General characteristics of a period and group

**3Chemical bond 2 hours**

3.1Properties of chemical bonds

3.2Selective bonds and examples

3.3Covalent bonds (polar and nonpolar, sigma and Pi bonds and examples)

3.4Coordinate bonds and examples

**4Water 2 hours**

4.1Chemical properties and properties

4.2Impurity

4.3Hardness of water (type, cause and removal)

4.4Measuring hardness tester (Clarke degree)

4.5Boiler feed water, specification and treatment

4.6Seawater desalination and sewage treatment

**5Acids, bases and salts 2 hours**

5.1Definition with examples

5.2Properties, their hardness, alkalinity and acidity

5.3Hydrochloride and its classification and examples

5.4 PH and scale

**6Oxidation and reduction 2 hours**

6.1Procedures, definitions and examples

6.2Oxidant and reducing agent

6.3Oxides and their classification

**7Nuclear chemistry2 hours**

7.1Brief introduction

7.2Radioactivity (alpha rays, β rays and gamma ray)

7.3Half-life period

7.4Nuclear reaction and element transformation

**8Cement 2 hours**

8.1Brief introduction

8.2Production and manufacture

8.3Chemistry of solidification and hardening

8.4Special cement

**9Glass 2 hours**

9.1Combination and raw materials

9.2Manufacture

9.3Variation and application

**10Plastics and polymers 2 hours**

10.1Introduction and importance

10.2Classification

10.3Manufacture

10.4Properties and applications

**11Paints, varnishes and pastes 2 hours**

11.1Brief introduction

11.2Components

11.3Preparation and application

**12Corrosion 2 hours**

12.1Reason introduction

12.2Corrosion type

12.3Expansion of iron

12.4Corrosion protection measures

**13Refractories and abrasives 2 hours**

13.1Introduction to refractories

13.2Classification of refractory materials

13.3Properties and applications

13.4Introduction to abrasive tools

13.5 Artificial and natural abrasives and their applications

**14Alloy 2 hours**

14.1Introduction in need

14.2Preparation and properties

14.3Some important alloys and their compositions

14.4Objectives

**15Fuel 2 hours**

15.1Introduction of fuel

15.2Fuel classification

15.3Combustion

15.4Some problems of combustion

**16Lubricant 1 hour**

16.1Brief introduction

16.2Classification

16.3Property rights of lubricating oil

16.4Selection of lubricant

**17Contaminated 1 hour**

17.1Pollution problems and hazards

17.2Causes of pollution

17.3Dealing with pollution hazards

**Book recommendation**

1. Text Book of Intermediate Chemistry (I & II)

2. Ilmi Applied Science by Sh. Atta Muhammad

3. Polytechnic Chemistry by J. N. Reedy Tata McGraw Hill (New Delhi)

4. Chemistry for Engineers by P.C. Jain (New Delhi, India)

**Teaching objectives**

**1Understanding the scope, significance and fundamental role of the whole course**

1.1Define chemistry and its important terms

1.2Display units of measurement in chemistry research

1.3Write the chemical formula of common compounds

1.4Describe the types of chemical reactions with examples

**2Understanding the structure of atoms and the arrangement of subatomic particles in the atomic structure**

2.1Define atoms

2.2Explain the periodic law of elements

2.3Describe basic subatomic particles

2.4Distinguish atomic and mass numbers; isotope and isobase

2.5Explain the arrangement of electrons in different shells and sub levels

2.6Explain the grouping and placement of elements in the periodic table of elements

**3Understanding the properties of chemical binding**

3.1Define chemical bonds

3.2Describe the properties of chemical bonds

3.3Distinguish electrovalence bond and covalence bond

3.4Explain the formation of polarity and nonpolarity, sigma bond and π bond with examples

3.5Describe the properties of coordinate bonds with examples

**4Understanding the chemical properties of water**

4.1Describe the chemical properties of water with formula

4.2Describe general impurities in water

4.3Explain why and how to remove water hardness

4.4Expresse hardness in different units, such as mg / liter, p.p.m, Clarke degree and French degree

4.5Describe the formation and properties of scale in boiler feed water

4.6Explain the treatment of scales

4.7Explain sewage treatment and desalination of seawater

**5Understanding the properties of acids, bases and salts**

5.1Define acids, bases, and salts with examples

5.2Describe the general properties of acids and bases

5.3 Distinguish between acidity and alkalinity and use related terms

5.4Define salt and illustrate its classification with examples

5.5Explain the p-H and pH values of the solution

**6Understanding the oxidation and reduction processes**

6.1Define oxidation

6.2Explain the oxidation process with examples

6.3Define reduction

6.4Explain the reduction process with examples

6.5Define oxidizing and reducing agents and give at least six examples of each

6.6Define oxides

6.7Classify oxides and give examples

**7Basic knowledge of nuclear chemistry**

7.1Define nuclear chemical and radiological activities

7.2 Differences between α, β and γ particles

7.3Explain the Hall life process

7.4Explain at least six nuclear reactions lead to the conversion of some elements

7.5 Explain the important applications of isotopes

**8Understanding the manufacturing, solidification and quenching of cement**

8.1Define port land cement and give its composition

8.2Describe the manufacturing method

8.3Describe the chemical properties of cement solidification and hardening

8.4Difference between ordinary cement and special cement

**9Understanding the manufacturing process of glass**

9.1Define glass

9.2Describe its composition and raw materials

9.3Describe the manufacture of glass

9.4Describe its variety and application

**10Understanding the nature and importance of plastic polymers**

10.1 Define plastics and polymers

10.2Explain the polymerization mechanism

10.3Describe the preparation and application of certain plastics / polymers

**11Understanding the chemical properties of paints, varnishes and pastes**

11.1Define paint, varnish and pastes

11.2Components

11.3Preparation method and application

**12Understanding the corrosion process and its causes and types**

12.1Define corrosion

12.2Describe different types of corrosion

12.3Explain the cause of corrosion

12.4Explain the rust process of iron

12.5Describe methods to prevent / control corrosion

**13Understanding the properties of refractories and abrasives**

13.1 Define refractory

13.2Classification of refractory materials

13.3Describe the propertiy and application of refractory materials

13.4 Define abrasives

13.5 Classification of natural and artificial abrasives

13.6 Describe the application of the abrasive

**14Understanding the properties and importance of alloys**

14.1 Define alloys

14.2 Describe different methods of alloy preparation

14.3 Describe the important properties of the alloy

14 4 Collect some important alloys and their compositions, properties and applications

**15Understanding the nature of fuel and its combustion**

15.1 Define fuel

15.2 Classify fuels and distinguish between solid, liquid and gaseous fuels

15.3 Describe important fuels

15.4 Explain combustion

15.5 Calculate the amount of air and gas in combustion

**16Understanding the properties of lubricants**

16.1 Define lubricant

16.2 Explain the application of lubricant

16.3Classify lubricants and quote examples

16.4 Describe the important properties of oils, greases, and solid lubricants

16.5 Describe the selection criteria of lubricants and specific applications

**17Understanding the nature of pollution**

17.1 Define pollution (air, water, food)

17.2 Describe the causes of environmental pollution.

17.3 Collect some common pollutants.

17.4 Explain how to prevent pollution

**Applied Chemistry96 hours**

1.This lesson introduces the common instruments, glassware and chemical reagents in the chemical laboratory.

2.Crystallize to purify chemicals.

3.Separate the mixture of sand and salt.

4.Find the melting point of the substance.

5.Use pH paper to find the pH value of the solution.

6.Separate the ink mixture by chromatography.

7.The coefficient of benzene viscosity is determined with the help of Ostwald vasomotor.

8.Use the surface tension drop weight meter to find the surface tension of the liquid.

9.Water is electrolyzed to produce hydrogen and oxygen.

10.The chemical equivalent of copper is determined by electrolysis of CuSO4.

11.The analysis scheme of basic free radical salt is introduced.

12.The first group of free radicals (Ag+ - Pb++ - Hg+) are analyzed.

13. Practice detecting the first group of free radicals.

14.Introduce the scheme of group II radicals.

15.Detect and confirm II-A free radicals (Hg++, Pb++++, Cu+, Cd++, Bi+++).

16. Detect and confirm II-B free radicals (Sn+++, Sb+++, As+++).

17.Introduce the scheme of group III free radicals (Fe+++ - Al+++, Cr+++)

18.Detect and confirm Fe+++, Al+++ and Cr+++.

19.Introduce the scheme of group IV free radicals.

20.Detect and confirm An++ and Mn++ free radicals in group IV.

21.Detect and confirm Co++ and Ni++ free radicals in group IV.

22.Introduce the scheme of acid radicals.

23.Detect dilute acid groups.

24.Detect and confirm CO32- and HCO3- free radicals.

25.Introduce the method / device for volume estimation.

26. Prepare the standard solution of the substance.

27.Find the strength of a given alkali solution.

28. Estimate HCO3- content in water.

29.Find out the percentage age composition of KNO3 and KOH mixed solution..

30.Find out the amount of chloride ion (Cl-) in the water by volume.

**2.6Applied Physics**

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| **Three-year Higher Vocational Water Resources and Hydropower Construction Engineering Specialty**  **The First Year**  **Applied Physics**  **Course code: Phy 122** | | | | |
| **Total hours** | **128** | **T** | **P** | **C** |
| **Theory** | **32** | **1** | **3** | **2** |
| **Practice** | **96** |  |  |  |

Course objective: Students will be able to understand the basic principles and concepts of physics, use these principles and concepts to solve problems in practice situation / technology courses, and understand concepts to learn advanced physics / technology courses.

**Course content**

1**Measurement 2 hours**

1.1 Basic units and derived units

1.2 Measurement system and S.I. units

1.3 Dimension concept and dimension formula

1.4 Transition from one system to another

1.5 Important figures

**2Scalar and vector 4 hours**

2.1 Revision of rules from beginning to end

2.2 Parallelogram, triangle and force polygon laws

2.3Analysis of vector

2.4 Adding vectors by rectangular components

2.5 Multiplication, scalar product and cross product of two vectors

**3Motion 4 hours**

3.1Review laws and equations of motion

3.2 Momentum conservation method

3.3 Angular motion

3.4 Relationship between linear motion and angular motion

3.5 Centripetal acceleration and force

3.6 Inequality of angular motion

**4Torque, balance and rotational inertia 5 hours**

4.1 Torque

4.2 Center of gravity and center of mass

4.3 Equilibrium and its conditions

4.4 Torque and angular acceleration

4.5 Rotational inertia

5**Wave motion 4hours**

5.1 Check Hooke’s law of elasticity

5.2 Move under elastic restoring force

5.3 Characteristics of simple harmonic motion

5.4 S.H.M and circular motion

5.5 Simple pendulum

5.6 Wave form of S.H.M

5.7 Resonance

5.8 Transverse vibration of stretching rope

6**Voice 4 hours**

6.1 Longitudinal wave

6.2 Acoustics, pitch and sound quality

6.3 Units of horizontal intensity and frequency response of the ear

6.4 Interference of silent area and beat of sound waves

6.5 Acoustics

6.6 Doppler effect

7**Light 4 hours**

7.1 View the laws of reflection and refraction

7.2 Form images through mirrors and lenses

7.3 Optical instrument

7.4 Wave theory of light

7.5 Interference, diffraction and polarization of light wave

7.6 Application of polarization in sunglasses, optical activity and stress analysis

8**Optical fiber 2 hours**

8.1 Objective communication and problems

8.2 View total internal reflection and critical angle

8.3Optical fiber structure

8.4 Fiber materials and manufacturing

8.5 Optical fiber and application

**9Laser 3 hours**

9.1 Theory of light

9.2 Emission and absorption of light

9.3 Absorption and emission of laser

9.4 Laser principle

9.5 Structure and operation of laser device

9.6 Type of laser device with brief description

9.7 Application (basic concept)

9.8 Material processing

9.9 Laser welding

9.10 Laser assisted machining

9.11 Micromachining

9.12 Drilling, underlining and marking

9.13 Printing

9.14 Laser in medicine

**Recommended books**

1 Tahir Hussain, Fundamentals of Physics Vol-I and II

2 Farid Khawaja, Fundamentals of Physics Vol-I and II

3 Wells and Slusher, Schaum’s Series Physics .

4 Nelkon and Oyborn, Advanced Level Practical Physics

5 Mehboob Ilahi Malik and Inam-ul-Haq, Practical Physics

6 Wilson, Lasers - Principles and Applications

7 M. Aslam Khan and M. Akram Sandhu, Experimental Physics Note Book

**Teaching objectives**

**1** **Applying measurement concepts to practical situations and technical problems**

1.1Write dimension formula of physical quantity

1.2Units of measure using dimension equations

1.3 Convert measured values from one system to another

1.4 Use measurement concepts and important parameters when solving problems

**2** **Using scalar and vector concepts to solve problems involving these concepts**

2.1 Interpretation laws of parallelogram, triangle and force polygon

2.2A resolution method for describing vector to component

2.3Method of describing rectangular component plus vector

2.4 There is differentiation between scalar product and cross product of vectors

2.5 Use concepts when solving problems involving vector addition resolution and multiplication

**3** **Applying the law of conservation of momentum and the concept of angular motion to practice**

3.1 Apply the law of conservation of momentum to practical / technical problems

3.2 Explain the relationship between linear motion and angular motion

3.3 Use the concept and equation of angular motion to solve related technical problems

**4 Applying the concepts of torque, balance and rotational inertia to practical situations / problems**

4.1 Explain torque

4.2Difference between center of gravity and center of mass

4.3 Explain the rotational balance and its conditions

4.4 Explain examples given by rotational inertia

4.5 Use the above concepts when solving technical problems

**5** **Using the concept of wave motion to solve related problems**

5.1 Explain Hooke’s law of elasticity

5.2Derivation formula of motion under elastic restoring force

5.3Formulas for simple harmonic motion and simple pendulum

5.4 Refer to S.H.M and interpretive waveform of circular motion

5.5 Explain resonance

5.6Explain the transverse vibration of a stretched string

5.7 Use the above concepts and formulas of S.H.M to solve relevant problems.

**6 Understanding the concept of sound**

6.1 Describe longitudinal waves and their propagation

6.2 Explain concepts: intensity, loudness, pitch and quality of sound

6.3An explanatory unit for the horizontal intensity and frequency response of the ear

6.4 Explain the silent area and beat phenomenon

6.5 Architectural acoustics interpretation

6.6 Explain the Doppler effect and give the mathematical expression.

7 **The concept of geometric optics is applied to mirrors and lenses.**

7.1 Interpretation of the law of reflection and refraction

7.2 Use the mirror formula to solve the problem

7.3 Use the concept of mirrors and lenses to form images to describe the work of optical instruments, such as microscopes, telescopes, cameras, and sextants.

**8 Understanding the wave theory of light**

8.1 Interpretive wave theory of light

8.2 Explain the interference, diffraction and polarization of light wave

8.3 Describe the polarization usage given in the course content

**9 Understanding the structure, working principle and application of optical fiber**

9.1 Explain the structure of the optical fiber

9.2 Explain how it works

9.3 Describe the applications of optical fiber in industry and medicine

**Practice list**

1Draw a graph representing a function:

1. y=mx means m=0, 0.5, 1, 2
2. y=x2
3. y=1/x

2Use the cursor caliper to find the volume of a given solid cylinder.

3 Use a micrometer screw gauge to find the profile area of a given conductor.

4 Demonstrate that the force is proportional to (a) the mass, and (b) the acceleration, using the Fletcher trolley.

5 Verify the force parallelogram law using the grave sand device.

6 Verify the triangle law of force and Lamy’s theorem.

7Determine the weight of a given object.

a. Parallelogram law of force, B. trigonometric law of force, C. Lamy theorem

8 Verify the force polygon law using the grave sand device.

9 Locate the position and magnitude of results similar to parallel forces.

10 Determine the results of two different parallel forces.

11 Use the moment principle to identify the weight of a given object.

12 Locate the center of gravity of regular and irregular shaped objects.

13 Find Young’s metal linear elastic module.

14 Use coil springs to verify Hooke’s law.

15 Study on the frequency of long drawstring.

16 Study on frequency variation of tension string.

17 Study the resonance of the gas column in the resonance tube and find the sound velocity.

18 Use the resonance tube to find the frequency of a given tuning fork.

19 Find the speed of sound in the rod through the quintet tube.

20 Verify the linear propagation of light and study the formation of shadows.

21 The influence of plane mirror rotation on reflection is studied.

22 Compare the refractive index of a given glass plate.

23 Find the focal length of the concave mirror by locating the center of curvature.

24 Find the focal length of the concave mirror by object and image method

25 Find the focal length of the concave mirror using the convergent lens.

26 Find the refractive index of glass through the apparent depth.

27 Find the refractive index of glass by spectrometer.

28 Find the focal length of convergent lens through the plane mirror.

29 Find the focal length of convergent lens by displacement method.

30 Find the focal length of divergent lens by convergent lens.

31 Find the focal length of divergent lens using a concave mirror

32 Measure the angular magnification of an astronomical telescope.

33Find the angular magnification of a simple microscope (magnifying glass).

34Find the angular magnification of a composite microscope.

35Study the work and structure of the camera.

36Study the work and structure of sextant.

37Compare different temperature scales and verify the conversion formula.

38Determine the specific heat of the lead bullet.

39Determine the linear expansion coefficient of the metal rod.

40 Find the heat of ice fusion.

41 Find the heat of vaporization

42Determination of relative humidity using a hygrometer

**2.7Engineering Mechanics**

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| **Three-year Higher Vocational Water Resources and Hydropower Construction Engineering Specialty**  **The First Year**  **Engineering Mechanics**  **Course code: WHR 112** | | | | | | | | | | |
| Total learning time: | | **80** | | **T** | | | | **P** | | **C** | |
| Theory: | | 32 | | **1** | | | | **1.5** | | **1.5** | |
| Practice: | | 48 | |
| **Course objective:** | Through learning the basic knowledge of rigid body statics and the calculation of the bearing capacity of the member of the two parts of the content, students can carry on the force analysis of the member, strength, stiffness calculation and check, for the member to choose a reasonable material, determine a reasonable section shape and size, provide the necessary calculation.. | | | | | | | | | |
| **Course content** | | | | | | | 32 hours | | | |
| **1.Axiom of statics and force analysis of objects**  Introduction  1.1 Basic concepts of statics  1.2 Basic axiom of statics  1.3Constraint and constraint reaction  1.4 Force analysis of object system | | | | | | 8 hours | | | | |
| **2.Synthesis and balance of plane force system**  2.1 Torque  2.2 An analytical method for the synthesis and equilibrium of plane intersection force system  2.3 Couple of force  2.4 Synthesis and balance of plane couple system  2.5 Simplification, balance and application of plane arbitrary force system | | | | | | 6 hours | | | | |
| **3.Axial tension and compression internal force analysis and strength calculation of rod**  3.1 The concept of basic deformation and internal force of rod  3.2 Internal force analysis of axially deformed rod  3.3 Stress of axial tension (compression) rod  3.4 Deformation of tension (compression) rod-Hooke’s law  3.5 Mechanical properties of materials in tension and compression  3.6 Strength, safety factors, allowable stress  3.7 Strength calculation of tension (compression) rod | | | | | | 8 hours | | | | |
| **4.Internal force analysis of beam bending deformation**  4.1Internal force of beam-shear force and bending moment  4.2 Solution of internal force of beam and general drawing position of internal force diagram of beam  4.3 Internal force of beam-shear force and bending moment | | | | | | 8 hours | | | | |
| **5.Compression rod stability**  5.1 rod stability concept  5.2 Critical load of slender compression rod  5.3 Stability calculation of compression rod  5.4 Measures to improve the stability of compression rod | | | | | | 2 hours | | | | |
| **Recommended/Reference Books:** | | | | |  | | | | | |
| 1.*Engineering Mechanics*, edited by Liao Yun, China Water and Power Press.  2.*Mechanics of Materials* (6th edition, first and second volumes), Sun Xunfang et al., Higher Education Press, published in 2019;  3.*Complete Solutions to Exercises of Engineering Mechanics*, edited by Tang Jingjing and Fan Qinshan, Higher Education Press, published in 2020. | | | | | | | | | | |
| **Teaching objectives** | | | | |  | | | | | |
| **1.Axiom of statics and force analysis of objects**  Introduction. Understand the meaning of buildings, structures and components and the relationship among them; Understand the classification of engineering structures and define the research object of engineering mechanics; Master the concepts of strength, stiffness and stability preliminarily, and understand the task and content of engineering mechanics; Be familiar with the concepts of rigid body and deformed solid, and master the basic assumptions of deformed solid.   * 1. Master the concepts of force, balance, rigid body and constraint.   2. Understand several basic axioms and inferences of statics, and be able to solve practical problems by using statics axioms.   1.3 Master several common constraint types and characteristics, and be able to determine the constraint reaction force.  1.4 Be able to analyze the force of a single object and object system.   1. **Synthesis and balance of plane force system**   2.1 Master the calculation of moment of force to point and the application of sum moment theorem.  2.2 Comprehend axis and projection of force on the plane; Analytical method for synthesis and balance of plane intersection force system  2.3 Master the nature of force couple  2.4 Master the synthesis method of plane couple system and the application of equilibrium equation.  2.5 Understand the synthesis method and simplified results of plane general force system; Master the necessary and sufficient conditions of plane general force system balance and the application of balance equation.   1. **Axial tension and compression internal force analysis and strength calculation of rod**   3.1 Understand the stress characteristics and deformation characteristics of four basic deformation members; Understand the concepts of internal force and external force.  3.2 Master the section method of internal force and the sign rules of each internal force; Calculate the axial force of tension (compression) members and draw the axial force diagram of members.  3.3 Understand the concept of stress, and master the stress calculation on the cross section of axial tension (compression) rod.  3.4 Understand the basic concepts of strain and deformation, be familiar with Hooke’s law, and calculate the deformation of tension (compression) rod.  3.5 Be familiar with the mechanical properties of materials in tension and compression.  3.6 Understand the strength conditions, safety factors and allowable stress.  3.7 Familiar with strength calculation of tension (compression) rod.  3.8 Calculation of axial force of tension (compression) rod and drawing of axial force diagram; Strength calculation of tension (compression) rod.   1. **Internal force analysis of beam bending deformation**   4.1 Understand the basic concepts of internal force-shear force and bending moment of beams.  4.2 Understand the solution of beam internal force and the general drawing method of beam internal force diagram.  4.3 Understand the internal force of the beam-shear force and bending moment calculation and drawing shear force diagram and bending moment diagram.   1. **Compression rod stability**   5.1 Understand the basic concept of compression rod stability;  5.2 Understand the concepts of critical force, critical stress, length coefficient and flexibility.  5.3 Be familiar with the calculation formula of critical stress of compression rod;  5.4 Understand the engineering measures to improve the stability of compression rod in practical engineering. | | | | | | | | | | | |
| **Practice list** | | | **48 hours** | | | | | | | |
| 1. The application of basic axioms and inferences of statics | | | | | | | | | 2 hours | |
| 2. Constraint and constraint reaction force | | | | | | | | | 1 hour | |
| 3. Draw the stress analysis diagram of a single object. | | | | | | | | | 2 hours | |
| 4. Draw the force analysis diagram of the object system | | | | | | | | | 2 hours | |
| 5. Torque | | | | | | | | | 2 hours | |
| 6. Force projection on coordinate axis | | | | | | | | | 2 hours | |
| 7. Synthesis and balance of plane intersection force system | | | | | | | | | 2 hours | |
| 8. Couple of force | | | | | | | | | 1 hour | |
| 9. Synthesis and balance of plane couple system | | | | | | | | | 2 hours | |
| 10. Use the equilibrium equation to calculate the bearing reaction force. | | | | | | | | | 4 hours | |
| 11. Calculation of axial force of axial tension (compression) rod and drawing of axial force diagram | | | | | | | | | 4 hours | |
| 12. Stress calculation of axial tension (compression) rod | | | | | | | | | 2 hours | |
| 13. Deformation calculation of tension (compression) rod | | | | | | | | | 2 hours | |
| 14. Strength calculation of tension (compression) rod | | | | | | | | | 4 hours | |
| 15. Calculation of internal force-shear force and bending moment of beam by section method | | | | | | | | | 4 hours | |
| 16. Drawing beam shear force diagram and bending moment diagram by column equation | | | | | | | | | 4 hours | |
| 17.Drawing beam shear force diagram and bending moment diagram by indirect method | | | | | | | | | 4 hours | |
| 18. Stability of compression rod | | | | | | | | | 4 hours | |
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**2.8Building Materials and Testing**

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| **Three-year Higher Vocational Water Resources and Hydropower Construction Engineering Specialty**  **The First Year**  **Building Materials and Testing**  **Course code: WRH 122** | | | | | | | |
| **Total learning time:** | | **96** | **T** | **P** | | **C** | |
| Theory: | | **48** | **1.5** | **1.5** | | **2** | |
| Practice: | | 48 |
| **Course objective:** | Through the study of building materials and testing, students can be familiar with the standard methods, applications and skills of performance testing of common building materials, correctly evaluate the quality of materials, and select and use materials reasonably and economically. | | | | | | |
| **Course content** | | | | |  | | |
| 1. **Introduction**    1. Brief introduction of the development of building materials    2. Definition, classification and technical standards of building materials    3. Witness sampling and management of material quality inspection    4. Physical properties of building materials    5. Mechanical properties of building materials    6. Chemical properties and durability of materials | | | | | 4 hours | | |
| 1. **Cement and its testing**    1. Definition, development trend and classification of cement    2. Production of Portland cement, composition and characteristics of cement clinker    3. Hydration characteristics and setting and hardening factors of cement    4. Technical properties of portland cement (fineness testing and qualification judgment)    5. Testing of water consumption, setting time and volume stability of standard consistency of portland cement    6. Cement mortar strength testing    7. Performance characteristics and application of portland cement    8. Technical characteristics and selection of general cement    9. Quality control of cement | | | | | 8 hours | | |
| 1. **Basic knowledge and technical indices of sand and gravel aggregate**    1. Basic knowledge of concrete sand and gravel aggregate    2. Grain gradation and fineness of sand (including practical training)    3. Testing of water content and density of sand (including practical training)    4. Maximum particle size and grading of stone    5. Testing of moisture content and density of stones (including practical training)    6. Quality control of sand and gravel aggregate | | | | | 6 hours | | |
| 1. **Concrete and its testing**    1. Concrete overview    2. Main technical properties of ordinary concrete (workability, strength and durability)    3. Classification and characteristics of concrete admixtures    4. Additive testing    5. Other common concretes    6. Basic knowledge of concrete mix proportion design    7. Concrete mix design    8. Concrete quality control and strength evaluation    9. Slump and expansion test of fresh concrete (including practical training)    10. Concrete compressive strength testing (including practical training) | | | | | 14 hours | | |
| 1. **Construction steel and its testing**     1. Basic knowledge of construction steel    2. Mechanical properties of construction steel    3. Process performance of construction steel    4. Standard and selection of construction steel    5. Sampling and performance testing of reinforcement    6. Arrangement of testing results and qualification determination of reinforcement    7. Low carbon steel tensile test (practical training) | | | | | 6 hours | | |
| 1. **Geosynthetics and their testing**    1. Development and classification of geosynthetics    2. Basic functions and technical indices of geosynthetics    3. Sampling and performance testing of geosynthetics    4. Collation of test results and qualification determination of geosynthetics | | | | | 3 hours | | |
| **Recommended/Reference Books:** | | | | |  | | |
| 1.*Building Materials and Testing*, edited by Liu Youfan and other editors, published by China Water and Power Press, published in January 2017, version: the third printing in 2020  2.*Building Materials* (7th Edition), edited by Fang Kunhe and He Zhen, published by China Water and Power Press, published in January 2015  3.*Testing and Application of Building Materials*, edited by Chen Ting, Huazhong University of Science and Technology Press, version: September 2020  4.Testing standards: (1) *Sand for Construction* (GB/T14684-2011); (2) *Pebble and Crushed Stone for Building* (GB/T14685-2011); (3) *Standard for Technical Requirements and Test Method of Sand and Crushed Stone (or Gravel) for Ordinary Concrete* (JGJ52-2006); (4) *Code for Testing Aggregates of Hydraulic Concrete* (DL/T 5151-2014); (5) *Test Code for Hydraulic Concrete*(SL/T 352-2020); (6) *The Test Sieving Method for Fineness of Cement* (GB/T1345-2005); (7) *Testing Method for Specific Surface of Cement – Blaine Method* (GB/T8074-2008); (8) *Test Methods for Water Requirement of Normal Consistency, Setting Time and Soundness of the Portland Cement* (GB/T 1346-2011); (9) *Method of Testing Cements – Determination of Strength (ISO Method)* (GB/T17671-1999); (10) *Steel for the Reinforcement of Concrete – Part 1: Hot Rolled Plain Bars* (GB/T 1499.1-2017); (11) *Hot Rolled Low Carbon Steel Wire Rods* (GB/T 701-2008); (12) *Steel and Steel Products – Location and Preparation of Samples and Test Pieces for Mechanical Testing* (GB/T 2975-2018); (13) *Metallic Materials – Tensile Testing (Series)* (GB/T 228-2010); (14) *Metallic Materials – Bend Test* (GB/T 232-2010). | | | | | | |  | |
| **Teaching objectives** | | | | |  | | |
| 1. **Understanding the basic knowledge of building materials**    1. Understand the meaning, classification and role of building materials in construction engineering    2. Be familiar with technical standards of building materials products and their applications    3. State the concept and expression of quality related properties of materials    4. State the concept and expression of water related properties of materials    5. Describe the concept and expression of heat related properties of materials    6. Understand the basic concepts of mechanical properties and durability of materials 2. **Understanding cement and its testing**    1. Understand the production process of portland cement    2. Describe the mineral composition and characteristics of portland cement clinker    3. State the setting and hardening of portland cement and its influencing factors    4. Understand the technical properties and application of portland cement mixed with blend materials    5. Be capable of sampling and performance testing of cement    6. Be able to sort out the test results and qualification judgment of cement 3. **Understanding sand and gravel aggregate and its testing**    1. State the basic knowledge and technical indices of concrete sand and gravel aggregate    2. Be capable of sampling and performance testing of concrete sand and gravel aggregate    3. Be able to sort out the test results and qualification judgment of concrete sand and gravel aggregate. 4. **Concrete and its testing**    1. Understand the basic knowledge of concrete    2. State the main technical properties of ordinary concrete    3. Understand other common concretes    4. Be familiar with the classification, selection, application, quality control and testing of concrete admixtures    5. Be familiar with the function and classification of concrete admixtures    6. Be able to test the slump and expansion of fresh concrete    7. Be capable of testing concrete cube compressive strength    8. Be able to sort out concrete test results and conduct qualification judgment 5. Understanding construction steel and its inspection    1. Understand the basic knowledge of construction steel    2. State the mechanical properties of construction steel    3. State the process performance of construction steel    4. Understand the technical standard and application of construction steel    5. Be able to sample and test the performance of construction steel according to the current standards    6. Determine the qualification of steel quality according to current standards 6. **Understanding geosynthetics and their testing**    1. Understand the basic knowledge of geosynthetics    2. State the technical indices of geosynthetics    3. Be capable of sampling and performance testing of geosynthetics    4. Be able to sort out the test results of geosynthetics and make qualification judgment | | | | |  | | |
| **Practice list** | | | | | **hours** | | |
| 1. Determination of water consumption, setting time and volume stability of cement standard consistency 2. Strength test of cement mortar 3. Grading detection of fine aggregate 4. Water content test of fine aggregate 5. Density test of fine aggregate 6. Moisture content test of coarse aggregate 7. Grading detection of coarse aggregate 8. Inspection of bulk density and porosity of coarse aggregate 9. Slump and slump expansion test of concrete mixture 10. Inspection of apparent density of concrete mixture 11. Compressive strength test of concrete cube 12. Tensile property test of reinforcement | | | | | 3 hours  4 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  4 hours  2 hours  3 hours  4 hours | | |

**2.9Water Resources Engineering Mapping and Drawing**

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| **Three-year Higher Vocational Water Resources and Hydropower Construction Engineering Specialty**  **The First Year**  **Water Resources Engineering Mapping and Drawing**  **Course code: WRH 132** | | | | | | | | |
| **Total learning time:** | **80** | | | **T** | **P** | | **C** | |
| Theory: | 32 | | | **1** | **1.5** | | **1.5** | |
| Practice: | 48 | | |
| **Course objective:** | Cultivate students to establish the concept of projection, learn the basic method of drawing recognition, read water resources engineering mappings and draw water resources engineering diagram, reinforcement diagram and building construction diagram through learning, so as to meet the requirements of the working ability of water resources engineering management and engineering technicians. | | | | |  | | |
| **Course content** | | | | | | 32 hours | | |
| **Module 1: Reading and drawing of engineering diagram**  **Task 1: Water resources and hydropower engineering drawing standards**  1. Drawing standard: drawing format and frame format;  2. Drawing scale, font and drawing line;  3. Dimension marking;  4. Geometric drawing.  **Task 2: Basic knowledge of map reading and drawing**  1. Basic principle of projection and projection law of three views;  2.The drawing method of three views of basic body and simple body;  3.The drawing method of three views of the combination;  4.Drawing method of profile and section views;  5.The objective of elevation projection and the concept of slope;  6.The method of cylinder, cone and square circle transition surface in hydraulic structures. | | | | | | 10 hours | | |
| **Module 2: Reading and drawing of hydraulic engineering diagram**  **Task 3: Overview of hydraulic engineering diagram**  1. Overview of hydraulic diagram;  2.Expression method of hydraulic diagram;  3.Dimension marking of hydraulic diagram;  4.Reading and drawing of hydraulic diagram.  **Task 4: Channel understanding and drawing reading**  1. Role of channels;  2. Formation of vertical and horizontal sections, profile views and section of the channel;  3. Relevant provisions for reading, drawing and dimension marking of channel vertical and horizontal section diagram, profile views and section diagram.  **Task 5: Understanding of spillway and reading of diagram**  1. Function and classification of spillway;  2. Formation of spillway plan, longitudinal profile and section;  3. Relevant provisions for reading, drawing and dimension marking of spillway plan, longitudinal profile and section.  **Task 6: Understanding of aqueduct and reading of diagram**  1. Function and type of aqueduct;  2. Formation of plan, elevation and profile view of aqueduct;  3. Formation of composite view of aqueduct;  4. Relevant provisions for reading, drawing and dimension marking of flume plan, elevation and profile.  **Task 7: Understanding of earth rock dam and reading of diagram**  1. Working characteristics and types of earth rock dams;  2. Formation of plan, profile and section of earth rock dam;  3. Relevant provisions for reading, drawing and dimension marking of plan, profile and section of earth rock dam.  **Task 8: Understanding of gravity dam and reading of diagram**  1. Working characteristics and types of gravity dam;  2. Formation of plan, profile and section of gravity dam;  3. Relevant provisions for reading, drawing and dimension marking of plan, profile and section of gravity dam.  **Task 9: Understanding of arch dam and reading of diagram**  1. Working characteristics and types of arch dam;  2. Formation of plan, profile and section of arch dam;  3. Relevant provisions for reading, drawing and dimension marking of arch dam plan, profile and section; | | | | | | 16 hours | | |
| **Module 3: Reading and drawing of reinforcement diagram**  **Task 10: Understanding and reading of reinforcement diagram**  1. Type and function of reinforcement;  2. Expression method of reinforcement drawing;  3. Reading method of reinforcement drawing; | | | | | | 3 hours | | |
| **Module 4: Reading and drawing of building diagram**  **Task 11: Reading of building diagram**  1. Types and applications of buildings;  2. Differences between building drawing standards and hydraulic drawing standards. | | | | | | 3 hours | | |
| **Recommended / Reference Books:** | | | | | |  | | |
| 1.*Water Resources Engineering Drawing* (Fourth Edition), edited by Pang Lu, Shen Beibei, Li Chilan, China Water and Power Press, published in 2021, Fourth Edition;  2.*Problem Set of Hydraulic Engineering Drawing* (Fourth Edition), edited by Pang Lu, Shen Beibei, Li Chilan, China Water and Power Press, published in 2021, Fourth Edition;  3.*Water Resources Engineering Drawing*, edited by Zeng Lingyi, published by Higher Education Press in 2017, 4th Edition;  4.*Problem Set of Hydraulic Engineering Drawing*, edited by Zeng Lingyi, published by Higher Education Press in 2017, 4th Edition. | | | | | | | | |
| **Teaching objectives** | |  | | | | | | |
| 1. **Master the application of drawing standards and basic projection knowledge of hydraulic engineering diagram**   1.1Be able to apply relevant provisions of drawing standards  1.1.1Be able to correctly apply relevant provisions of drawing standards.  1.1.2Be able to correctly distinguish the materials represented by the hydraulic engineering diagram and the plane legends of hydraulic structures.  1.1.3Be able to draw simple plane graphics according to the provisions of drawing lines in drawing standards.  1.2Be able to apply the basic knowledge of projection to map recognition and drawing  1.2.1According to the projection characteristics of three-dimensional space, use the method of reading pictures to quickly imagine the shape of three-dimensional space.  1.2.2Be able to use the theory of projection to correctly express the spatial form.  1.2.3Be able to read various profile views and section views commonly seen in engineering diagram.  1.2.4Be able to dimension correctly, completely and clearly according to the drawing standards.  1.2.5Be able to establish the corresponding relationship between elevation projection drawing and spatial shape. | | | | | | | | |
| 1. **Master the identification and drawing of hydraulic diagram**   2.1Be able to read and draw water resources engineering diagram  2.2Be able to read the channel map  2.3Be able to read the spillway diagram  2.4Be able to read the aqueduct drawing  2.5Be able to read the earth rock dam drawing  2.6Be able to read gravity dam diagram  2.7Be able to read arch dam diagram | | | | | | | | |
| 1. **Master the understanding of reinforcement and the reading of diagram**   3.1Be able to read reinforcement diagram | | | | | | | | |
| 1. **Master the reading of building diagram**   4.1Be able to read building diagram | | | | | | | | |
| **Practice list** | | | **48 hours** | | | | |
| 1.Practice on application of drawing standard for water resources and hydropower engineering | | | 4 hours | | | | |
| 2.Practice of basic knowledge of map reading and drawing | | | 6 hours | | | | |
| 3.Reading and drawing of hydraulic engineering diagram | | | 6 hours | | | | |
| 4. Understanding of channel and drawing reading | | | 4 hours | | | | |
| 5.Understanding of spillway and reading of diagram | | | 4 hours | | | | |
| 6.Understanding of aqueduct and reading of diagram | | | 4 hours | | | | |
| 7.Understanding of earth rock dam and reading of diagram | | | 4 hours | | | | |
| 8.Understanding of gravity dam and reading of diagram | | | 4 hours | | | | |
| 9.Understanding of arch dam and reading of diagram | | | 4 hours | | | | |
| 10.Understanding and reading of reinforcement drawing | | | 4 hours | | | | |
| 11.Reading of building diagram | | | 4 hours | | | | |

**2.10Water Engineering Culture Education**

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| **Three-year Higher Vocational Water Resources and Hydropower Construction Engineering Specialty**  **The First Year**  **Water Engineering Culture Education**  **Course code: WRH 142** | | | | | | | | |
| **Total learning time** | | **48** | **T** | **P** | | | **C** | | |
| Theory | | **48** | **1.5** | **0** | | | **1.5** | | |
| Practice | | **0** |
| **Course objective** | Through the teaching and learning of course, combined with historical figures and typical engineering cases, taking water culture as the main line. This lesson studies the problems accumulated in the process of human historical development, such as how to understand water, manage water, use water, cherish water, and appreciate the sum of material and spirit of water. | | | | | | | |
| **Course content** | | | | | 48 hours | | |
| 1. **Introduction**    1. Culture and water culture    2. Basic structure of water culture    3. Functions and attributes of water culture    4. Principles and methods of water culture research object | | | | | 3hours | | |
| 1. **Water and society**   2.1 Water and life  2.2 Water and civilization  2.3 Water and economy  2.4 Water and politics  2.5 Water and military  2.6 Water and social life | | | | | 7 hours | | |
| **3 Water culture in material form**  3.1 Water engineering  3.2 Water landscape  3.3 Water environment  3.4 Water implement | | | | | 6 hours | | |
| **4 Water culture in institutional form**  4.1 Water resources laws and regulations  4.2 Establishment of water resources management organization  4.3 Non governmental water management organizations and regulations | | | | | 6 hours | | |
| **5 Water culture in in spiritual form**  5.1 Water and philosophy  5.2 Water and literature  5.3 Water and art  5.4 Water and faith | | | | | 6hours | | |
| **6 Water and regional culture**  6.1 The influence of water on regional culture  6.2 The influence of human intervention in water environment on regional culture  6.3 Examples of water and regional culture | | | | | 6 hours | | |
| **7 Water culture in hydraulic practice**  7.1 Integrate culture into water resources planning  7.2 Cultural design of water engineering  7.3 Construction requirements for cultural water engineering  7.4 Management of cultural water engineering | | | | | 6 hours | | |
| **8 Protection and development of water cultural heritage**  8.1 Protection and development of water cultural heritage  8.2 Status quo of water culture heritage | | | | | 4 hours | | |
| 9 **Education and dissemination of water culture**  9.1 Education and dissemination of water culture  9.2 Water culture from an international perspective | | | | | 4 hours | | |
| **Recommended / Reference Books:** | | | | | |
| 1. *General Theory of Chinese Water Culture*, editor in chief: Jin Huaiyu, publishing house: China Water and Power Press, published in June 2015, version: the first edition. 2. *Chinese Water Culture (MOOC Edition)*, chief editor: Bi Xueyan, etc., published by China Water and Power Press, published in September 2019, version: the first edition. 3. *Chinese Water Culture and Education*, edited by Cai Mei, published by China Water and Power Press in 2021, version: the first edition in August 2021. 4. *Water Engineering Culture: Creation and Development*, edited by Dong Wenhu and Liu Guanmei, The Yellow River Water Conservancy Press, published in July 2017, version: the first edition. | | | | | |
| **Teaching objectives** | | | | | |
| **1. Quality objectives**  1.1 Have a correct outlook on the world, life and values. Firmly support the leadership of the Communist Party of China, establish the common ideal of socialism with Chinese characteristics, practice the core socialist values, and have a deep sense of patriotism, national identity, and Chinese national pride; Uphold the constitution, abide by laws and disciplines; Have a sense of social responsibility and participation.  1.2 Have good professional ethics and professional quality. Being good, honest and trustworthy, loving profession and dedicated, with the craftsman spirit of excellence; Respect labor, love labor, and have strong practice ability; Have quality awareness, green environmental protection awareness, safety awareness, information literacy and innovation spirit; Have strong collective awareness and team spirit, be able to carry out effective interpersonal communication and cooperation, and live in harmony with society and nature; Have awareness of career planning.  1.3 Have good living habits, behavior habits and self-management ability. Have good language expression ability and information technology processing ability, and have certain literary and artistic aesthetic accomplishment.  1.4 Have good physical and mental quality and humanistic quality. Have a healthy body and mind, sound personality, and adapt to the hard working environment of water resources and hydropower production.  1.5 Actively practice the new era water resources spirit of “loyalty, cleanliness, responsibility, science, truth-seeking and innovation”, and have a sense of responsibility and mission to serve the water resources industry.  **2. Knowledge objectives**  2.1 Understand the basic structure, functions and attributes of water culture, as well as the principles and methods of research objects.  2.2 Master the relationship between water and civilization, economy, politics and military in society.  2.3 Master the basic knowledge of material form, institutional form, spiritual form and water culture.  2.4 Master the cultural construction of water engineering practice.  2.5 Master water cultural heritage protection and development, education and communication.  **3. Capability objectives**  3.1 Correctly classify the basic structure of water culture; Correctly explain the three functions and five attributes of water culture; Be able to correctly apply the research principles and methods of water culture.  3.2 Can correctly understand the important role of water in life; Be able to correctly understand the influence of water on agriculture and industry; Be able to correctly understand the influence of water on politics; Be able to correctly understand the application of water in social life.  3.3 Correctly understand that water engineering is an important carrier of water culture; Be able to correctly understand the establishment and development of water resources management institutions; Correctly understand that connection between water and philosophy, literature and art.  3.4 Be able to integrate regional water culture into water resources planning and inject culture into the design of water resources engineering.  3.5 Be able to correctly understand the connotation and classification of water cultural heritage; The water culture can be spread through various channels. | | | | | |

**2.11Water Resources Engineering CAD Drawing Technology**

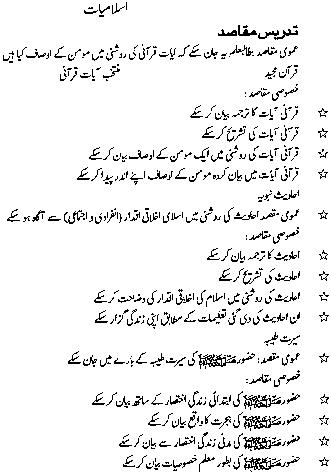
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| **Three-year Higher Vocational Water Resources and Hydropower Construction Engineering Specialty**  **The First Year**  **Water Resources Engineering CAD Drawing Technology**  **Course code: WRH 152** | | | | | | | |
| **Total learning time:** | | **96** | **T** | **P** | | **C** |
| Theory: | | 48 | **1.5** | **1.5** | | **2** |
| Practice: | | 48 |
| **Course objective:** | 1.Be able to consult and understand relevant drafting standards and requirements;  2.Be able to read engineering diagram;  3.Be able to use CAD drawing software to draw simple engineering diagram;  4.Have strong practice ability, and pass the theory or skill examination. | | | | | |
| **Course content** | | | | |  | |
| 1. **Drawing the picture frame**    1. Master the basic knowledge of CAD    2. Master the simple commands learned.    3. Complete drawing of A0-A4 drawing frame | | | | | 9 hours | |
| 1. **Drawing of water resources structure diagram**    1. Graphic editing (1)    2. Graphic editing (2)    3. Three-view drawing    4. Elevation projection diagram    5. Profileview    6. Water resources structure diagram | | | | | 18hours | |
| 1. **Drawing of hydraulic engineering diagram**    1. Understanding of aqueduct    2. Aqueduct drawing    3. Understanding of earth dam    4. Drawing of earth dam diagram    5. Drawing of building construction diagram (1)    6. Drawing of building construction diagram (2)    7. Drawing printing and output | | | | | 21hours | |
| **Recommended / Reference Books:** | | | | |  | |
| 1.*Hydraulic Engineering CAD*, edited by Zhong Juying, Liu Jianfen and Shu Jian, published by China Water and Power Press in 2022, version: 978752260307  2.*Quick Introduction to CAD Drawing of Hydraulic Engineering*, edited by Tan Rongwei, Chemical Industry Press, published in 2021, version: 9787122386908  3.*Hydraulic Engineering CAD*, edited by Yan Xiaocai, published by Huazhong University of Science and Technology Press in 2019, version: 9787560990354. | | | | |  | |
| **Teaching objectives** | | | | |  | |
| 1.A0-A4 type drawing frame can be drawn through CAD, and commands such as line, rectangle, single line text, break, extend, move, attribute, distance, etc. can be used preliminarily.  2.Draw three views, elevation projection drawing and profile drawing through CAD. Be able to skillfully use commands such as line, rectangle, text, break, extend, move, attribute and distance, and preliminarily use commands and functions such as polyline, circle, construction line, object capture, offset, mirror, cut, text format, layer and dimension.  3.When drawing hydraulic diagram through CAD, students can skillfully use the commands such as line, rectangle, text, break, extend, move, attribute, distance, basically use the commands and functions such as polyline, circle, construction line, object capture, offset, mirror, cut, text format, layer, dimension, and preliminarily use region, hatch, spline, decomposition, attribute modification, scaling, and drawing installation. | | | | |  | |
| **Practice list** | | | | | **hours** | |
| 1. Basic knowledge of CAD practice 2. Simple command practice 3. A0-A4 frame drawing 4. Graphic editing practice 5. Three view drawing 6. Elevation projection drawing 7. Profile drawing 8. Drawing of hydraulic engineering structure drawing 9. Drawing of aqueduct 10. Earth rock dam drawing 11. Building drawing 12. Drawing printing and output practice | | | | | 3 hours  3 hours  3 hours  6 hours  3 hours  3 hours  3 hours  3 hours  6 hours  6 hours  6 hours  3 hours | |

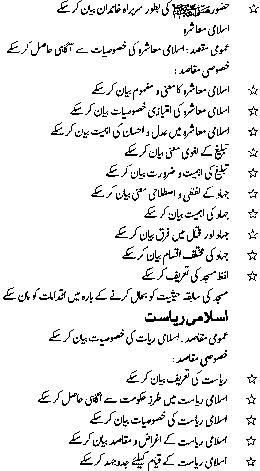
**3.Curriculum Standards for Year 2**

**3.1 Islamiat and Pakistan Studies**

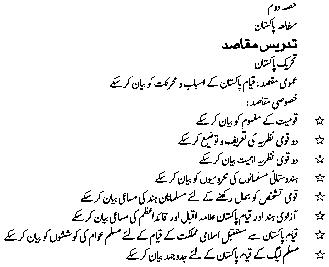
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| **Three-year Higher Vocational Water Resources and Hydropower Construction Engineering Specialty**  **The Second Year**  **Islamiat and Pakistan Studies**  **Course code: Gen 211** |



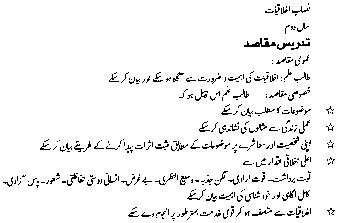












**3.2Applied Mathematics II**

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| **Three-year Higher Vocational Water Resources and Hydropower Construction Engineering Specialty**  **The Second Year** |
| **Applied Mathematics**  **Course code: Math 212** |

**Total learning time** 64 T P C

Theory 64 2 0 2

Practice 0

**Prerequisite: Mathematics I must be completed.**

objective Students will be able to:

1.Solve problems in calculus and analytical geometry.

2.Cultivate mathematical skills, attitudes and logical perception when using mathematical instruments.

3.The principle of calculus is applied to calculate the velocity measurement, velocity, acceleration, maximum value and minimum value.

4.Use the principle of integral calculus to calculate the area and volume.

5.Skillfully solve technical problems with mathematical clarity and insight.

**Course content**

**1.Function 4 hours**

1.1Constant and variable quantity

1.2Function and classification

1.3Concept of restriction

1.4Limit of function

1.5Basic theorem of limit

1.6Some important limitations

1.7 Question

**2.Differentiation 4 hours**

2.1Increment

2.2Difference coefficient or derivative

2.3Distinction made from the outset or according to first principles

2.4Geometric interpretation of difference coefficients

2.5Difference coefficient of Xn in (ax + b) n

2.6Three important rules

2.7 Question

**3.Differentiation of algebraic functions 4 hours**

3.1Explicit function

3.2Important function

3.3Parameter form

3.4 Question

**4.Differentiation of trigonometric functions 6 hours**

4.1From the first principle, the difference coefficients of Sin x, Cos x, Tan x

4.2 Difference coefficients of Cosec x, Sec x, Cot x

4.3Difference of inverse trigonometric function

4.4 Question

**5.Differentiation of logarithmic and exponential functions 4 hours**

5.1 Logarithm of ln x

5.2Logarithm of log ax

5.3Logarithm of ax

5.4Logarithm of ex

5.5 Question

**6.Rate of change of variables 4 hours**

6.1Increasing function and decreasing function

6.2Maximum and minimum values

6.3Criteria for maximum and minimum values

6.4Methods for finding maximum and minimum values

6.5 Question

**7.Integration 8 hours**

7.1Concept

7.2Basic formula

7.3Important rules

7.4 Question

**8.Integration approach 6 hours**

8.1 Integration through substitution

8.2Integration by component

8.3 Question

**9.Defined integration 6 hours**

9.1Attribute

9.2Applicable to region

9.3 Question

**10.Plane analytic geometry and lines 6 hours**

10.1Coordinate system

10.2Difference formula

10.3Ratio formula

10.4Inclination and slope of straight line

10.5Slope formula

10.6 Question

**11.Linear equation 6 hours**

11.1Some important tables

11.2General form

11.3Angle formula

11.4Parallel and vertical

11.5 Question

**12.Equation of circle 8 hours**

12.1Standard form of equation

12.2Intermediate form of equation

12.3General form of equation

12.4Radius and center coordinates

12.5 Question

**Reference books**

*Applied Mathematics*-212 by Sana-ullah Khan, Syed Tanvir Haider, Zaif-ullah Khan Vol - I, National Book Foundation

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| **Teaching objectives**  **1.Using the concept of function and its limit to solve simple problems.**  1.1Define functions.  1.2List all types of functions.  1.3Explain the concept of quadrants and quadrants of functions.  1.4Explain the basic theorem about quadrants.  1.5Analyze some important quadrants.  1.6Solve quadrant problems.  **2.Understanding the concept of difference coefficient**  2.1The mathematical expression of differential coefficients.  2.2Explain the geometric interpretation of differential coefficients.  2.3Distinguish between a constant, a constant associated with a variable, and the sum of a finite number of functions.  2.4Solve relevant problems.  **3.Using differential rules to solve algebraic function problems.**  3.1Decompose xn and (ax+b)n.  3.2Derivatives, quotients and chain rules.  3.3Find the derivatives of implicit and explicit functions.  3.4Distinguish parameterized form, function w.r.t another function and rationalize it.  3.5Use these formulas to solve the problem.  **4.Using differential rules to solve problems involving trigonometric functions.**  4.1Be different from the first principle sin x, cos x, tan x.  4.2Derived formulas of sec x, cosec x, cot x.  4.3Find the differential coefficient of the inverse trigonometric function.  **5.Using differential rules to solve logarithmic and exponential functions.**  5.1The cause of differential coefficient between logarithmic function and exponential function.  5.2Use these formulas to solve the problem.  **6.Understanding the rate of change of one variable relative to another.**  6.1Deviation formula of linear velocity, acceleration and slope.  6.2Define increasing and decreasing functions, maximum and minimum values, and turning points.  6.3Explain criteria for the maximum and minimum values of a function.  6.4Solve problems involving variable change rate.  **7.Using the integration concept to solve relevant problems.**  7.1Explain the concept of integration.  7.2State the basic theorem of integral.  7.3List some important integration rules.  7.4The basic formula of integral.  7.5Solve integration problems based on these rules / formulas.  **8.Understanding different integration methods**  8.1List the integration standard formulas.  8.2Integrate functions through substitution methods.  8.3Find the integral through the method of part integral.  8.4Use these methods to solve the problem.  **9.Understanding how to solve definite integral.**  9.1Define definite integral.  9.2List the properties of definite integral.  9.3Use definite integral to find the area under the curve.  9.4Solve the problem of definite integral.  **10.Understanding the concept of plane analytic geometry.**  10.1Explain the rectangular coordinate system.  10.2Locate points in different quadrants.  10.3Distance formula.  10.4Prove some formulas.  10.5Slope formula  10.6Use these formulas to solve the problem.  **11.Using the linear equation to solve the problem.**  11.1Define a line.  11.2Write the general form of the linear equation.  11.3Intercept of slope and intercept form of linear equation.  11.4A straight line representation of the angle between two lines.  11.5Inequality conditions for perpendicularity and parallelism of two straight lines.  11.6Solve problems involving these equations / formulas.  **12.Using circular equation to solve technical problems.**  12.1Define a circle.  12.2Describe circular equation in standard, central, and general forms.  12.3Transform circular equation from general form into central form.  12.4A formula derived from the general form of the radius and coordinates of a circle.  12.5An inequality in which a circle passes through three given points.  12.6Solve problems involving these equations. |  |

**3.3Understanding China**

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| **Three-year Higher Vocational Water Resources and Hydropower Construction Engineering Specialty**  **The Second Year**  **Understanding China**  **Course code: MgmC 212**  **Total learning time 64**  Theory 64 T P C  Practice 0 2 0 2  **Course objective:** Through this lesson study, foreign students can have a basic understanding of China’s humanities and social development, help them better adapt to their study life in China, and cultivate students’ in-depth understanding of China, their interest in studying China, and their feelings of knowing China, befriending China and loving China.  **Course content**  **1.Geography of China 6 hours**   1. Looking at China from the world 2. China’s natural environment 3. Mountains and riversI 4. Mountains and rivers II 5. Famous cities in China - Beijing 6. Famous cities in China - Shanghai 7. Famous cities in China - Hong Kong 8. A journey to nature - Wuyue, Zhangjiajie, Jiuzhaigou 9. A journey to nature - Tibet 10. A journey to nature - Xinjiang 11. A journey to cultural   **2.History 6 hours**  2.1Chinese ancestors  2.2First Emperor of Qin  2.3Emperor Wudi of Han Dynasty  2.4Silk Road of the Western Han Dynasty  2.5Tang Dynasty and prosperous times  2.6Qingming Festival Shengjiang  2.7Genghis Khan and Kublai Khan  2.8Taizu of Ming Dynasty  2.9Seven voyages  2.10The prosperous course of Kangxi and Qianlong  2.11Opium War  2.12Sun Yat Sen and the Kuomintang  2.13The Communist Party of China  2.14 September 18 Incident  2.15Mao Zedong and the establishment of new China  2.16New China diplomacy  2.17Deng Xiaoping and China’s reform and opening up  2.18Enter a new era  **3.Philosophy 6 hours**  3.1Confucius - a key figure in Confucianism  3.2Mencius - a key figure in Confucianism  3.3Core doctrine of Confucianism - Etiquette (Li)  3.4Core doctrine of Confucianism - Benevolence and benevolent rule  3.5Core doctrine of Confucianism - Exploration of things with extended knowledge  3.6Zhouyi, Yin and Yang and the Five Elements  3.7Taoism - Lao Tzu  3.8Taoism - Chuang Tzu  3.9Other schools of military thought  3.10Other schools of legal thought  **4.Religion 2 hours**  4.1Indigenous beliefs and religions in China  4.2Taoism  4.3Buddhism was introduced into China  4.4Buddhist doctrines, Chan sect (Zen) in Buddhist schools and Buddhist attractions.  4.5Other non indigenous religions and the status quo of Chinese religions  **5.China’s political system 2 hours**  5.1National flag, national emblem and national anthem  5.2Administrative regionalization of China  5.3National institutions I  5.4National institutions II  5.5Political party I  5.6Political party II  5.7Foreign policy of the People’s Republic of China  **6.Literature and art 6 hours**  6.1Different stages and schools of Chinese Literature  6.2Ancient Chinese Literature - Pre Qin literature  6.3Ancient Chinese Literature - Tang Poetry  6.4Ancient Chinese Literature - Song Poetry  6.5Ancient Chinese Literature - Four Classical Novels  6.6Modern and contemporary literature I  6.7 Modern and contemporary literatureII  6.8Chinese opera I  6.9Chinese opera II  6.10Chinese opera III  6.11Concept of Chinese traditional music  6.12Chinese traditional musical instruments and classical works  6.13Colorful modern music  **7.Chinese and Chinese characters 2 hours**  7.1Mandarin and dialects  7.2Ancient and modern Chinese  7.3Common saying  7.4Interesting origin of Chinese characters & development of Chinese characters  7.5Six categories of Chinese characters  7.6Traditional and simplified Chinese  **8.Painting and calligraphy 6 hours**  8.1What is calligraphy?  8.2Evolution of Chinese Calligraphy - oracle bone inscriptions and bronze inscriptions.  8.3Evolution of Chinese Calligraphy - small seal and calligraphy  8.4Evolution of Chinese Calligraphy - conventional writing  8.5Evolution of Chinese Calligraphy - cursive script  8.6Evolution of Chinese Calligraphy - handwritten calligraphy  8.7Beauty of calligraphy  8.8The four treasures of research  8.9The relationship between calligraphy and other arts  8.10Basic knowledge of Chinese painting  8.11Artistic features of Chinese painting  8.12Three themes and representative works of Chinese painting  **9.Economics 2 hours**  9.1Chinese agriculture  9.2Chinese industry  9.3China’s tertiary industry  9.4The new normal of China’s economy  9.5Digital Economy 2.0  9.6 The Belt and Road Initiative  **10.Science and technology 4 hours**  10.1The Four Ancient Chinese Inventions  10.2Bronze work  10.3Chang’s seismograph  10.4Pottery and porcelain  10.5Hybrid rice  10.6Eye of China’s Sky  10.7China high - speed rail  10.8Jiaolong’s deep sea adventure  10.9 “Shenwei - Light of Taihu Lake” supercomputer  10.10Aerospace science and technology  10.11Internet payment  **11.Education 2 hours**  11.1Imperial examination system  11.2Chinese colleges and universities  11.3Chinese examination  11.4Chinese international education  **12.Medical care 4 hours**  12.1Chinese medical system  12.2Traditional Chinese Medicine  12.3Development of Traditional Chinese Medicine  12.4The core concept of Traditional Chinese Medicine  12.5Acupuncture and massage  12.6 Traditional Chinese Medicine and life I  12.7 Traditional Chinese Medicine and life II  12.8Understanding Traditional Chinese Medicine  12.9Mystery of Traditional Chinese Medicine  12.10Traditional Chinese Medicine in the world  **13.Sports and martial arts 2 hours**  13.1Chinese traditional sport - kite  13.2The myth of Houyi shooting the sun  13.3Chinese women and the Olympic Games  13.4Tai chi  13.5Martial arts movie  13.6Martial arts elements and martial arts spirit in martial arts movies  13.7Cultural connotation of Chinese martial arts  **14.Traditional festivals and Chinese cuisine 2 hours**  14.1Chinese traditional festivals  14.2Chinese traditional festivals - Spring Festival and Lantern Festival  14.3Chinese traditional festivals - Dragon Boat Festival and Mid-Autumn Festival  14.4Chinese cuisine  **15.Material cultural heritage 6 hours**  15.1Human civilization: Peking Man  15.2Grottoes: Mogao Grottoes in Dunhuang  15.3Magic projects: Dujiang Dam  15.4Imperial mausoleums: Ming Xiao Mausoleum and Ming Dynasty Mausoleum  15.5The largest ceremonial bronze ware: Simuwu Tripod  15.6Musical instruments in Warring States Period: Chime Bells by Marquis Yi of Zeng  15.7Ancient Chinese architectures  15.8Types of ancient Chinese architecture  15.9Royal architecture: Beijing old imperial palace  15.10Ancient folk house: Quadrangles  15.11Chinese ancient gardens  **16.Intangible cultural heritage 6 hours**  16.1Chinese Intangible Cultural Heritage  16.2Intangible Cultural Heritage Projects - Epic of King Gesar  16.3Intangible Cultural Heritage Projects - Guqin  16.4Intangible Cultural Heritage Projects - Dance of Chinese Korean Farmers  16.5 Intangible Cultural Heritage Projects - shadow play  16.6 Intangible Cultural Heritage Projects - Shaoxing opera  16.7 Intangible Cultural Heritage Projects - Seal carving  16.8 Intangible Cultural Heritage Projects - Nanjing Brocade  16.9 Intangible Cultural Heritage Projects - 24 solar terms  16.10 Intangible Cultural Heritage Projects -crosstalk  16.11 Intangible Cultural Heritage Projects - Art acrobatics  16.12Chinese Intangible Cultural Heritage Protection  **Recommended/Reference Books:**  1.Understanding China( Digital and Paper format), edited by Cheng Aimin, jointly developed by Peking University、Beijing Normal University、Zhejiang University、Tianjin University、Harbin Institute of Technology、Xi’an Jiaotong University、Wuhan University、Chongqing University、Shanghai International Studies University、Dalian Medical University、South China Normal University、Jiangsu Normal University and Tang International Education Group, published by Shanghai Foreign Language Education Press, recommended by China Association for International Education (CAFSA)  **Teaching objectives:**  1.Quality objective: Cultivate students’ interest in understanding and learning about China, and their feelings of knowing China, being friendly to China and loving China.  2.Knowledge objective: Through the systematic teaching of this lesson, students can have a comprehensive understanding of China from the aspects of geography, history, philosophy, religion, culture and art.  3.Ability objective: Through the study of this lesson, students can tell stories about Chinese culture to their own people or overseas students from other countries. |  |

**3.4Chinese II**

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| **Three-year Higher Vocational Water Resources and Hydropower Construction Engineering Specialty**  **The Second Year**  **Chinese II** |

**Course code: GenC 212**

**Total learning time 288**

Theory 96 T P C

Practice 192 3 6 5

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| **Course objective:** Cultivate the basic Chinese language ability of overseas students in China, and they can pass the HSK3 exam through this vocabulary. |
| **Course content**   |  |  |  | | --- | --- | --- | | Learning situation | Learning content (specific work tasks) | Class hours | | Lesson 1 Pick up international students at the airport | This lesson introduces grammar knowledge such as “flexible use of interrogative pronouns” and “basic forms of disjunctive words”, and requires students to correctly use sequential words in expression and understand the contextual meaning of some special words. | 6 hours | | Lesson 2 What would you like to drink? | Introduce the form of rhetorical question “can...” and the related word “not only...but also…” to express your needs correctly in communication. | 6 hours | | Lesson 3  I’m kidding you | This lesson will explain the fixed structure “more and more”, “more A and more B”, and learn how to praise in Chinese and how to respond to others’ praise. | 6 hours | | Lesson 4  I like winter best | Through the description of weather, learn the usage of adverbs “often” and “always” that express frequency, and be able to compare and describe similar phenomena. | 6 hours | | Lesson 5  I have a cold | This lesson is to learn the basic usage of “Ba” sentence, understand the expressions related to illness and seeing a doctor, and learn the language communication in the hospital scene. | 6 hours | | Lesson 6 You are such a careless man. | Learn and summarize the usage of simple directional complements “V comes” and “V goes”, and master the basic expressions of request and evaluation functions in daily communication. | 6 hours | | Lesson 7 British black tea is healthy and delicious. | Learn how to express approximate numbers in Chinese, how to persuade others, and how to express your basic attitude. | 6 hours | | Lesson 8 I’m not a shopaholic | This lesson is related to online shopping. Learn the expression “A is A, that is” and learn how to express your opinions from different angles. | 6 hours | | Lesson 9 Why did grandparents move? | This lesson introduces a new life event related to “moving”, through which we can learn the expression of conditional relations and the extended meaning of directional complements. | 6 hours | | Lesson 10 Eat hotpot for the first time. | This lesson introduces the way of having dinner in China and some basic information of Chinese restaurants through “Hot Pot” to help learners get a preliminary understanding of Chinese catering customs. | 6 hours | | Lesson 11 Teacher Wang is going to change the house. | This lesson is related to “living” in “food, clothing, housing and transportation”. While learning the story, students should learn some language knowledge such as hypothetical relations and the overlapping of disyllabic verbs. | 6 hours | | Lesson 12 Single Li Wenchao | Introduce emotional problems, learn about young people’s concept of marriage and love, and learn how to compare in Chinese. | 6 hours | | Lesson 13 This is her new home. | This lesson introduces the current living conditions of young people, understands how to describe the living environment, and learns the Chinese expressions of concepts such as orientation and existence. | 6 hours | | Lesson 14 Allen’s Weekend | Introduce school life, understand the sentence structure of complete negation, and summarize the usage of three auxiliary words “De”, “Di” and “De”. | 6 hours | | Lesson 15 Fall in love with square dance | Through the introduction of the current living conditions of the elderly in China, learn Chinese comparative structures, enumeration relations, and various usages of complements. | 6 hours | | Lesson 16 Try English afternoon tea. | This lesson introduces grammar knowledge such as “Bei” sentence and “adjective reduplication”. Through the study of this lesson, we can learn about restaurant ordering and the dining habits of national dishes. | 6 hours | |
| **Recommended/Reference Books:** |
| 1. *Tang Chinese Course 3* 2. *HSK Standard Course*, edited by Jiang Liping, Beijing Language and Culture University Press, ISBN978-7-5619-3809-9. 3. *HSK Test Syllabus*, compiled by the Office of Chinese Language Council International, People’s Education Press, ISBN978-7-107-30419-4. 4. *International Curriculum for Chinese Language Education*, compiled by the Office of Chinese Language Council International, ISBN978-7-5600-7401-6. |
| **Teaching objective** |
| 1.Quality objective: To cultivate students’ knowledge of Chinese culture, cultivate their interest in understanding and recognizing China, promote the friendship of overseas students in China, and be active communicators of Chinese culture.  2.Knowledge objective: Students can master basic Chinese knowledge such as character, words, phrases, sentences, paragraphs and discourses, and deepen their understanding of Chinese history and geography.  3.Ability objective: Through the study of this lesson, learners can acquire the learning and training of listening, speaking, reading, writing and translation skills. |
| **Practice list** |
| |  |  |  | | --- | --- | --- | | Serial number | Learning situation | Class hours | | 1 | Pick up international students at the airport | 12 hours | | 2 | What would you like to drink? | 12 hours | | 3 | I’m kidding you. | 12 hours | | 4 | I like winter best. | 12 hours | | 5 | I’ve a cold. | 12 hours | | 6 | You are such a careless man. | 12 hours | | 7 | British black tea is healthy and delicious. | 12 hours | | 8 | I’m not a shopaholic. | 12 hours | | 9 | Why did grandparents move? | 12 hours | | 10 | Eat hotpot for the first time. | 12 hours | | 11 | Teacher Wang is going to change the house. | 12 hours | | 12 | Single Li Wenchao | 12 hours | | 13 | This is her new home. | 12 hours | | 14 | Allen’s Weekend | 12 hours | | 15 | Fall in love with square dance | 12 hours | | 16 | Try English afternoon tea. | 12 hours | |

**3.5Engineering Hydrology and Water Resources Calculation**

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| **Three-year Higher Vocational Water Resources and Hydropower Construction Engineering Specialty**  **The Second Year**  **Engineering Hydrology and Water Resources Calculation**  **Course code: WRH 212** | | | | | |
| **Total learning time:** | **96** | **T** | **P** | | **C** |
| Theory: | 48 | **1.5** | **1.5** | | **2** |
| Practice: | 48 |
| **Course objective:** | Through the study of Engineering Hydrology and Water Resources Calculation, the hydrological characteristic values required in planning and design, engineering construction, management and operation of water resources and hydropower projects and the calculation methods of reservoir profit regulation and flood control regulation are solved. | | |  | |
| **Course content** | | | |  | |
| **Task 1: General situation of water resources and basic concepts of hydrology**  1.The meaning and characteristics of water resources;  2.Hydrological phenomena and research methods  3.This currency mainly focuses on tasks;  4.Principle of water balance. | | | | 4 hours | |
| **Task 2 Runoff formation**  1.Knowledge of rivers and watersheds;  2.The method of measuring rainfall;  3.Evaporation and infiltration;  4.The formation process of runoff;  5.Representation method and measurement unit of runoff | | | | 4 hours | |
| **Task 3 Hydrological information collection and processing**  1.Hydrological station and station network  2.Precipitation observation  3.Evaporation observation  4.Water level observation  5.Flow measurement | | | | 6 hours | |
| **Task 4 Hydrological statistics**  1.Basic concepts of probability, frequency and return period;  2.Random variables and frequency distribution  3.Frequency calculation  4.Correlation analysis | | | | 6 hours | |
| **Task 5 Annual runoff analysis and calculation**  1.The annual runoff and the factors affecting the annual runoff, and the objective and task of designing the annual runoff analysis and calculation;  2.Analysis and calculation of design annual runoff with long-term measured runoff data;  3.Analysis and calculation of design annual runoff with short-term measured runoff data;  4.Calculation of design annual runoff in the absence of measured runoff data. | | | | 10 hours | |
| **Task 6 Flood analysis and calculation**  1.Design standards for flood and flood control;  2.Calculation of design flood from discharge data;  3.Calculation of design flood from rainstorm data;  4.Calculation of design flood in small watershed. | | | | 10hours | |
| **Task 7 Reservoir characteristics**  1.Basic characteristics of reservoir;  2.Water loss of reservoir;  3.Determination of dead water level of reservoir;  4.Calculation of reservoir runoff regulation;  5.Calculation of reservoir profit regulation. | | | | 8hours | |
| **Recommended/Reference Books:** | | | |  | |
| 1.*Fundamentals of Engineering Hydrology*, edited by Geng Hongjiang, China Water and Power Press, published in August 2010.  2.*Regulation for Calculating Design Flood of Water Resources and Hydropower Projects* (SL44-2006).  3.*Regulation for Water Conservancy Computation of Water Projects* (SL104-2015). | | | |  | |
| **Teaching objective** | | | |  | |
| Task 1  1.1Master the meaning and characteristics of water resources;  1.2Be able to apply the principle of water balance;  1.3Be able to identify topographic maps and divide watersheds;  Task 2  2.1Be able to divide the rainfall intensity level;  2.2Be able to draw rainfall intensity process line and cumulative rainfall curve;  2.3Be able to calculate the average surface rainfall in the basin;  2.4Master the classification of evaporation;  2.5Master the three stages of infiltration;  2.6Calculate energy flow, total runoff, runoff modulus and runoff coefficient. | | | |  | |
| Task 3  3.1 Be able to conduct precipitation observation;  3.2 Be able to conduct evaporation observation;  3.3 Be able to conduct water level observation;  3.4 Be able to conduct flow measurement. | | | |  | |
| Task 4  4.1Master the basic concepts of probability, frequency and recurrence period; Be able to calculate random variables and frequency distribution;  4.2Master the method of drawing experience frequency curve and theory frequency curve; | | | |  | |
| Task 5  5.1Master the objective and task of design annual runoff analysis and calculation;  5.2Be able to calculate the design annual runoff when there is long-term measured runoff data;  5.3Master the calculation of design annual runoff with short-term measured data and without measured data; | | | |  | |
| Task 6  6.1Master the calculation method of design flood and small watershed design flood from discharge data and rainstorm data.  6.2Master reservoir characteristics and classification of reservoir runoff regulation. | | | |  | |
| Task 7  7.1Understand the classification of reservoir runoff regulation, and master the characteristic water level and storage capacity of reservoirs;  7.2Master the drawing of reservoir characteristic curve;  7.3Master the determination of reservoir dead water level.  7.4Master the calculation of reservoir water loss. | | | |  | |
| **Practice module**  1.Be able to observe precipitation and sort out data;  2.Be able to perform evaporation observation;  3.Be able to perform water level observation;  4.Be able to measure the flow;  5.Be able to calculate the design annual runoff;  6.Be able to calculate the design flood;  7.Master the calculation method of reservoir profit regulation;  8.Master the calculation method of reservoir flood control regulation. | | | |  | |
| **Practice list** | | | | **Hours** | |
| 1. Precipitation observation  2. Evaporation observation  3. Water level observation | | | | 2 hours  4 hours  2 hours  4 hours  4 hours  4 hours  4 hours  4 hours  4 hours  4 hours  4 hours  4 hours  4 hours | |
| 4. Flow measurement | | | |
| 5. Analyze relevant practice training | | | |
| 6. Calculation of design annual runoff with long-term measured runoff data | | | |
| 7. Calculation of design annual runoff with short-term measured runoff data | | | |
| 8. Calculation of design annual runoff in the absence of measured data | | | |
| 9. Calculation of design flood from discharge data | | | |
| 10. Calculation of design flood from rainstorm data | | | |
| 11. Calculation of design flood of small watershed | | | |
| 12. Calculation of profit-making regulation of reservoir | | | |
| 13. Calculation of flood control regulation of reservoir | | | |
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**3.6Hydraulic Analysis and Calculation**

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| **Three-year Higher Vocational Water Resources and Hydropower Construction Engineering Specialty**  **The Second Year**  **Hydraulic Analysis and Calculation**  **Course code: WRH 223** | | | | | | |
| **Total learning time:** | | **112** | **T** | **P** | | **C** |
| Theory: | | 64 | **2** | **1.5** | | **2.5** |
| Practice: | | 48 |
| **Course objective:** | By studying the laws of liquid equilibrium and movement, and applying these laws to solve the common problems of hydraulic analysis and calculation in hydraulic engineering. | | | |  | |
| **Course content** | | | | |  | |
| **1 Analysis and calculation of hydrostatic pressure**  1.1 Overview of hydraulics  1.2 Basic characteristics and main physical and mechanical properties of liquid  1.3 Concept and basic characteristics of hydrostatic pressure  1.4 Basic law of hydrostatic pressure  1.5 Unit and measurement of hydrostatic pressure  1.6 Experiment 1: Hydrostatic pressure measurement practice | | | | | 10 hours | |
| **2 Analysis and calculation of hydrostatic pressure**  2.1 Drawing of hydrostatic pressure distribution map;  2.2Calculation of total pressure of plane wall hydrostatic:  2.3 Calculation of total hydrostatic pressure on curved wall. | | | | | 10 hours | |
| **3 Hydraulic analysis and calculation of pipe network**  3.1 The basic concept of water flow;  3.2 Continuity equation;  3.3 Energy equation;  3.4 Momentum equation.  3.5 The source and classification of head loss;  3.6 Head loss along the way;  3.7 Local head loss;  3.8 Experiment 2: Reynolds experiment practice.  3.9 Hydraulic calculation of short pipe;  3.10 Hydraulic calculation of long pipe. | | | | | 24 hours | |
| **4 Hydraulic analysis and calculation of open channel**  4.1 The concept of open channel flow;  4.2 Calculation of constant uniform flow in open channel.  4.3 Analysis of steady non-uniform flow in open channel. | | | | | 12 hours | |
| **5 Hydraulic analysis and calculation of sluice and weir**  5.1 Design and calculation of sluice outlet and weir flow  5.2 Connection and energy dissipation of water flow downstream of hydraulic structures | | | | | 8 hours | |
| **Recommended/Reference Books** | | | | |  | |
| 1.*Hydraulic Analysis and Calculation*, edited by Liu Chengxun, China Water and Power Press, published in July 2019, version: the second printing in January 2020.  2.*Hydraulics (3rd Edition)*, edited by Zhao Zhenxing, He Jianjing, Wang Cun, Tsinghua University Publishing House, published in April 2021.  3.*Hydraulic Analysis and Calculation*, edited by Xing Juxiang, The Yellow River Water Conservancy Press, published in July 2018, the first edition.  4.*Practice Guide of Hydraulics*, edited by Pan Huanying, Wan Junwei and Hu Yanfen, China University of Geosciences Press, published in January 2013. | | | | | | |
| **Teaching objective** | |  | | | | |
| **1 Mastering the knowledge of hydrostatic pressure and its application.**  1.1Be able to retell the basic characteristics of liquid;  1.2Be familiar with the main physical and mechanical properties of liquid and be able to make corresponding calculations;  1.3Master the calculation method of hydrostatic pressure and its application;  1.4Practice the hydrostatic pressure measurement experiment and get the experimental conclusion. | | | | | | |
| 2 **Mastering the relevant knowledge of hydrostatic pressure and its application.**  2.1Be able to draw the hydrostatic pressure distribution map;  2.2Be able to draw pressure volume map;  2.3Be able to calculate the total hydrostatic pressure on the plane wall by graphic method and analytical method, and master its application in engineering;  2.4Master the calculation of total hydrostatic pressure on curved wall and its application in engineering. | | | | | | |
| 3 **Mastering the relevant knowledge of pipe network and its application.**  3.1Retell two methods of the movement of water flow;  3.2Master the calculation of continuity equation, energy equation and momentum equation of constant total flow and their application in engineering;  3.3Master the law of head loss and its calculation method;  3.4Master the hydraulic calculation of pressure pipe flow;  3.5Be able to correctly carry out the Reynolds experiment operation and get the experimental conclusion. | | | | | | |
| **4 Mastering the basic knowledge and calculation method of hydraulic calculation of open channel flow;**  4.1Be able to retell the concept of open channel flow;  4.2Understand the characteristics and conditions of uniform flow in open channel;  4.3Master the hydraulic calculation of constant uniform flow in open channel and its engineering application;  4.4Understand the discrimination methods of three flow patterns of constant and non-uniform flow in open channel. | | | | | | |
| **5 Understanding the basic knowledge and calculation method of hydraulic calculation of sluice and weir.**  5.1Analyze the outflow phenomenon of energy sluice and weir;  5.2Be able to design and calculate the connection and energy dissipation according to the downstream forms of different hydraulic structures. | | | | | | |
| **Practice list** | | | | | **Hours** | |
| 1.Calculation of main physical and mechanical properties of liquid | | | | | 3 hours | |
| 2.Calculation method of hydrostatic pressure and its application | | | | | 3 hours | |
| 3.Experiment 1: Hydrostatic pressure measurement practice | | | | | 3 hours | |
| 4.Drawing of hydrostatic pressure distribution map | | | | | 2 hours | |
| 5.Calculation of total pressure of plane static water | | | | | 3 hours | |
| 6.Calculation of pressure of curved static water | | | | | 2 hours | |
| 7.Application of continuity equation | | | | | 2 hours | |
| 8.Application of energy equation | | | | | 3 hours | |
| 9.Momentum equation | | | | | 3 hours | |
| 10.Calculation of head loss along the way | | | | | 3 hours | |
| 11.Calculation of local head loss | | | | | 3 hours | |
| 12.Experiment 2: Reynolds experiment practice | | | | | 2 hours | |
| 13.Hydraulic calculation of short pipe | | | | | 3 hours | |
| 14.Hydraulic calculation of long pipe | | | | | 2 hours | |
| 15.Calculation of constant uniform flow in open channel | | | | | 3 hours | |
| 16.Analysis of constant non-uniform flow in open channel | | | | | 2 hours | |
| 17.Calculation of sluice and weir outflow | | | | | 3 hours | |
| 18.Calculation of flow connection and energy dissipation in downstream of hydraulic structures | | | | | 3 hours | |

**3.7Water-saving Technology**

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| **Three-year Higher Vocational Water Resources and Hydropower Construction Engineering Specialty**  **The Second Year**  **Water-saving Technology**  **Course code: WRH 232** | | | | | | | |
| **Total learning time:** | | **96** | **T** | **P** | | **C** |
| Theory: | | 48 | **1.5** | **1.5** | | **2** |
| Practice: | | 48 |
| **Course objective:** | Learn various water-saving irrigation engineering technologies and master the planning and design of water-saving irrigation engineerings. | | | | | | |
| **Course content** | | | | |  | | |
| 1. **Introduction**    1. Meaning and technical system of water-saving irrigation    2. Significance of water-saving irrigation    3. Problems in the development of water-saving irrigation    4. Objective and task of water-saving irrigation development in China | | | | | 4 hours | | |
| 1. **Sprinkler irrigation technology**    1. Characteristics of sprinkler irrigation    2. Composition and classification of sprinkler irrigation system    3. Main equipment of sprinkler irrigation    4. Composition and classification of sprinkler irrigation system    5. Planning and design of sprinkler irrigation engineering    6. Example of sprinkler irrigation engineering planning and design | | | | | 8 hours | | |
| 1. **Micro irrigation technology**    1. The concept of micro irrigation.    2. Types and characteristics of micro irrigation system    3. Composition of micro irrigation system    4. Main equipment of micro irrigation system    5. Planning and design of micro irrigation engineering    6. Example of sprinkler irrigation engineering planning and design | | | | | 8 hours | | |
| 1. **Low-pressure pipeline irrigation technology**    1. The concept of pipeline irrigation    2. Characteristics of pipeline irrigation    3. Composition of pipeline water conveyance system    4. Types of pipeline water conveyance system    5. Main equipment of low-pressure pipeline irrigation system    6. Planning and design of low-pressure pipeline irrigation engineering    7. Planning and design example of low-pressure pipeline irrigation engineering | | | | | 8 hours | | |
| 1. **Construction and operation management of pipeline engineering**     1. Engineering construction preparation and management    2. Construction lofting and pipe groove excavation    3. Piping erection    4. Water pressure and water seepage experiment of pipeline    5. Pipe trench backfilling and engineering acceptance    6. Operation management of pipeline irrigation engineering | | | | | 8 hours | | |
| 1. **Canal lining and seepage control**    1. Types and characteristics of canal seepage control engineering    2. Planning and design of canal seepage control engineering    3. Anti-frost heave measures of canal seepage control engineering | | | | | 6 hours | | |
| 1. **Surface irrigation water-saving technology**    1. Basic concept    2. Irrigation quality evaluation    3. Surface irrigation design    4. Brief introduction of surge irrigation technology    5. Brief introduction of film mulching irrigation technology | | | | | 6 hours | | |
| **Recommended/Reference Books:** | | | | |  | | |
| 1. Li Zongyao et al., *Water-saving Irrigation Technology*, Beijing: China Water and Power Press, 2018. 2. Xu Wenjing, Wang Xiangxiang, Shi Liulin, et al. Research on the Present Situation and Development Trend of Water-Saving Irrigation Technology in China. *Chinese Agricultural Science Bulletin*, 2016, 32(11):184-187. 3. Li Longchang, Wang Yanjun, Li Yongshun, et al. *Pipeline Water Delivery Engineering Technology*. Beijing: China Water and Power Press, 1998. 4. Guo Xuxin, Fan Huifang, Yao Yongzai. *Irrigation and Drainage Engineering Technology*. Zhengzhou: The Yellow River Water Conservancy Press, 2016. 5. Luo Jinyao. *Theory and Technology of Water-saving Irrigation (2nd Edition)*. Wuhan: Wuhan University Press, 2003. | | | | |  | | |
| **Teaching objective** | | | | |  | | |
| 1. **Overview of water-saving irrigation**    1. Explain the basic meaning of water-saving irrigation technology.    2. List the technical system of water-saving irrigation    3. Status quo and problems of water-saving irrigation development    4. Objective and significance of learning the water-saving irrigation technology course. 2. **Sprinkler irrigation technology**    1. Describe the characteristics of sprinkler irrigation system.    2. Introduce the composition and classification of sprinkler irrigation system.    3. List technical parameters related to sprinkler irrigation system and explain the meaning of each parameter.    4. Introduce the main equipment of sprinkler irrigation system and the selection principle of equipment.    5. Explain the principles of sprinkler irrigation design and planning.    6. Analysis and calculation of sprinkler irrigation design planning content    7. Selection of sprinkler irrigation system according to different water-saving irrigation areas 3. **Micro irrigation technology**    1. State the concept of micro irrigation system.    2. Describe the characteristics of micro irrigation system.    3. Introduce the composition and classification of micro irrigation system.    4. List technical parameters related to micro irrigation system and explain the meaning of each parameter.    5. Introduce the main equipment of sprinkler irrigation system and the selection principle of equipment.    6. Explain the principles of sprinkler irrigation design and planning.    7. Analysis and calculation of micro irrigation design planning content    8. Select the micro irrigation system according to different water-saving irrigation areas. 4. **Low-pressure pipeline irrigation technology**    1. Master the construction and installation methods of pipeline irrigation engineerings.    2. Introduce the advantages and disadvantages of low-pressure pipeline irrigation system.    3. List the components of low-pressure pipeline irrigation system    4. Introduce the types of low-pressure pipeline irrigation system.    5. Select the appropriate low-pressure pipeline system according to the conditions of irrigation area.    6. Select pipes and accessories according to different low-pressure piping systems.    7. Explain the planning principle of low-pressure pipeline irrigation engineering.    8. Calculate the design parameters    9. Example of solving low-pressure pipeline irrigation technology 5. **Understanding the construction and operation management methods of pipeline irrigation engineerings.**    1. Introduce the preparatory work before pipeline engineering construction.    2. List pipeline construction procedures.    3. List the types of pipes and pipe connection methods.    4. Choose the appropriate connection method according to the pipe.    5. Show the installation process of video pipeline.    6. Operation process and calculation method of pipeline water pressure and water seepage experiment    7. Describe the operation and management system of pipeline irrigation engineering.    8. Understand the pipeline operation and maintenance methods. 6. **Designing the seepage control channel.**    1. Explain the practical significance of canal seepage control.    2. List the types of canal seepage control technologies and their applicable conditions.    3. Describe the planning and design principles of canal seepage control project.    4. Determine the mixture ratio, the optimum moisture content and the thickness of the anti-seepage structure, etc.    5. Explain the causes of freezing damage in the channel.    6. List the measures to prevent the channel from swelling. 7. **Surface irrigation water-saving technology**    1. Define water-saving calculation of surface irrigation.    2. List the classification of surface irrigation and its applicable conditions.    3. Explain the law of soil infiltration.    4. Calculate technical elements for irrigation    5. Explain the process of surface irrigation.    6. Calculate evaluation of irrigation quality by through irrigation uniformity and irrigation efficiency.    7. Estimate the infiltration depth    8. Plan and design the surface irrigation system through calculation.    9. Explain surge irrigation and film mulching irrigation. | | | | |  | | |
| **Practice list** | | | | | **Hours** | | |
| 1. Case analysis of sprinkler irrigation system planning and design 2. Case analysis of micro irrigation system planning and design 3. Case analysis of erection and planning design of low-pressure pipeline system 4. Cognitive practice of water-saving irrigation training base in campus | | | | | 12 hours  12 hours  12 hours  12 hours | | |

**3.8Hydraulic Reinforced Concrete Structure**

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| **Three-year Higher Vocational Water Resources and Hydropower Construction Engineering Specialty**  **The Second Year**  **Hydraulic Reinforced Concrete Structure**  **Course code: WRH 243** | | | | | | |
| **Total learning time:** | **112** | **T** | | **P** | | **C** | |
| Theory: | 64 | **2** | | **1.5** | | **2.5** | |
| Practice: | 48 |
| **Course objective:** Through course study, master the calculation theory, design methods and structural requirements of reinforced concrete structural members, correctly understand and use specifications, be able to engage in simple hydraulic reinforced concrete structural design, and know the development direction of the discipline. | | |  | | | | |
| **Course content** | | | | |  | | |
| 1. **Introduction**    1. Reinforcing steel    2. Concrete    3. Bonding between reinforcing steel and concrete | | | | | 4 hours | | |
| 1. **Calculation rules for design of reinforced concrete structures**    1. Function and limit state of the structure    2. The function of the structure and the resistance of the structure    3. Practical design expression of design limit state of hydraulic structure | | | | | 6 hours | | |
| 1. **Calculation of normal section bearing capacity of reinforced concrete flexural members**    1. General structural rules for normal sections of flexural members    2. Failure mode of normal section of flexural member    3. Calculation of normal section bearing capacity of flexural members with rectangular section with single reinforcement    4. Calculation of normal section bearing capacity of flexural members with double reinforced rectangular sections    5. Calculation of normal section bearing capacity of T-section flexural members | | | | | 20 hours | | |
| 1. **Calculation of inclined section bearing capacity of reinforced concrete flexural members**   4.1 Failure mode of inclined section  4.2 Calculation of shear capacity of inclined section of beam with web reinforcement  4.3 Calculation of flexural capacity of inclined section of reinforced concrete beam  4.4 Structural regulation of reinforcing steel bar  4.5 Design example of reinforced concrete outrigger beam  4.6 Construction drawing of reinforced concrete members | | | 12 hours | | | | |
| 1. **Calculation of bearing capacity of reinforced concrete compression members**   5.1 Structural requirements of compression members  5.2 Calculation of normal section bearing capacity of axial compression members  5.3 Calculation of normal section bearing capacity of eccentric compression members  5.4 Calculation of bearing capacity of eccentric compression members with symmetrical reinforcement  5.5 Calculation of shear capacity of inclined section of eccentric compression members | | | 12 hours | | | | |
| 1. **Checking calculation of normal service limit state of reinforced concrete members**   6.1 Checking calculation of anti-cracking  6.2 Checking calculation ofcrack width  6.3 Checking calculation of deformation | | | 4 hours | | | | |
| 1. **Reinforced concrete beam-slab structure and steel frame structure**   7.1 Integral one-way and two-way slab beam-slab structure  7.2 Rigid frame structure and corbel design | | | 4 hours | | | | |
| 8. **Brief introduction of prestressed concrete structure**   * 1. Basic concept of prestressed concrete   2. Materials and tensioning machines for stress of concrete | | | 2 hours | | | | |
| **Recommendations/reference books** | | |  | | | | |
| 1. Li Cuiqing, Yan Chaojun and Zhao Jiandong, Editor-in-Chief of *Hydraulic Reinforced Concrete Structure*, China Water and Power Press, 2nd edition, June 2010. 2. *Design Code for Hydraulic Concrete Structures* (SL/T191-2008), Beijing: China Water and Power Press, 2009; 3. *Code for Design of Concrete Structures* (GB 50010-2002), Beijing: China Architecture and Building Press, 2002; 4. *Unified Design Standard for Reliability of Hydraulic Engineering Structures* (GB 50199-94), Beijing: China Water and Power Press, 1994. | | |  | | | | |
| **Teaching objective** | | |  | | | | |
| 1. **Introduction**    1. Master the variety of reinforcement and its physical and mechanical properties.    2. Master various strengths of concrete and their relationships.    3. Understand the bond between reinforcement and concrete    4. Understand the composition of adhesive force. 2. **Calculation rules for design of reinforced concrete structures**    1. Understand the basic functional requirements of structural design and design objective.    2. Master the definition and classification concept of limit state.    3. Master the limit state design method 3. **Calculation of normal section bearing capacity of reinforced concrete flexural members**    1. Master three typical failure characteristics of beam normal section.    2. Calculation of normal section bearing capacity of single reinforced rectangular section, double reinforced rectangular section and single reinforced rectangular section    3. Application conditions of double-reinforced beam    4. Classification of T-beam    5. Structural regulations of flexural members 4. **Calculation of inclined section bearing capacity of reinforced concrete flexural members**    1. Understand the main failure modes of beams along inclined sections.    2. Master the calculation formula and calculation steps of shear bearing capacity of inclined section.    3. Master the structural measures taken to prevent diagonal compression failure and diagonal tension failure.    4. Master the drawing of resistance bending moment diagram, reinforcement diagram and reinforcement table. 5. **Calculation of bearing capacity of reinforced concrete compression members**    1. Master the structural requirements of compression members and the calculation formula of bearing capacity of axial compression members.    2. Calculation formula and applicable conditions of bearing capacity of eccentric compression members    3. Master the calculation of bearing capacity of eccentric compression members with symmetrical reinforcement.    4. Master the discrimination of bearing capacity of large and small eccentric compression members. 6. **Checking calculation of normal service limit state of reinforced concrete members**    1. Master the methods and steps of crack resistance, crack width and deformation checking.    2. Master the reasonable measures to increase the crack resistance of members, reduce the crack width and deformation of beams and slabs. 7. **Reinforced concrete beam-slab structure and steel frame structure**    1. Understand beam-slab structure classification    2. Master the section design and structural requirements of ribbed beam-slab.    3. Understand the structural requirements of steel frame structure and corbel structure. | | |  | | | | |
| 1. **Brief introduction of prestressed concrete structure**    1. Master the working principle of prestressed concrete    2. Requirements of prestressed concrete structural members for concrete and reinforcement    3. Master the types and combinations of prestress losses. | | |  | | | | |
| **Practice list** | | | **Hours** | | | | |
| 1. Discrimination and cognition of failure form of normal section of flexural members | | |  | | | | |
| 2 hours | | | | |
| 1. Discrimination and cognition of failure form of inclined section of flexural members | | | 2 hours | | | | |
| 1. Discrimination of bearing capacity of eccentric compression members with large and small compression members | | | 2 hours | | | | |
| 1. Drawing of resistance moment diagram | | | 6 hours | | | | |
| 1. Design example of reinforced concrete outrigger beam | | | 10 hours | | | | |
| 1. Calculation and design example of bearing capacity of eccentric compression member with symmetrical reinforcement (reinforcement calculation) | | | 10 hours | | | | |
| 1. Calculation of shear capacity of inclined section of eccentric compression members | | | 10 hours | | | | |
| 1. Corbel design of reinforced concrete | | | 6 hours | | | | |

**3.9Engineering Geology and Foundation Basis**

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| **Water Resources and Hydropower Construction Engineering (Construction Design Supervision Direction) Specialty**  **The Second Year**  **Engineering Geology and Foundation Basis** | | | | | | | |
| **Course code: WRH 252** | | | | | | | |
| **Total learning time:** | **96** | | **T** | **P** | | **C** | |
| Theory: | 48 | | **1.5** | **1.5** | | **2** | |
| Practice: | 48 | |
| **Course objective:** | By learning the relevant knowledge of geology and soil mechanics, students can master the basic theory of geology and soil mechanics, and use the knowledge they have learned to solve the engineering geological problems of actual water resources engineering. | | | | | |  |
| **Course content** | | | | | | |  |
| **Module 1: Material composition of the earth** 8 hours  **Task 1: The structure of the earth**  1.Be familiar with the composition of the earth;  2.Master the material composition of the earth’s crust  3.Master geological processes;  **Task 2: Relevant physical properties of rocks and minerals**  1.Introduce the relationship between minerals and rocks, and master the related physical properties of minerals;  2.Master the classification of the three major rocks and their related properties.  **Task 3: Index of engineering properties of rock**  1.Master the indices of engineering properties of rocks.  **Module 2: Geologic age** 8 hours  **Task 1: Fold structure**  1.Master the concept of geological age  2.Master the elements of rock occurrence  3.Master the relevant knowledge of fold structure.  **Task 2: Fault structure**  1.Master the formation process of fault structures.  2.Master the related properties of faults.  **Module 3: Natural geological process** 8 hours  **Task 1: Weathering**  1.Master weathering type  2.Master the classification of weathering grade  **Task 2: Natural flowing water geological process**  1.Understand the type of flowingwater geological process  **Task 3: Karstification**  1.Master the conditions of karst development  2.Basic types of karst  **Module 4: Groundwater** 8 hours  **Task 1: Groundwater**  1.Relevant properties of groundwater  2.Basic classification of groundwater  **Module 5: Physical property index and engineering classification of soil 4hours**  **Task 1: Concept and calculation of soil physical property index**  1.Be familiar with the composition of soil  2.Master the calculation of physical property index of soil  3.Master the determination of physical state index of soil  4.Master the compactness of soil  **Task 2: Determination of basic physical property indices of soil**  1.The density, water content, compressibility and expansibility, organic matter content, clay content and shear strength of the samples are tested; Relevant test requirements of current national specifications shall be met.  **Task 3: Engineering classification of soil**  1.Master the engineering classification of foundation soil.  **Module 6: Calculation of soil compression and foundation deformation 4hours**  **Task 1: Calculation of foundation deformation of soil**  1.Understand the compressibility of soil;  2.Master the test of compression index;  3.Calculate the foundation deformation.  **Task 2: Stress calculation of soil**  1.Master the calculation of self weight stress in foundation;  2.Master the calculation of additional stress in foundation.  **Module 7: Determination of soil shear strength and foundation bearing capacity 8hours**  **Task 1: Determination of soil stability**  1.Master the test of soil shear strength and shear strength index;  2.Master the calculation of foundation bearing capacity. | | | | | | |  |
| **Recommended / Reference Books:** | | | | | | |  |
| 1.*Engineering Geology and Soil Mechanics*, edited by Ye Huoyan, published by The Yellow River Water Conservancy Press in August 2019.  2.*Physical Geology*, edited by Shu Liangshu, Geology Press, published in December 2020, Fourth Edition.  3. *Physical Geology*, edited by Wu Tairan, published by Peking University Press in December 2020.  4.*Soil Mechanics*, edited by Liu Songyu, published by China Architecture and Building Press in December 2020. | | | | | | | |
| **Teaching objective** | |  | | | | | |
| 1.Master the characteristics of rock forming minerals and rocks and field identification methods; | | | | | | | |
| 2.Master geological age discrimination and geological structure identification of strata; | | | | | | | |
| 3.Master the basic types of groundwater; | | | | | | | |
| 4.Be familiar with the classification of engineering soil, and master the main physical and mechanical property indices and applications of soil. | | | | | | | |
| **Practice list** | | | | | **Hours** | | |

1.Introduction to the composition of the earth, thinking about the material composition of the earth’s crust, and practice training on the relationship between minerals and rocks. 2 hour

2.Watch Chinese geography to understand the process of fold formation, and identify it in the training room. 2 hour

3.Video and picture viewing of karst landscape, on-the-spot viewing 4 hours

4.Test of physical state index of soil 4 hours

5.Test on compaction index of soil 6 hours

6.Water content and density test of soil samples 4 hours

7.Specific gravity, compression and direct shear test 4 hours

8.Sand particle size test 2 hour

9.Test on free swelling rate, organic matter content and clay content of soil samples 4 hour

10.Classification of soil by using engineering case data 2 hour

11.Measurement of compressibility index of soil and judgment of compressibility of soil 4 hours

12.Calculation of foundation deformation 2 hour

13.Calculation of natural stress in foundation 2 hour

14.Calculation of additional stress in foundation 2 hour

15.Calculation of shear strength index of soil 2 hour

16.Calculate the bearing capacity of foundation 2 hour

**3.10Water Resources Engineering Supervision**

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| **Water Resources and Hydropower Construction Engineering (Construction Design Supervision Direction) Specialty**  **The Second Year**  **Water Resources Engineering Supervision** | | | | | | |
| **Course code: WRH 262** | | | | | | |
| **Total learning time:** | | **96** | **T** | **P** | | **C** |
| Theory: | | 48 | **1.5** | **1.5** | | **2** |
| Practice: | | 48 |
| **Course objective:** | Through learning quality control, progress control, fund control, organization and coordination, contract management and information management, and safe and civilized construction supervision, the project construction supervision and management of contractors can be achieved. | | | | | |
| **Course content** | | | | |  | |
| 1. **Introduction**    1. Water resources construction procedure    2. Construction supervision system    3. Water resources supervision units and personnel    4. Water resources supervision organization | | | | | 10 hours | |
| 1. **Water resources supervision planning**    1. Supervision outline    2. Supervision planning    3. Implementation rules of supervision    4. The relationship between supervision outline, supervision planning and supervision implementation rules | | | | | 8 hours | |
| 1. **Supervision of water resources construction implementation stage**    1. Construction condition control    2. Engineering quality control    3. Project schedule control    4. Project fund control    5. Safety civilized construction supervision    6. Contract management and information management    7. Organization and coordination | | | | | 26 hours | |
| 1. **Supervision of water resources project completion acceptance stage**    1. Supervision of water resources project completion acceptance    2. Supervision of water resources project warranty period    3. Compilation of archives of water resources construction | | | | | 4 hours | |
| **Recommended/Reference Books:** | | | | |  | |
| 1. *Code for Construction Supervision of Hydraulic Engineering*; 2. *Code for Inspection and Evaluation of Construction Quality of Water Resources and Hydropower Projects*; 3. *Code for Construction Engineering Supervision*; 4. *Compilation of Water Resources Project Construction Supervision Laws and Regulations*; 5. *Code for Acceptance of Water Resources and Hydropower Construction Projects*. | | | | |  | |
| **Teaching objective** | | | | |  | |
| 1. **Introduction**    1. Master the construction procedures of water resources projects.    2. Master the characteristics, tasks, content and basis of project supervision.    3. Master the responsibilities of supervisors.    4. Master the organization mode of water resources project supervision 2. **Water resources supervision planning**    1. Master the functions and main content of the supervision outline.    2. Master the basis, requirements and main content of supervision planning.    3. Master the compilation points and main content of supervision implementation rules.    4. Be able to distinguish the relationship between supervision outline, supervision planning and supervision implementation rules. 3. **Supervision of water resources construction implementation stage**    1. Master the control of construction conditions    2. Master the content of quality control in the construction stage and deal with engineering quality accidents.    3. Master the content of progress control in the construction stage.    4. Master the content of fund control in the construction stage.    5. Master safety and civilized construction supervision.    6. Master construction contract management and information management.    7. Master the connotation, content and methods of organization and coordination. 4. **Supervision of water resources project completion acceptance stage**    1. Master the supervision of project acceptance stage.    2. Master the beginning, extension and termination of warranty period, and the main work of warranty supervision.    3. Master the filing of acceptance data and the management of supervision archives. | | | | |  | |
| **Practice list** | | | | | **Hours** | |
| 1. Job responsibilities of supervisors. 2. Draw various organization modes of water resources project supervision, and write out their advantages and disadvantages. 3. Write the content of supervision plan. 4. Case analysis of planning. 5. Inspection terms of commonly used materials. 6. General position of quality control point setting. 7. Case analysis of quality control. 8. Engineering quality accident treatment procedure. 9. Double-code network drawing. 10. Time parameter calculation of double code network diagram. 11. Calculation of time parameters of double code time scale network diagram. 12. Process of construction progress monitoring system. 13. Analysis of the influence of progress deviation on follow-up work and total construction period. 14. Case analysis of progress control. 15. Flow chart of fund control principle. 16. Reason analysis of fund deviation. 17. Case analysis of fund control. 18. Case analysis of contract management. 19. Common claim content and composition of claim cost 20. Determine the compensatable contractor content according to different claim contents. | | | | | 2 hours  4 hours  2 hours  2 hours  2 hours  4 hours  2 hours  2 hours  4 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  4 hours | |

**4 Curriculum Standards for Year 3**

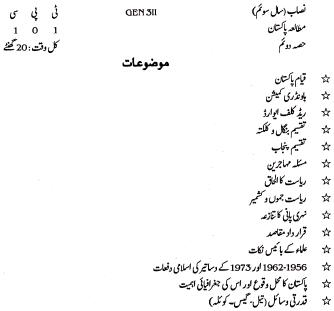
**4.1 Islamiat and Pakistan Studies**

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| **Water Resources and Hydropower Construction Engineering (Construction Design Supervision Direction) Specialty**  **The first semester of the third year**  **Islamiat and Pakistan Studies** |
| **Course code: Gen 311** |















**4.2Chinese Synthesis -1**

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| **Water Resources and Hydropower Construction Engineering (Construction Design Supervision Direction) Specialty**  **The first semester of the third year**  **Chinese Synthesis -1** |
| **Course code: GenC 322** |

**Total learning time: 128**

Theory : 32 T P C

Practice: 96 1 3 2

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| **Course objective:** Cultivate the comprehensive Chinese ability of overseas students in China, and they can pass the HSK4 exam through this vocabulary.  **Course content** | | | |
| Learning situation | Learning content (specific work tasks) | Class hours | |
| Lesson 1 Simple love | 32 new words; Language points: not only ..... but also/still/and; Never; Just; Even if ..... also .....; On ..... | 2 hours | |
| Lesson 2 A true friend | 30 new words; Language points: Just right; Almost; Although; However; And ... | 2 hours | |
| Lesson 3 The manager is very impressed with me. | 31 new words; Language points: Quite; Original; In addition; Firstly....... secondly......; No matter. | 2 hours | |
| Lesson 4 Don’t be too anxious to make money. | 31 new words; Language points: Think; Originally; And; According to; Even | 2 hours | |
| Lesson 5 Buy only the right ones, not the expensive ones. | 30 new words; Language points: Affirmative; Moreover; Actual; For ......; Especially | 2 hours | |
| Lesson 6 You get what you pay for | 30 new words; Language points: Actually; Times; Worthy; Among them; Under ...... | 2 hours | |
| Lesson 7 The best doctor is yourself. | 30 new words; Language points: Estimate; Can’t wait; Compound words overlap; If; Not only ..... but also ....... | 2 hours | |
| Lesson 8 There is no shortage of beauty in life. | 30 new words; Language points: Make; As long as; No; Therefore; Often. | 2 hours | |
| Lesson 9 Sunshine always appears after wind and rain. | 30 new words; Language points: Don’t; Pass; But; Results; Go! | 2 hours | |
| Lesson 10 The standard of happiness | 30 new words; Language points: However; Indeed; In the opinion of .....; Because, For example. | 2 hours | |
| Lesson 11  Reading is good, reading good books, loving reading | 30 new words; Language points: Even; Otherwise, No matter; However; At the same time. | 2 hours | |
| Lesson 12  Discover the world with heart | 30 new words; Language points: And; And then Also; For; Noun quantifier overlap; contrary. | 2.5 hours | |
| Lesson 13  Drinking tea and watching Beijing Opera | 30 new words; Language points: General; Occasionally; By; Conduct; With. | 2.5 hours | |
| Lesson 14  Protect mother earth | 30 new words; Language points: Enough; With; Since; Therefore; Something. | 2.5 hours | |
| Lesson 15  The art of teaching children | 30 new words; Language points: Remember; Make; Must; Come; About. | 2.5 hours | |
| **Recommended/Reference Books:** | | |  |

1.*HSK Standard Course*, edited by Jiang Liping, Beijing Language and Culture University Press, ISBN978-7-5619-3809-9.

2.*Chinese Proficiency Grading Standards for International Chinese Language Education*, compiled by State Language Commission, Beijing Language and Culture University Press, ISBN9877561957196.

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| **Teaching objective** |  |
| 1.Quality objective: Tell Chinese stories well, convey Chinese voices, show Chinese images, and cultivate international students who know China, love China, and be friends with China.  2. Knowledge objective: Master HSK4 pronunciation, vocabulary, sentence patterns, syntax, culture and other knowledge.  3. Ability objective: Have certain listening, speaking, reading, writing skills and preliminary translation skills. Be able to conduct basically complete, coherent and effective social communication on complex topics such as daily life, study and work. |  |
|  |
| **Practice list** |  |
| |  |  |  | | --- | --- | --- | | Serial number | Learning situation | Teaching hours | | 1 | Simple love | 6 hours | | 2 | A true friend | 6 hours | | 3 | The manager is very impressed with me. | 6 hours | | 4 | Don’t be too anxious to make money. | 6 hours | | 5 | Buy only the right ones, not the expensive ones. | 6 hours | | 6 | You get what you pay for. | 6 hours | | 7 | The best doctor is yourself. | 6 hours | | 8 | Sunshine always appears after wind and rain. | 6 hours | | 9 | There is no shortage of beauty in life. | 6 hours | | 10 | The standard of happiness | 6 hours | | 11 | Reading is good, reading good books and loving reading. | 6 hours | | 12 | Discover the world with heart | 7.5 hours | | 13 | Drinking tea and watching Beijing Opera | 7.5 hours | | 14 | Protect mother earth | 7.5 hours | | 15 | The art of teaching children | 7.5 hours | |  |

**4.3Chinese listening**

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| **Water Resources and Hydropower Construction Engineering (Construction Design Supervision Direction) Specialty**  **The first semester of the third year**  **Chinese listening** |
| **Course code: GenC 311** |

**Total learning time:**

Theory 0 T P C

Practice 96 0 3 1

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| **Course objective:** This lesson aims to improve Chinese learners’ listening ability in an all-round way, especially the listening ability based on daily conversations and discourse segments. As follows:  1.Be able to listen to the sound, rhyme and tone of mandarin.  2.Be able to understand mandarin and talk about common problems in daily life and study.  3.Be able to understand the basic content of the narration of things in specific context and the basic intention of the speaker.  **Course practice content:** | | | | |
| Learning situation | Learning content (specific work tasks) | Class hours | | |
| Lesson 1 See off those who depart and welcome those who arrive | Dialogue: See off those who depart and welcome those who arrive; Essay 1: Hospitality; Essay 2: Shake hands. | 3 hours | | |
| Lesson 2 Neighbours | Dialogue: neighbors; Essay 1: Several of my neighbors; Essay 2: Their home | 3 hours | | |
| Lesson 3 Unlike China. | Dialogue: Unlike China; Essay 1: Knowledge of seating arrangement; Essay 2: Language of hands | 3 hours | | |
| Lesson 4 What gift is good? | Dialogue: What gift is good? Essay 1: Socialization on university campus; Essay 2: How to give gifts? | 3 hours | | |
| Lesson 5 Thank you for your birthday. | Dialogue: Thank you for your “birthday”; Essay 1: A red apple; Essay 2: Raise your hand. | 3 hours | | |
| Lesson 6 Marriage | Dialogue: Marriage; Essay 2: He is in my heart; Essay 3: Miss G’s mate selection criteria | 3 hours | | |
| Lesson 7 A “two-person” family | Dialogue: A “two-person” family; Essay 1: Go shopping with my wife; Essay 2: You can eat anything. | 3 hours | | |
| Lesson 8 Hold high hopes for one’s child | Dialogue: Hold high hopes for one’s child; Essay 1: On the education of the only child; Essay 2: Dialogue between father and son | 3 hours | | |
| Lesson 9 Mother and son. | Dialogue: Mother and son; Essay 1: Love; Essay 2: Heartbeat and life span | 3 hours | | |
| Lesson 10  Life is gone | Dialogue: Life is gone; Essay 1: Spend yesterday’s money and tomorrow’s money; Essay 2: When is the best time to buy something | 3 hours | | |
| Lesson 11  Charging | Dialogue: Charging; Essay 1: How to improve learning efficiency; Essay 2: Chop and change | 3 hours | | |
| Lesson 12 Be cheerful. | Dialogue: Be cheerful; Essay 2: About losing weight; Essay 3: New ways to lose weight | 3 hours | | |
| Lesson 13 You’d better quit. | Dialogue: You’d better quit; Essay 1: On the education of the only child; Essay 2: Dialogue between father and son | 3 hours | | |
| Lesson 14 How can I have a good rest | Dialogue: How can I have a good rest; Essay 1: Talk about “cold”; Essay 2: Mobile phones have changed our lives. | 3 hours | | |
| Lesson 15 Whose turn is it? | Dialogue: Whose turn is it?; Essay 1: A pair of pants; Essay 2: Be in a dilemma | 3 hours | | |
| Lesson 16 Discrepancy | Dialogue: Discrepancy; Essay 1: Men in East-West Dialect; Essay 2: Differences in South China | 3 hours | | |
| Lesson 17 What should I say? | Dialogue: What should I say? Essay 1: Eat another bowl; Essay 2: Unfortunate words | 3 hours | | |
| Lesson 18 Name | Dialogue: Name; Essay 1: Pen name, stage name and cybername; Essay 2: Name and translation of goods | 3 hours | | |
| Lesson 19 Change jobs | Dialogue: Change jobs; Essay 1: Ways for college students to find jobs; Essay 2: Interview | 3 hours | | |
| Lesson 20 Saying Chinese New Year | Dialogue: Say Chinese New Year; Essay 1: The origin of Spring Festival couplets; Essay 2: Stealing Spring Festival couplets | 3 hours | | |
| Lesson 21 Penguin’s love and marriage | Dialogue: Penguin’s love and marriage; Essay 1: If cheetahs participate in the Olympic Games; Essay 2: Birds | 3 hours | | |
| Lesson 22 Talk about advertising | Dialogue: Talk about advertising; Essay 1: The wonderful use of advertising; Essay 2: Public service advertisement | 3 hours | | |
| Lesson 23 Use of computers | Dialogue: Use of the computers; Essay 1: 5G is coming; Essay 2: Virtual School under 5G Technology | 3 hours | | |
| Lesson 24 Environmental Protection | Dialogue: Environmental Protection; Essay 1: Garbage classification; Essay 2: Overview of China | 3 hours | | |
| Lesson 25 Clothes make the man. | Dialogue: Clothes make the man; Essay 1: How much is it? Essay 2: Four seasons diet | 3 hours | | |
| HSK4 listening training | Listening training of HSK4 real questions | 3 hours | | |
| HSK4 listening training | Listening training of HSK4 real questions | 3 hours | | |
| HSK4 listening training | Listening training of HSK4 real questions | 3 hours | | |
| HSK4 listening training | Listening training of HSK4 real questions | 3 hours | | |
| HSK4 listening training | Listening training of HSK4 real questions | 3 hours | | |
| HSK4 listening training | Listening training of HSK4 real questions | 3 hours | | |
| HSK4 listening training | Listening training of HSK4 real questions | 3 hours | | |
| **Recommended/Reference Books:** | | |  | |
| 1.*Chinese Listening Course III*, edited by Hu Bo and Yang Xuemei, Beijing Language and Culture University Press, ISBN9787561955956.  **Teaching objective** | | | |  |
| 1.Quality objective: Tell Chinese stories well, convey Chinese voices, show Chinese images, and cultivate international students who know China, love China, and be friends with China.  2.Knowledge objective: Master the listening content of HSK4 level.  3.Ability objective: Be able to understand informal conversations or speeches involving the content of level 4 topics and tasks; Be able to avoid the influence of unnecessary repetition, pause and other factors, and accurately obtain the main information; Be able to listen to the implication and be aware of the cultural factors involved in dialogue or speech. | | | |  |
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**4.4Spoken Chinese**

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| **Water Resources and Hydropower Construction Engineering (Construction Design Supervision Direction) Specialty**  **The first semester of the third year**  **Spoken Chinese** |
| **Course code: GenC 331** |

**Total learning time 96**

Theory 0 T P C

Practice 96 0 3 1

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| **Course objective:**This lesson aims to improve Chinese learners’ oral expression ability in an all-round way, especially their comprehensive oral expression ability based on daily conversations and discourse segments. As follows:  1.Through the training of common sentence patterns and grammatical structures, learners can form correct pronunciation and intonation.  2.Through word analysis and application, learners can skillfully use common words in intermediate Chinese.  3.Through dialogue exercises and functional project training in specific contexts, learners can communicate and express clearly, accurately and appropriately by using common sentence patterns.  4.Through situational exercises, learners can discuss general topics in social life (such as campus life, interpersonal relationships, study and work, social hotspots, etc.), and form a preliminary expression ability in paragraphs.  **Course practice content** | | | |
| Learning situation | Learning content (specific work tasks) | Class hours | |
| Lesson 1  Is there a place to eat nearby? | This lesson teaches students to learn about places to eat and play sports near their schools, and how to introduce their respective schools. | 3 hours | |
| Lesson 2 What are your plans? | This lesson teaches students how to plan after the holiday, so that students can learn how to make specific plans. | 3 hours | |
| Lesson 3  There’s nothing wrong with the wrong name | This lesson mainly teaches students how to address their friends’ families and how to address waiters; Learn how to address correctly on different occasions. | 3 hours | |
| Lesson 4  Will this work | This lesson mainly teaches students how to address strangers, and learn to address strangers correctly in any case. | 3 hours | |
| Lesson 5  Where are you from | This lesson mainly teaches students to introduce their hometown. Students can briefly introduce their hometown, climate, places of interest and population. | 3 hours | |
| Lesson 6  My hometown | This lesson mainly teaches students about the words and language points of their hometown. Students can introduce the population, weather, scenery and economy of their hometown. | 3 hours | |
| Lesson 7  Have you ever thought about working here | This lesson mainly teaches students about their plans to go or stay after graduation, and analyzes the advantages and disadvantages of going or staying. | 3 hours | |
| Lesson 8  Hometown song | This lesson mainly teaches students to learn to sing a hometown song and express their yearning for their hometown. | 3 hours | |
| Lesson 9 A working ghost | This lesson mainly teaches students that this article introduces workaholics by telling stories, a ghost who loves to work. | 3 hours | |
| Lesson 10 What are you crazy about? | This lesson mainly teaches students to learn related words, grammar points and how to introduce their own families by introducing what crazy people are in a family of three. | 3 hours | |
| Lesson 11 I want to know more Chinese students. | This lesson mainly teaches some words and grammar points related to school associations, and learns how to meet some new friends in an unfamiliar environment. | 3 hours | |
| Lesson 12 You are welcome to join | This lesson mainly teaches the process of how to apply to join a school club, and how to choose the club you want to join. | 3 hours | |
| Lesson 13 It’s my treat today | This lesson mainly teaches word-level grammar points related to hospitality, as well as the specific location and points for attention of hospitality. | 3 hours | |
| Lesson 14 Do you have takeout? | This lesson mainly teaches words and grammar points related to ordering takeout, and learns how to order takeout online. | 3 hours | |
| Lesson 15 I want to return these pants. | This lesson mainly teaches words and grammar points about goods return, and learns how to return goods in shopping malls. | 3 hours | |
| Lesson 16 Review | Review the course content in Lesson 1-15 | 3 hours | |
| Lesson 17 Please enjoy your meal. | This lesson mainly teaches grammar and words related to communication with waiters in fast food restaurants, and can correctly express their own meaning and ideas. | 3 hours | |
| Lesson 18 I want to rent a house. | This lesson mainly introduces the grammar and words about renting a house, and learns how to find and rent a suitable house. | 3 hours | |
| Lesson 19 Rent an apartment with a person of the opposite gender | This lesson mainly teaches grammar and words related to sharing with people, and learns how to find sharing people. | 3 hours | |
| Lesson 20 What’s to be done? | This lesson mainly teaches the planned grammar and words after graduation, so that students can have a clear understanding of their future life choices. | 3 hours | |
| Lesson 21 There is such a good thing in the world. | This lesson mainly teaches the matters needing attention when looking for a job, so that students can avoid being cheated when looking for a job. | 3 hours | |
| Lesson 22 How do you study? | This lesson mainly teaches grammar and vocabulary related to learning methods, and explores our own learning methods. | 3 hours | |
| Lesson 23 I like exams. | This lesson mainly teaches grammar points and words about exams, so that students can use relevant sentence patterns correctly in communication. | 3 hours | |
| Lesson 24 What new job have you found? | This lesson mainly teaches how to find a job-related grammar and words in school, so that students can use this sentence pattern correctly in communication. | 3 hours | |
| Lesson 25 I want to find a job. | This lesson mainly teaches grammar and vocabulary related to interview and job application, and learns how to apply relevant knowledge points to apply for jobs. | 3 hours | |
| Lesson 26 How is your Xi’an tour arranged? | This lesson mainly teaches vocabulary and language points related to travel plans, and learns how to arrange travel plans reasonably. | 3 hours | |
| Lesson 27 Xinjiang is so fun. | This lesson introduces the climate, scenic spots, beliefs and specialties of Xinjiang. Let students know more about Xinjiang. | 3 hours | |
| Lesson 28 I usually read bestsellers. | This lesson mainly teaches grammar and words related to favorite books and best-selling books, so that students can learn to recommend books to classmates and students. | 3 hours | |
| Lesson 29 My favorite book | This lesson mainly teaches students to learn grammar and words about a favorite book, and learn to introduce a favorite book to friends. | 3 hours | |
| Lesson 30 Going home soon? | This lesson mainly teaches about the arrangement after studying in China, and recalls the most unforgettable things during studying in China. | 3 hours | |
| Lesson 31 The most unforgettable lesson | This lesson mainly teaches medical students to learn the usage of stethoscopes and the difference between the heartbeat of patients and that of normal people. | 3 hours | |
| Lesson 32 Review | Review the course content in Lesson 16-31 | 3 hours | |
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| **Recommended/Reference Books:** | | |  |

1.*Developing Chinese* - *Intermediate Speaking Course I*; Editor-in-Chief: Lu Zhiying; Press: Beijing Language and Culture University Press; ISBN:9787561930687, etc.

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| **Teaching objective** |  |
| 1Knowledge objective: Students master common sentence patterns and grammatical structures, correct pronunciation and intonation, common sentence patterns and grammatical structures.  2Ability objective: Through the study of this lesson, learners can skillfully use common words in intermediate Chinese, communicate and express clearly, accurately and appropriately by using common sentence patterns, and discuss general topics in social life (such as campus life, interpersonal relationship, study and work, social hot spots, etc.), forming a preliminary expression ability in paragraphs.  3Quality objective: Cultivate a group of international students who know, are friends of, are pro China and love China, and cultivate the ability of international students to correctly explain their views in Chinese, self-study, and actively find and solve problems. |  |
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**4.5Chinese Reading and Writing**

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| **Water Resources and Hydropower Construction Engineering (Construction Design Supervision Direction) Specialty**  **The first semester of the third year**  **Chinese Reading and Writing** |
| **Course code: GenC 351** |

**Total learning time 96**

Theory 0 T P C

Practice 96 0 3 1

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| **Course objective:**  This lesson aims to comprehensively develop and improve learners’ Chinese language ability, Chinese communication ability, Chinese comprehensive application ability, Chinese learning interest and Chinese learning ability.  1.Through the standardized teaching of Chinese, Chinese characters and related cultural knowledge, as well as scientific and systematic language skills training such as listening, speaking, reading and writing, the learners’ ability to distinguish and match the forms and meanings of Chinese elements (pronunciation, Chinese characters, vocabulary and grammar) is comprehensively cultivated and improved.  2.The ability to accurately receive and output Chinese information in specific texts, contexts and social and cultural conventions.  3.Be ableto use Chinese to express orally and in writing appropriate discourse situations and discourse features;  4.With the help of the textbook content and its teaching implementation, the learners’ Chinese learning motivation and autonomous learning ability are constantly strengthened.  **Course practice content** | | | |
| Learning situation | Learning content (specific work tasks) | Class hours | |
| Lesson 1 Learn as soon as you can. | This lesson mainly teaches the grammar and vocabulary related to *You can learn as soon as you can*, reads and understands China decades ago, and learns the significance of “if it comes, it will be easy”. | 6 class hours | |
| Lesson 2 Travel around the world | This lesson mainly teaches the grammar and vocabulary related to *Travel around the world*, reads and understands the words related to “self-help”, and learns the significance of “where there is a will, there is a way”. | 6 class hours | |
| Lesson 3 Open a window. | This lesson mainly teaches grammar and vocabulary related to *Open a window*, reads and understands “China’s Time-honored Brand”, “Fair Price” and “Famous Tobacco and Alcohol”, and learns the significance of “seeing is believing”. | 6 class hours | |
| Lesson 4 Be interested in everything. | This lesson mainly teaches grammar and vocabulary related to *Be interested in everything*, reads and understands the importance and significance of life, and learns the significance of “a young idler, an old beggar”. | 6 class hours | |
| Lesson 5 The Yellow River has ninety-nine bends | This lesson mainly teaches grammar and vocabulary related to *The Yellow River has ninety-nine bends*, reads and understands slogans and meanings of different times, and learns the important significance of “I don’t know the true face of Lushan Mountain, only because I am in this mountain”. | 6 class hours | |
| Lesson 6 It won’t change for a while. | This lesson mainly teaches grammar and vocabulary related to *It won’t change for a while*, reads and understands the meaning of ancient Chinese architecture and plaques, and learns the significance of “the waves behind the Yangtze River push the waves ahead, and each generation is stronger than the other”. | 6 class hours | |
| Lesson 7 Who stole my days? | This lesson mainly teaches grammar and vocabulary related to *Who stole my days*, reads and understands the meaning of “being fair and square”, and learns the significance of “spring is the plan of a year, morning is the plan of a day, and diligence is the plan of a lifetime”. | 6 class hours | |
| Lesson 8 Development is the last word | This lesson mainly teaches the grammar and vocabulary related to *Development is the last word*, reads and understands the traditional calligraphy of ancient Chinese celebrities, and learns the significance of “the weather is inferior to the geographical location, and the geographical location is inferior to the harmony between people”. | 6 class hours | |
| Lesson 9 Wait for me to call back at home. | This lesson mainly teaches the grammar and vocabulary related to *Wait for me to call back at home*, reads and understands the meaning of the school motto of Beijing Normal University, and learns the significance of “people who have no foresight must have immediate worries”. | 6 class hours | |
| Lesson 10  There is a wisdom called the golden mean. | This lesson mainly teaches the grammar and vocabulary related to “There is a wisdom called the golden mean”, reads and understands the differences between foreigners’ signatures and Chinese signatures, and learns the significance of “different people have different views on the same thing”. | 6 class hours | |
| Lesson 11 Learn Chinese well before going home. | This lesson mainly teaches grammar and vocabulary related to “Learn Chinese well before going home”, reads and understands the meaning of “inscription”, and learns the great significance of “He who knows others is clever, and he who knows himself is wise; He who wins others is strong, and he who wins himself is powerful”. | 6 class hours | |
| Lesson 12 I have a wish in my heart. | This lesson mainly teaches grammar and vocabulary related to “I have a wish in my heart”, reads and understands the meaning of “restaurant” and “wineshop”, and learns the significance of “what you do not wish upon yourself, extend not to others”. | 6 class hours | |
| Lesson 13 Feeling better and better. | This lesson mainly teaches grammar and vocabulary related to “Feeling better and better”, and reads and understands what to do in that department of the school after coming to China. Learn the significance of “the sea is wide with fish leaping, and the sky is high with birds flying”. | 6 class hours | |
| Lesson 14 Action is better than heart | This lesson mainly teaches grammar and vocabulary related to “Action is better than heart”, reads and understands how to register if you are ill in China, and learns the significance of “reading thousands of books and traveling thousands of miles”. | 6 class hours | |
| Lesson 15 I love China for the tip of my tongue | This lesson mainly teaches the grammar and vocabulary related to “I love China for the tip of my tongue”, reads and understands the significance and customs of Chinese traditional culture, such as Spring Festival couplets, and learns the significance of “our life has a limit but knowledge has none”. | 6 class hours | |
| Lesson 16 | Review the course content in Lesson 1-15 | 6 class hours | |
| **Recommended/Reference Books:** | | |  |

1.*Developing Chinese* - *Elementary Reading and Writing Course II*; Editor-in-Chief: Li Quan, Wang Shuhong, Yao Shujun; Press: Beijing Language and Culture University Press; ISBN:9787561934616, etc.

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| **Teaching objective** |  |
| 1.Knowledge objective: Students master basic Chinese knowledge such as characters,words, phrases, sentences, paragraphs and discourses. Through standardized teaching of Chinese, Chinese characters and related cultural knowledge, they can master scientific and systematic language skills training such as listening, speaking, reading and writing.  2.Ability objective: Through the study of this lesson, comprehensively develop and improve learners’ Chinese language ability, Chinese communication ability, Chinese comprehensive application ability, Chinese learning interest and Chinese learning ability; Cultivate and improve learners’ ability to distinguish and match the forms and meanings of Chinese elements (pronunciation, Chinese characters, vocabulary and grammar) in an all-round way.  3.Quality objective: Cultivate a group of international students who know China, are friends with China, pro China and love China, and cultivate the ability of international students to correctly explain their views in Chinese, self-study and actively discover and solve problems. |  |

**4.6Chinese Culture -1**

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| **Water Resources and Hydropower Construction Engineering (Construction Design Supervision Direction) Specialty**  **The first semester of the third year**  **Chinese Culture -1** | | | | | | |
| **Course code: GenC 341** | | | | | | |
| **Total learning time** | | **32** | **T** | **P** | | **C** |
| Theory: | | 32 | **1** | **0** | | **1** |
| Practice: | | 0 |
| **Course objective:** | Promote the integration of excellent water culture into education and teaching, and spread Chinese excellent traditional culture. | | | | | |
| **Course content** | | | | |  | |
| **1 Chapter of folk etiquette**   * 1. Water and Guizhou ethnic customs   2. Water and Guizhou Traditional Festivals   3. Clothing and pattern art of Shui Nationality in Guizhou   4. Water and life etiquette | | | | | 16 hours | |
| **2 Chapter of scholars’ discussion on water**   * 1. Guan Zhongtalked about water: Water is the origin of all things.   2. Lao Tzu talked about water: The best is like water.   3. Sun Tzu talked about water: The war has no general trend, and water has no constant form.   4. Mozi talked about water: A gentleman does not take water as his mirror, but people as his mirror. | | | | | 16 hours | |
| **Recommended/Reference Books:** | | | | |  | |
| 1.*Water Culture and Education in China*, Cai Mei, China Water and Power Press, ISBN 9787517098096. | | | | |  | |
| **Teaching objective** | | | | |  | |
| **1 Chapter of folk etiquette**   * 1. Understand and learn about water and Guizhou customs   2. Understand and learn about water and Guizhou traditional festivals   3. Understand and learn about clothing and pattern of Shui Nationality in Guizhou.   4. Learn about water and life etiquette, and understand the important role of water in birthdays, coming-of-age ceremony, weddings and funerals.   **2 Chapter of scholars’ discussion on water**  2.1 Master the water origin thought of Guan Zhong.  2.2 Learn the important relationship between water, industrial and agricultural production and human life discussed by Guan Zhong.  2.3 Learning the essence of Lao Tzu’s Tao and his philosophy of life  2.4 Master Lao Tzu’s water philosophy.  2.5 Master the characteristics and functions of water expounded by Sun Tzu and discuss military thoughts.  2.6 Learn Mozi’s political ideas and military thoughts.  2.7 Master the characteristics and functions of water in Mozi’s ideas. | | | | |  | |

**4.7Chinese Cultural Practice -1**

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| **Water Resources and Hydropower Construction Engineering (Construction Design Supervision Direction) Specialty**  **The First Semester of the Third Year**  **Chinese Cultural Practice -1** | | | | | | |
| **Course code: GenC 361** | | | | | | |
| **Total learning time** | | **48** | **T** | **P** | | **C** |
| Theory: | | 0 | **0** | **1.5** | | **0.5** |
| Practice: | | 48 |
| **Course**  **objective:** | Promote the integration of excellent water culture into education and teaching, and spread Chinese excellent traditional culture. | | | | | |
| **Course content** | | | | |  | |
| 1 Huangguoshu Waterfall | | | | | 12 hours | |
| 2 Huang Dafa - Daihatsu Canal Bridge | | | | | 12 hours | |
| 3 Guizhou Vocational and Technical College of Water Resources and Hydropower | | | | | 12 hours | |
| 4 Shui Nationality of Sandu County in Guizhou Province | | | | | 12 hours | |
| **Recommended/Reference Books:** | | | | |  | |
| 1.*Water Culture and Education in China*, Cai Mei, China Water and Power Press, ISBN 9787517098096. | | | | |  | |
| **Teaching objective** | | | | |  | |
| 1.Visit Huangguoshu Waterfall and experience the water culture of Guizhou.  2.Learn the story of Huang Dafa and Daihatsu Canal Bridge, the “model of the times”.  3.Incorporate Chinese water culture into the international culture practice course, turn Guizhou Vocational and Technical College of Water Resources and Hydropower into an “international study tour base”, promote Guizhou water culture, and combine its own advantages to build a brand of water culture study tour.  4.Understand and learn the customs and habits of the Shui Nationality in Sandu, Guizhou, and perceive the water culture in Guizhou. | | | | |  | |

**4.8Water Resources Engineering Survey**

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| **Water Resources and Hydropower Construction Engineering (Construction Design Supervision Direction) Specialty**  **The First Semester of the Third Year**  **Water Resources Engineering Survey** | | | | | | | | | |
| **Course code: WRH 312** | | | | | | | | | |
| **Total learning time:** | | **128** | | **T** | **P** | | | **C** | |
| Theory: | | 32 | | **1** | **3** | | | **2** | |
| Practice: | | 96 | |
| **Course**  **objective:** | Through course study, students can master the basic knowledge of survey, the basic principles and methods of angle, distance and elevation survey, the basic principles of small-area control survey and construction survey, and can use measuring equipment such as level gauge, total station and GNSS. | | | | | | | | |
| **Course content** | | | | | | 32 hours | | | |
| 1. **Basic knowledge of measurement**    1. Overview of surveying    2. Representation method of ground point position    3. Common units of measurement and conversion    4. Practice notes | | | | | | 4 hours | | | |
| 1. **Levelling**    1. Basic principles of leveling    2. Leveling tools and methods of use    3. Understanding and use of level    4. Basic knowledge of continuous leveling    5. Relevant knowledge of general leveling    6. Internal calculation of leveling    7. Basic knowledge of profile survey | | | | | | 8 hours | | | |
| 1. **Measurement of angle**    1. Basic knowledge of angle measurement    2. Horizontal angle observation    3. Vertical angle observation | | | | | | 4 hours | | | |
| 1. **Distance measurement and straight line orientation**    1. Method of measuring distance    2. Linear orientation related knowledge    3. Direct calculation and inverse calculation of coordinates | | | | | | 4 hours | | | |
| 1. **Small area control survey**     1. Basic knowledge of measurement    2. Basic knowledge of traverse survey    3. Closed traverse survey-Internal calculation of traverse survey | | | | | | 6 hours | | | |
| 1. **Construction survey**    1. Basic methods of construction lofting    2. Measurement principle of GNSS    3. The basic principle of GNSS-RTK survey | | | | | | 6 hours | | | |
| **Recommended/Reference Books:** | | | | | |  | | | |
| 1. *Survey of Water Resources Engineering*, published by Chen Tao, China Water and Power Press, in August 2019. 2. *Water Resources Engineering Survey Training*, published by Chen Tao, China Water and Power Press, in August, 2019. 3. *Code for Engineering Survey*, 2020 4. *Specification for Water Resources and Hydropower Survey* (survey and design stage) 5. *Topographic Map Schema* 6. Operating instructions of Zhonghaida V30/V90/V98 instruments, etc. | | | | | | | | |
| **Teaching objective** | | | | | |  | | | |
| 1. **Quality objective**    1. Have the spirit of water resources in the new era of “loyalty, cleanliness, responsibility, science, truth-seeking and innovation”.    2. Have the spirit of dedication, loyalty, modesty and prudence, unity and cooperation.    3. Have the rigorous and realistic artisan spirit and keep improving.    4. Have the work style of abiding by laws and regulations, working safely, protecting the environment, obeying orders and sticking to posts.    5. Have the consciousness of serving ecological civilization construction and new infrastructure construction, and consciously abide by professional ethics and industry norms.    6. Have a high sense of social responsibility, rigorous work style, hard-working attitude, good habit of conscious study, and actively practice the new era professional culture of “responsibility, innovation, cooperation, dedication and incorruptibility”. 2. **Knowledge objective**    1. Master the basic knowledge of engineering survey.    2. Master the knowledge of elevation calculation.    3. Master the surveying and mapping methods of vertical and horizontal sections.    4. Master the basic principles and methods of angle measurement.    5. Master the basic methods of traverse survey.    6. Master the basic methods of construction survey. 3. **Ability objective**    1. Be able to measure height difference and elevation with level gauge.    2. Be able to complete the field work of leveling.    3. Be able to map vertical and horizontal sections.    4. Be able to measure the horizontal angle, vertical angle and horizontal distance by total station.    5. Be able to measure the coordinates of points by total station and GNSS receiver.    6. Be able to use total station and GNSS receiver to set out the position of the point. | | | | | | | | | |
| **Practice list** | | | **96 hours** | | | | | | |
| 1. Understanding and application of level 2. Continuous leveling 3. Closed leveling 4. Leveling industry 5. Section measurement 6. Section drawing 7. Understanding and application of total station 8. Measurement of horizontal angle by back method 9. Vertical angle measurement 10. Horizontal distance measurement 11. Traverse survey 12. Wire industry 13. Total station coordinate acquisition 14. Total station coordinate lofting 15. Understanding and application of RTK 16. RTK coordinate acquisition 17. RTK coordinate lofting | | | | | | | 2 hours  6 hours  10 hours  4 hours  6 hours  2 hours  4 hours  6 hours  2 hours  2 hours  12 hours  4 hours  12 hours  12 hours  4 hours  4 hours  4 hours | | |

**4.9Water Resources Engineering Building**

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| **Water Resources and Hydropower Construction Engineering (Construction Design Supervision Direction) Specialty**  **The Second Semester of the Third Year**  **Water Resources Engineering Building** | | | | | | | |
| **Course code: WRH 322** | | | | | | | |
| **Total learning time:** | | **96** | **T** | **P** | | **C** | | |
| Theory: | | 48 | **1.5** | **1.5** | | **2** | | |
| Practice: | | 48 |
| **Course objective:** | Through modular teaching, students can master the functions, basic working principles, characteristics, design methods and structures of common hydraulic structures, cultivate students’ hands-on ability, ability to solve practical engineering problems and self-learning ability, and improve students’ water resources professional quality. | | | | | |  |
| **Course content** | | | | | 48 hours | | |
| **Module 1: Cognition of water resources hub and hydraulic structures**  **Task 1: Construction of water resources and water resources projects in China**  1.China’s water resources and water resources project construction;  2.Concepts of water resources hubs and hydraulic structures;  3.Impact of water resources project on environment.  **Task 2: Classification of water resources hubs and hydraulic structures**  1.The significance of water resources hub classification and hydraulic structure classification;  2.Classification of water resources projects;  3.Water resources hubs and hydraulic structures;  4.Flood standard. | | | | | 4 hours | | |
| **Module 2: Understanding and analysis of gravity dam**  **Task 3: Cognition of gravity dam and section design of non-overflow gravity dam.**  1.Working principle, characteristics, types, applicable conditions and layout of gravity dams;  2.Determination method of non-overflow gravity dam profile.  **Task 4: Load and combination analysis of gravity dam**  1.Load of gravity dam and its combination;  2.Load combination of gravity dam.  **Task 5: Anti-sliding stability and stress calculation of gravity dam**  1. Calculation of anti-sliding stability of gravity dam;  2.Stress calculation of gravity dam.  **Task 6: Profile analysis and determination of overflow gravity dam**  1. Discharge mode of overflow gravity dam;  2.Determination of overflow dam orifice;  3.Determination of gravity dam profile;  4.Energy dissipation downstream of gravity dam;  5.Gravity discharge hole of dam.  **Task 7: Material and structural requirements of gravity dam**  1. Material requirements of gravity dam;  2.Gravity dam zoning;  3.Gravity dam structure.  **Task 8: Foundation treatment of gravity dam**  1. Requirements of gravity dam on foundation;  2.Excavation and cleaning of foundation;  3.Reinforcement treatment of foundation. | | | | | 12 hours | | |
| **Module 3: Cognition and analysis of arch dam**  **Task 9: Cognition of arch dam**  1.Working principle of arch dam;  2.Characteristics, types, applicable conditions and layout of arch dams.  **Task 10: Analysis and determination of arch dam profile, load and combination analysis of arch dam.**  1. Preliminary drawing up of arch dam size;  2. Arch dam layout;  3.Load of arch dam and its combination analysis.  **Task 11: Anti-sliding stability and stress calculation of arch dam**  1.Calculation method of anti-sliding stability of arch dam;  2.Calculation and analysis method of arch dam stress.  **Task 12: Selection of flood discharge and energy dissipation mode of arch dam**  1.The arch dam body drainage mode;  2.Energy dissipation mode of arch dam.  **Task 13: Material structure analysis and foundation treatment of arch dam**  1.Material requirements of arch dam;  2.Transverse joints and longitudinal joints, arch dam crest layout;  3.Inner corridor and traffic of dam, water stop and drainage of dam body, joints between cushion seat and periphery, gravity pier and thrust pier;  4.Foundation treatment method of arch dam based on. | | | | | 10 hours | | |
| **Module 4: Cognition and analysis of earth-rock dam**  **Task 14: Cognition of Earth-rockfill dam and determination of profile analysis**  1.Characteristics, types and hub layout of earth dams;  2.Section design and structure of earth dam.  **Task 15: Seepage calculation of earth-rock dam**  1.Seepage analysis task, method, working condition and calculation of earth dam;  2.Prevention measures of seepage deformation of earth dam.  **Task 16: Calculation of dam slope stability and foundation treatment of earth-rock dam**  1.Analysis of constant non-uniform flow in open channel:  2.Measures to improve the stability of earth-rock dam slope:  3.Foundation treatment of earth dam. | | | | | 10 hours | | |
| **Module 5: Cognition and analysis of spillway**  **Task 17: Cognition of riverside spillway and selection of riverside spillway location and type**  1.Types, characteristics and tunnel line selection of riparian spillway;  2. Setting conditions of riparian spillway;  3.Location and type selection of riparian spillway.  **Task 18: Analysis of the function, layout and structure of each component of the channel spillway**  1.Diversion channel;  2.Control section;  3.Drain trough;  4.Energy dissipation facilities;  5.Outgoing channel | | | | | 4 hours | | |
| **Module 6: Cognition and analysis of hydraulic tunnel**  **Task 19: Cognition of hydraulic tunnel and selection of tunnel line**  1.Hydraulic tunnel type and tunnel line;  2.Characteristics of hydraulic tunnel;  3.Route selection and layout of hydraulic tunnel.  **Task 20: Selection and structural analysis of the entrance buildings of hydraulic tunnels, and structural analysis of the tunnel body of hydraulic tunnels.**  1.Hydraulic tunnel entrance and exit section and understand its structure;  2.Cave structure. | | | | | 4 hours | | |
| **Module 7: Cognition and analysis of canal buildings**  **Task 21: Cognition of canal buildings and layout and design of canals.**  1.Types, layout principles, characteristics and classification of canal buildings;  2.The arrangement of channels;  3.Horizontal and vertical section design of channel.  **Task 22: Cognition and analysis of aqueduct and inverted siphon**  1.Composition and type of aqueduct;  2.General layout and building materials of aqueduct  3.Characteristics, usage and layout of inverted siphon. | | | | | 2 hours | | |
| **Module 8: Layout of water resources project**  **Task 23: Design stage of water resources project and layout of water storage project**  1. Water resources design stage;  2. Layout of Water Resources hub. | | | | | 2 hours | | |
| **Recommended/Reference Books:** | | | | | | |  |
| 1.*Design Specification for Concrete Gravity Dams* (SL319-2005);  2.*Design Specification for Concrete Arch Dams* (SL282-2003);  3.*Design Specification for Stone Masonry Dam* (SL25-2006)；  4.*Design Code for Rolled Earth-Rock Fill Dams* (SL274-2001);  5.*Design Code for Spillway* (SL253-2000);  6.*Specification for Design of Hydraulic Tunnel* (SL279-2002);  7.*Code for Design of Culvert Pipe*(SL279-2002). | | | | | | | |
| **Teaching objective** | |  | | | | | |
| **1.Mastering the knowledge related to the cognition of water resources hubs and hydraulic structures and its application.**  1.1Be able to distinguish various water resources projects from hydraulic structures;  1.2Be able to classify water resources and hydropower projects and hydraulic structures according to relevant indicators;  1.3Be able to find the flood standards of hydraulic structures of different levels. | | | | | | | |
| 2.**Mastering the knowledge related to the understanding and analysis of gravity dams and its application**  2.1Be able to classify different types of gravity dams;  2.2Be able to analyze common loads acting on gravity dams;  2.3Be able to put forward anti-sliding stability measures for gravity dams;  2.4Be able to preliminarily draw up the profile of overflow gravity dam;  2.5Be able to correctly recognize the material zoning of gravity dam and the requirements of each district for materials;  2.6Be able to judge whether geological and topographic conditions are suitable for building a gravity dam. | | | | | | | |
| 3.**Mastering the knowledge and application of cognition and analysis of arch dams.**  3.1Be able to select the shape of arch dam and arrange flood discharge;  3.2Be able to preliminarily draw up the profile of arch dam;  3.3Be able to put forward measures for anti-sliding stability of abutment of arch dam;  3.4 Be able to correctly select the discharge mode and energy dissipation mode of arch dam;  3.5Be able to correctly understand the material requirements of the arch dam, the structural requirements of the arch dam such as vertical and horizontal joints, crest, corridor and traffic, water stop and drainage of the dam body, joints between cushion base and periphery, gravity pier, etc.  3.6Be able to put forward treatment measures for arch dam foundation. | | | | | | | |
| **4.Mastering the basic knowledge and calculation method of earth-rock dam cognition;**  4.1Be able to preliminarily determine the crest elevation, crest width and dam slope of earth-rock dam according to relevant indices;  4.2Be able to preliminarily design the earth-rock dam structure;  4.3Be able to preliminarily analyze seepage of earth-rock dam;  4.4Be able to correctly judge the types of seepage deformation of earth-rock dams and take appropriate preventive measures;  4.5Be able to judge the possible form of the slip surface of the earth-rock dam if it slides according to the actual situation, and put forward measures to improve its stability;  4.6Be able to judge whether geological and topographic conditions are suitable for building earth-rock dams;  4.7Be able to put forward treatment measures for earth-rock dam foundation. | | | | | | | |
| **5.Mastering the basic knowledge and calculation method of spillway cognition and analysis;**  5.1Be able to judge whether geological and topographic conditions are suitable for building spillway;  5.2Be able to preliminarily select the site of spillway;  5.3Be able to carry out the plane layout and structural design of the approach channel, discharge channel and outlet channel;  5.4Be able to preliminarily judge various weir types in the control section, the types and applicable conditions of energy dissipation facilities. | | | | | | | |
| **6.Mastering the basic knowledge and calculation method of hydraulic tunnel cognition and analysis;**  6.1Be able to judge whether geological and topographic conditions are suitable for building hydraulic tunnels;  6.2Be able to conduct preliminary route selection and layout of hydraulic tunnel;  6.3Be able to select the form of tunnel entrance building according to different conditions;  6.4Be able to line and construct hydraulic tunnels. | | | | | | | |
| **7.Mastering the basic knowledge and calculation methods of cognition and analysis of canal buildings;**  7.1Be able to grade canal buildings;  7.2Be able to make preliminary route selection and overall layout of channels;  7.3Be able to preliminarily select the vertical and horizontal sections of the channel according to the actual situation;  7.4Be able to preliminarily select the location and type of aqueduct;  7.5Be able to preliminarily lay out the inverted siphon. | | | | | | | |
| **8.Mastering the basic knowledge and calculation method of water resources project layout;**  8.1Be able to make preliminary dam selection;  8.2Be able to preliminarily carry out the general layout of the dam water storage and water resources project. | | | | | | | |
| **Practice list** | | | | | **48hours** | | |
| 1.Landscape Dujiangyan water resources engineering training | | | | | 3 hours | | |
| 2.Training of gravity dam water control project | | | | | 3 hours | | |
| 3.Practice training of gravity design drawing recognition. | | | | | 3 hours | | |
| 4.Practice of arch dam water control project | | | | | 3 hours | | |
| 5.Practice of arch dam design drawing recognition | | | | | 3 hours | | |
| 6.Practice training of Xiangchou Lake earth rock dam project | | | | | 3 hours | | |
| 7.Practice training on design drawing recognition of earth rock dam | | | | | 3 hours | | |
| 8.Spillway cognition training | | | | | 3 hours | | |
| 9.Practice training of spillway design drawing recognition | | | | | 3 hours | | |
| 10.Cognition training of hydraulic tunnel | | | | | 3 hours | | |
| 11.Practice training of hydraulic tunnel design drawing recognition | | | | | 3 hours | | |
| 12.Channel cognition training | | | | | 3 hours | | |
| 13.Cognition training of other canal system buildings | | | | | 3 hours | | |
| 14.Training on design drawing identification of channel, aqueduct and inverted siphon | | | | | 3 hours | | |
| 15.Practice training of water resources project layout | | | | | 3 hours | | |
| 16.Practice training on the layout plan of water control project | | | | | 3 hours | | |

**4.10Organization and Management of Water Resources Engineering Construction**

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| **Water Resources and Hydropower Construction Engineering (Construction Design Supervision Direction) Specialty**  **The Second Semester of the Third Year**  **Organization and Management of Water Resources Engineering Construction** | | | | | | |
| **Course code: WRH 332** | | | | | | |
| **Total learning time:** | | **80** | **T** | **P** | | **C** |
| Theory: | | 32 | **1** | **1.5** | | **1.5** |
| Practice: | | 48 |
| **Course**  **objective:** | The course comprehensively implements the Party’s education policy and the fundamental task of building morality and cultivating people. It is a professional core course for water resources and hydropower project management and related specialtys. It has strong comprehensiveness and applicability. The solution of many problems involves the comprehensive application of relevant disciplines, which is of great significance to enterprises to improve production capacity, accelerate project progress, reduce costs and improve operation and management. | | | | | |
| **Course content** | | | | | 32 hours | |
| **1.Connotation and basic concept of curiculum**  1.1.1 Meaning of construction organization and management  1.1.2 Curiculum research object  1.1.3 Curiculum task  1.2.1 Capital construction procedure  1.2.2Project classification and construction characteristics  1.2.3Classification | | | | | 6 hours | |
| **2.Network planning technology**  2.1Brief description of network plan  2.2Double code network plan  2.3Double code time scale network planning technology  2.4Network planning technology optimization | | | | | 8hours | |
| **3.General construction organization design, unit project construction organization design**  3.1.1Contents and principles for preparation of general design of construction organization  3.1.2Construction plan  3.1.3General construction schedule  3.1.4General construction layout  3.1.5Compilation example of general design of construction organization  3.2.1Overview of unit project construction organization design  3.2.2Project overview and construction condition analysis  3.2.3Selection of construction scheme  3.2.4Construction schedule of unit works  3.2.5Construction layout plan of unit works | | | | | 18hours | |
| **Recommended/Reference Books:** | | | | |  | |
| 1.*Water Resources Project Construction Organization and Management*, edited by Mi Shuzhen, China Water and Power Press.  2.*Water Resources Project Maintenance and Management*, edited by Yang Weiwei, Northeast University Press.  3.*Maintenance and Repair of Water Resources Projects*, edited by Xi Liping, China Water and Power Press, published in July 2017.  4.*Water Resources Project Management*, edited by Mei Xiaowei, published by China Water and Power Press in 2013.  5.*Engineering Project Management*, edited by Hu Peng and Guo Qingjun, Beijing Institute of Technology Press. | | | | |  | |
| **Teaching objective** | | | | |  | |
| **I. Quality objective**  1. Cultivate students’ concept of strengthening the country through science and technology, and stimulate students’ endogenous motivation to love professional learning;  2.Overall arrangement, rigorous and meticulous work style;  3.Organization and communication skills of unity and cooperation.  4.Cultivate water resources workers with the spirit of “loyalty, cleanness, responsibility, science, realism and innovation” in the new era.  **II. Knowledge objective**  1.Be familiar with construction management procedures and construction preparation content;  2.Master the principle of flow construction;  3.Master the drawing method of network plan, calculation and optimization of network plan parameters;  4.Master the content and preparation method of construction organization design.  **III. Capability objective**  1.Have the ability to organize the construction preparation of Water Resources projects;  2.Have the ability to organize construction by using flow construction principle and network planning technology;  3.Have the ability to prepare the construction schedule;  4.Have the ability to carry out construction organization design of unit project. | | | | |  | |
| **Practice list** | | | | | **48 hours** | |
| 1.Brief description of network plan  2.Double code network plan  3.Double code network plan  4.Double code time scale network planning technology  5.Network planning technology optimization  6.Contents and principles for preparation of general design of construction organization  7.Construction plan  8.General construction schedule  9.General construction layout  10.Compilation example of general design of construction organization  11.Overview of unit project construction organization design  12.Project overview and construction condition analysis  13.Selection of construction scheme  14.Construction schedule of unit works  15.Construction layout plan of unit works  16.Construction project contract  17.Contract management content  18.Brief introduction of contract conditions for construction of water resources and hydropower civil engineering  19.Construction contract claim management  20.Main contents and influencing factors of quality management  21.Quality control in construction stage of engineering project | | | | | 2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  4hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours | |

**4.11Water Resources Engineering Construction Technology**

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| **Water Resources and Hydropower Construction Engineering (Construction Design Supervision Direction) Specialty**  **The Second Semester of the Third Year**  **Water Resources Engineering Construction Technology** | | | | | | | | | |
| **Course code: WRH 343** | | | | | | | | | |
| **Total learning time** | | **112** | | **T** | **P** | **C** | | | | |
| Theory: | | 64 | | **2** | **1.5** | **2.5** | | | | |
| Practice: | | 48 | |
| **Course**  **Objective:** | Understand construction machinery, master construction methods, and be able to prepare objective construction schemes for construction terms. | | | | | | |
| **Course content** | | | |  | | | |
| 1. **Construction water flow control**    1. Construction diversion    2. Construction closure    3. Foundation pit drainage | | | | 10 hours | | | |
| 1. **Foundation engineering construction**    1. Earthwork and stonework    2. Foundation treatment | | | | 5 hours | | | |
| 1. **Earth rock dam construction**    1. Earthwork construction of rolled earth rock dam    2. Construction of face rockfill dam | | | | 6 hours | | | |
| 1. **Construction of concrete works**    1. Formwork works    2. Reinforcement works    3. Sand production    4. Concrete mixing    5. Concrete dam construction    6. RCC dam construction | | | | 28 hours | | | |
| 1. **Masonry construction**     1. Brick masonry construction    2. Stone masonry construction | | | | 7 hours | | | |
| 1. **Water conveyance network construction**    1. Canal system construction    2. Pipeline construction | | | | 4 hours | | | |
| 1. **Underground engineering construction**    1. Tunnel and underground powerhouse construction | | | | 4 hours | | | |
| **Recommended/Reference Books:** | | | |  | | | |
| 1. *Water Resources Engineering Construction Technology*, edited by Huang Yamei and Zhang Jun, published by China Water and Power Press in 2014, version: ISBN: 9787517018162 2. *Specifications for Rolled Earth-rockfill Dam Construction* (DL/T 5129-2013); 3. *Specifications for Hydraulic Concrete Construction* (SL677-2014); 4. Specificationfor Levee Project Construction (SL260-2014). | | | |  | | | |
| **Teaching objective** | | | |  | | | |
| 1. **Construction water flow control**    1. Understand the basic methods and standards of diversion, master the selection of diversion schemes, and understand the basic knowledge of flood control;    2. Basic form and structure of cofferdam, closure method, closure procedure and construction;    3. Understand the technology and scheme selection of initial drainage and regular drainage. 2. **Foundation engineering construction**    1. Master the engineering characteristics of soil and earthwork excavation method and measurement; Master the principle and method of blasting construction, and understand the common control blasting construction technology; Be able to guide the rock blasting construction of foundation pit according to the basic requirements of blasting engineering;    2. Master the excavation method and treatment measures of soft foundation; Master the rock foundation grouting method and process; Master the grouting method and process of sand gravel foundation; Be able to organize grouting site construction. 3. **Earth rock dam construction**    1. Understand the planning principles of earth rock borrow pit; Master the construction procedures and methods of rolling earth rock dam; Be able to organize the on-site construction of rolled earth rock dam according to the basic requirements of the project;    2. Dam filling; Master the construction procedures and methods of concrete face rockfill dam; Be able to organize the on-site construction of concrete face rockfill dam according to the basic requirements of the project; Master the quality control technology of concrete face rockfill dam. 4. **Construction of concrete works**    1. Master the template classification method; Master the basic methods of formwork fabrication and installation; Be able to make and install formwork; Master the basic requirements for formwork removal;    2. Understand the reinforcement construction work and equipment preparation; Master reinforcement processing, connection and installation technology; Reinforcement construction inspection and protection;    3. Understand aggregate mining and processing methods; Understand the basic methods of aggregate storage;    4. Concrete batching requirements and strength influencing factors; Understand the concrete production system;    5. Preparation; Master concrete transportation knowledge; Master concrete pouring technology; Master concrete curing technology; Understand the construction technology in special seasons; Quality control technology;    6. Batching of RCC; RCC pouring technology; Master RCC quality control methods. 5. **Masonry construction**   Understand the basic technology of scaffold erection; Understand the requirements for preliminary preparation of bricklaying construction; Master masonry methods;   * 1. Understand the construction technology of dry masonry engineering; Master the masonry construction technology, and be able to organize the site construction of masonry works.  1. **Water conveyance network construction**    1. Master the basic channel construction technology; Understand sluice construction;    2. Master PE pipe construction technology; Master steel pipe construction. 2. **Underground engineering construction**    1. Understand the tunnel excavation mode and method; Master the basic methods of tunnel support and lining. | | | |  | | | |
| **Practice list** | | | **48hours** | | | | | |
| 1. Construction diversion planning 4 hours 2. Selection of construction scheme for earth rock dam 4 hours 3. Construction organization design of earth rock dam 6 hours 4. Determination of soil compaction parameters 2 hours 5. Rebar cutting calculation 4 hours 6. Rebar processing 6 hours 7. Formwork fabrication and installation 4 hours 8. Preparation and pouring of concrete 4 hours 9. Concrete curing and mixing equipment maintenance 4 hours 10. Selection of construction scheme for concrete gravity dam 4 hours 11. Brick masonry construction 4 hours 12. Stone masonry construction 2 hours | | | | | | |  | |

**4.12Cost and Bidding of Water Resources Engineering**

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| **Water Resources and Hydropower Construction Engineering (Construction Design Supervision Direction) Specialty**  **The Second Semester of the Third Year**  **Cost and Bidding of Water Resources Engineering** | | | | | | |
| **Course code: WRH 353** | | | | | | |
| **Total learning time:** | | **112** | **T** | | **P** | **C** | |
| Theory: | | 64 | **2** | | **1.5** | **2.5** | |
| Practice: | | 48 |
| **Course**  **objective:** | Through the study of the basic knowledge of water resources project budget estimate and the preparation of water resources project budget estimate, students can independently prepare water resources project budget estimate and bidding documents, cultivate students’ adaptability to actual positions, improve students’ professional quality, and meet the requirements of working ability for professional positions. | | | | | | |
| **Course content** | | | | 64 hours | | | |
| **Module 1: Cognition of water resources and hydropower project cost**  **Task 1: Understanding of water resources and hydropower projects**  1.Recognize water resources and hydropower projects;  2.Understand the cost documents of water resources and hydropower projects.  **Task 2: Project division and cost composition of project cost**  1.Recognize the division of water resources and hydropower projects;  2.Understand the cost composition of water resources and hydropower projects.  **Task 3: Cognition of project quota**  1.Cognitive engineering quota;  2.Prepare project quota;  3.Use engineering quota. | | | | 6 hours | | | |
| **Module II: Design budget estimate of water resources and hydropower projects**  **Task 1: Budget estimate preparation procedure and engineering quantity calculation**  1.Preparation procedure of design budget estimate;  2.Calculate the quantities.  **Task 2: Basic unit price preparation**  1.Prepare labor budget unit price;  2.Prepare material budget price;  3.Prepare budget prices of electricity, wind and water;  4.Prepare the use fee of construction machinery;  5.Prepare unit price of sand and gravel;  6.Prepare unit price of concrete and mortar materials.  **Task 3: Preparation of construction unit price**  1.Prepare earthwork unit price;  2.Prepare unit price of stonework;  3.Prepare the unit price of earth rock filling works;  4.Prepare unit price of concrete works;  5.Prepare unit price of formwork works;  6.Prepare unit price of drilling and grouting works;  7.Prepare the unit price of shotcrete anchor support works;  8.Prepare unit price of sand and gravel preparation project;  9.Prepare the unit price of water and soil conservation ecological construction project;  10.Prepare unit prices for other works.  **Task 4: Preparation of unit price of equipment and installation works**  1.Prepare unit price of equipment cost;  2.Prepare unit price of installation works.  **Task 5: Preparation of general estimate of the project**  1.Prepare budget estimate of divisional works;  2.Prepare the general estimate of the project;  3.Prepare annual investment and capital flow;  4.Quantity analysis;  5.Prepare preparation instructions and output and sort out documents. | | | | 50 hours | | | |
| **Module 3: Bidding documents for water resources and hydropower projects**  **Task 1: Preparation of project bidding documents**  1.Basic procedures for construction bidding  2.Composition of project construction bidding documents;  3.Prepare bill of quantities;  4.Preparation of tender base price.  **Task 2: Preparation of project bidding documents**  1.Basic procedures for construction bidding;  2.Composition of bidding documents;  3.Prepare bidding offer (including bidding skills and case analysis). | | | | 8 hours | | | |
| **Recommended/Reference Books:** | | | |  | | | |
| 1.*Measurement and Pricing Practice of Construction Projects*, edited by Deng Azi, published by China Water and Power Press in October 2021, Version 1.  2.*Water Resources Project Cost*, edited by Zeng Yu and Li Sha, published by Higher Education Press in 2020, Edition: the first edition.  3.*Water Resources Project Cost and Bidding*, edited by Xu Mingli, published by China Water and Power Press, in August 2021. | | | | | | | |
| **Teaching objective** | |  | | | | | |
| **Module 1. Cognition of water resources and hydropower project cost**  **1.Mastering the cost of water resources and hydropower projects**  1.1Understand the classification and basic construction procedures of water resources and hydropower projects.  1.2Master the types and functions of cost documents in different stages of water resources and hydropower projects.  1.3Understand the prediction method of construction and installation works of water resources and hydropower projects.  2.**Mastering project cost project division and cost composition**  2.1Master the project division of water resources and hydropower projects.  2.2Master the cost composition of water resources and hydropower projects.  3.**Mastering the quota of water resources and hydropower projects**  3.1Understand the classification of quota.  3.2Master the preparation method of engineering quota.  3.3Master the functions of various quotas  3.4Master the use of water resources and hydropower engineering quota. | | | | | | | |
| **Module II. Preparation of design budget estimate for water resources and hydropower projects**  **1.Mastering the budget estimate preparation procedure and engineering quantity calculation**  1.1Understand the preparation basis of preliminary design estimate.  1.2Master the preparation procedure of preliminary design estimate.  1.3Master the basis of engineering quantity calculation.  1.4Master the basic principles and calculation methods of engineering quantity calculation.  **2.Mastering basic unit price preparation**  2.1Master the composition and calculation of labor budget unit price.  2.2Master the calculation of material budget price.  2.3Master the calculation of construction electricity, water and wind budget prices.  2.4Master the calculation of machine shift cost of construction machinery.  2.5Master the calculation of unit price of aggregate and stone.  2.6Master the calculation of unit price of concrete and mortar.  **3.Mastering the compilation of unit price of construction engineering**  3.1Understand the composition and calculation procedure of construction cost.  3.2Master the classification of soil and rock.  3.3Master the calculation of unit price of various construction projects.  3.4Master the precautions of engineering quota.  **4.Mastering the unit price preparation of equipment and installation works**  4.1Understand the difference between equipment and materials.  4.2Master the composition of equipment cost unit price and the preparation of unit price.  4.3Master the compilation of unit price of installation works.  **5.Mastering the preparation of general estimate of the project**  5.1Master the composition of estimate of divisional works.  5.2 Master the method of preparing the budget estimate of divisional works.  5.3 Be familiar with the concept and calculation method of reserve fund.  5.4Master the calculation method of interest during the construction period.  5.5Master the preparation of the general estimate table of the project and the general estimate table of the project.  **6.Mastering quantity analysis**  6.1Master the calculation of price difference reserve fund and interest during the construction period.  6.2Master the preparation method of annual investment and capital flow statement and its role in calculating the general estimate of the project.  6.3Master the composition content of the budget estimate document.  6.4Master the preparation methods and requirements of preparation instructions. | | | | | | | |
| **Module III. Bidding documents for water resources and hydropower projects**  **1.Mastering the preparation of bidding documents for water resources projects**  1.1Understand the role of project bidding; Be familiar with project bidding procedures.  1.2Master the contents of bidding documents for water resources and hydropower projects.  1.3Master the preparation of bill of quantities of water resources projects.  1.4Master the preparation of water resources project bidding base price.  **2.Mastering bidding documents of water resources projects**  2.1Be familiar with the contents and preparation steps of bidding documents for water resources and hydropower projects  2.2Familiar with bidding process of water resources and hydropower projects.  2.3Master the preparation of bidding quotation (including bidding skills and case analysis). | | | | | | | |
| **Practice list** | | | | **48 hours** | | | |
| 1.Labor budget unit price preparation | | | | 2 hours | | | |
| 2.Material budget price preparation | | | | 2 hours | | | |
| 3.Preparation of electricity, wind and water budget prices | | | | 4 hours | | | |
| 4.Preparation of machine shift cost for construction machinery | | | | 2 hours | | | |
| 5.Preparation of unit price of concrete and mortar materials | | | | 4 hours | | | |
| 6.Preparation of earthwork unit price | | | | 4 hours | | | |
| 7.Preparation of unit price for stonework | | | | 4 hours | | | |
| 8.Preparation of unit price for earth rock filling works | | | | 2 hours | | | |
| 9.Preparation of unit price for concrete works | | | | 4 hours | | | |
| 10.Preparation of unit price for formwork works | | | | 2 hours | | | |
| 11.Preparation of unit price for drilling and grouting works | | | | 2 hours | | | |
| 12.Preparation of unit price for shotcrete anchor support works | | | | 2 hours | | | |
| 13.Preparation of unit price for sand and gravel preparation project | | | | 2 hours | | | |
| 14.Preparation of unit price for water and soil conservation ecological construction project | | | | 2 hours | | | |
| 15.Preparation of unit price of equipment and installation works | | | | 2 hours | | | |
| 16.Preparation of general estimate of the project | | | | 4 hours | | | |
| 17.Preparation of bidding documents for water resources projects | | | | 2 hours | | | |
| 18.Bidding documents for water resources projects | | | | 2 hours | | | |

**4.13Maintenance and Management of Water Resources Engineering**

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| **Water Resources and Hydropower Construction Engineering (Construction Design Supervision Direction) Specialty**  **The Second Semester of the Third Year**  **Maintenance and Management of Water Resources Engineering** | | | | | | | |
| **Course code: WRH 362** | | | | | | | |
| **Total learning time:** | | **80** | **T** | **P** | **C** | | |
| Theory: | | 32 | **1** | **1.5** | **1.5** | | |
| Practice: | | 48 |
| **Course**  **Objective:** | Through course learning, I have the basic ability to maintain and manage water source projects, water retaining structures, water transmission and release structures and embankment projects, and can master the knowledge and relevant measures of flood control and drought relief. | | | | | | |
| **Course content** | | | | | 32 hours | | |
| 1. **Understanding of water resources project maintenance and management**    1. Overview of maintenance and management of hydraulic engineering    2. Learning methods of water resources project maintenance and management | | | | | | | 2 hours |
| 1. **Maintenance and management of water source project**    1. Division of water source protection areas    2. Provisions on the administration of pollution prevention and control in water source protection areas    3. Maintenance and management of water source project    4. Information management technology of water source engineering | | | | | | | 4hours |
| 1. **Maintenance and management of water retaining structures**    1. Maintenance and management of earth rock dam    2. Maintenance and management of concrete dam and masonry dam    3. Reservoir information management technology | | | | | | | 10hours |
| 1. **Maintenance and management of water transmission and discharge structures**    1. Maintenance and management of water conveyance structures    2. Maintenance and management of water release structures    3. Information management technology for water transmission and release structures | | | | | | | 8hours |
| 1. **Dike engineering maintenance and management**     1. Overview of embankment works    2. Dike engineering maintenance and management    3. Maintenance and repair of embankment works    4. Information management technology of embankment engineering | | | | | | | 4hours |
| 1. **Flood control and drought relief**    1. Flood disaster    2. Flood control work    3. Drought disaster    4. Drought relief work | | | | | | | 4hours |
| **Recommended/Reference Books:** | | | | | | |  |
| 1. Water Resources Project Maintenance and Management, edited by Yang Weiwei, Northeast University Press. 2. Maintenance and Repair of Water Resources Projects, edited by Xi Liping, China Water and Power Press, published in July 2017. 3. Water Resources project management, edited by Mei Xiaowei, published by China Water and Power Press in 2013. 4. *Code of Maintenance and Repair for Earth Rockfill Dam* (SL210-2015); 5. *Code for Putting Construction Project Documents into Records* (GB/T50328-2019); 6. *Design Specification for Levee Project Management*(SL/T171-2020); 7. *Maintenance and Repair Specification of Levee Project* (SL595-2013); 8. *Code for Technical Management of Sluices* (SL75-2014); 9. *Code of Practice for Technical Management of Pumping Station* (GB/T30948-2014); 10. *Code of Maintenance and Repair for Concrete Dam* (SL230-2015); 11. *Standard for Scrapping of Dam Safety Monitoring Instrument* (SL621-2013); 12. *Technical Specification of Earth Dam Grouting* (SL564-2014); 13. Technical Specification for Earth-rockfill Dam Safety Monitoring (SL551-2012). | | | | | | | |
| **Teaching objective** | | | | | | |  |
| 1. **Quality objective**    1. Have the new era water resources spirit of “loyalty, cleanness, responsibility, science, realism and innovation”.    2. Have good professional quality and actively practice the new era water control policy of “giving priority to water-saving, spatial balance, systematic management and two hands”.    3. Have the good quality of hard-working, rigorous, cooperative and willing to contribute. 2. **Knowledge objective**    1. Understand the significance and content of water resources project maintenance and repair and the basic knowledge of implementation mode.    2. Master the basic knowledge of earth rock dams, concrete dams and masonry dams, embankments, sluices, spillways, tunnels, culverts, channels and canal system buildings.    3. Master the maintenance and repair knowledge of common water resources projects and auxiliary facilities. 3. **Capability objectivee**    1. Have the ability to preliminarily analyze the disease causes of hydraulic structures.    2. Have the basic ability to check and observe common hydraulic structures and understand the maintenance of the working state of hydraulic structures.    3. Have the basic ability to maintain and repair common hydraulic structures. | | | | | | | |
| **Practice list** | | | | | | **48hours** | |
| 1. Overview of hydraulic engineering 2. Relevant engineering standards 3. Engineering archives 4. Division of drinking water source protection areas 5. Water quality requirements for surface water source protection areas of drinking water 6. Maintenance and management of water source project 7. The strictest water resources management system 8. Maintenance of earth rock dam 9. Inspection of earth rock dam 10. Leakage of earth rock dam and its treatment 11. Repair of slope protection of earth rock dam 12. Crack treatment of concrete dam and masonry dam 13. Leakage treatment of concrete dam and masonry dam 14. Anti sliding stability treatment of concrete dam and masonry dam 15. Maintenance and management of water pipeline 16. Maintenance and management of water conveyance channel 17. Water conveyance flow measurement 18. Maintenance and management of spillway 19. Maintenance and management of sluice 20. Maintenance of embankment works 21. Embankment maintenance 22. River maintenance and prevention worker 23. Flood control engineering measures 24. Anti drought engineering measures | | | | | | 2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  2 hours | |

**4.14Chinese Synthesis -2**

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| **Water Resources and Hydropower Construction Engineering (Construction Design Supervision Direction) Specialty**  **The Second Semester of the Third Year**  **Chinese Synthesis -2** |
| **Course code: GenC 332** |

**Total learning time: 96**

Theory: 48 T P C

Practice: 48 1.5 1.5 2

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| **Course objective:**Cultivate the comprehensive Chinese ability of foreign students in China, and pass the HSK4 examination through the study of the course.  **Course content** | | | |
| Learning situation | Learning content (specific task) | Class hours | |
| Lesson 1  Life can be better | 30 new words; Language points: Yes; I’m afraid; to the end; Take for example; Dare. | 2 hours | |
| Lesson 2  Man and nature | 30 new words; Language points: Just; Do; Times; For…, do…; Still. | 2 hours | |
| Lesson 3  Technology and the world | 30 new words; Language points: Yes or no; cannot bear sth; next; in addition to; take…as… | 3 hours | |
| Lesson 4  The taste of life | 30 new words; Language points: interrogative pronouns are used flexibly to express any reference; Upper; Come out; in general; lie in. | 3 hours | |
| Lesson 5  Scenery on the road | 30 new words; Language points: v+ ing +v+ ing; I Just; Exactly? Get up; V+ up. | 3 hours | |
| HSK4 simulation training 1 | Explanation of HSK4 real examination questions | 3.5 hours | |
| HSK4 simulation training 2 | Explanation of HSK4 real examination questions | 3.5 hours | |
| HSK4 simulation training 3 | Explanation of HSK4 real examination questions | 3.5 hours | |
| HSK4 simulation training 4 | Explanation of HSK4 real examination questions | 3.5 hours | |
| HSK4 simulation training 5 | Explanation of HSK4 real examination questions | 3.5 hours | |
| HSK4 simulation training 6 | Explanation of HSK4 real examination questions | 3.5 hours | |
| HSK4 simulation training 7 | Explanation of HSK4 real examination questions | 3.5 hours | |
| HSK4 simulation training 8 | Explanation of HSK4 real examination questions | 3.5 hours | |
| HSK4 simulation training 9 | Explanation of HSK4 real examination questions | 3.5 hours | |
| HSK4 simulation training 10 | Explanation of HSK4 real examination questions | 3.5 hours | |
| **Recommended/Reference Books:** | | |  |

1.*HSK Standard Course*, edited by Jiang Liping, Beijing Language and Culture University Press, ISBN978-7-5619-3809-9.

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| 2.*Chinese Proficiency Grading Standards for International Chinese Language Education*, compiled by State Language Commission, Beijing Language and Culture University Press, ISBN9877561957196.  **Teaching objective** |  |
| 1.Quality objective: Tell Chinese stories, convey Chinese voice, display Chinese image, and cultivate international students who know, love and love China.  2.Knowledge objective: Master HSK4 phonetics, vocabulary, sentence patterns, syntax, culture and other knowledge.  3. Ability objective: Have certain listening, speaking, reading and writing skills and preliminary translation skills. Be able to conduct basically complete, coherent and effective social communication on complex topics such as daily life, study and work. |  |
|  |
| **Practice list** |  |
| |  |  |  | | --- | --- | --- | | Serial number | Learning situation | Teaching hours | | 1 | Life can be better | 2 hours | | 2 | Man and nature | 2 hours | | 3 | Technology and the world | 3 hours | | 4 | The taste of life | 3 hours | | 5 | Scenery on the road | 3 hours | | 6 | HSK4 real examination training | 3.5 hours | | 7 | HSK4 real examination training | 3.5 hours | | 8 | HSK4 real examination training | 3.5 hours | | 9 | HSK4 real examination training | 3.5 hours | | 10 | HSK4 real examination training | 3.5 hours | | 11 | HSK4 real examination training | 3.5 hours | | 12 | HSK4 real examination training | 3.5 hours | | 13 | HSK4 real examination training | 3.5 hours | | 14 | HSK4 real examination training | 3.5 hours | | 15 | HSK4 real examination training | 3.5 hours | |  |

**4.15Chinese Culture -2**

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| **Water Resources and Hydropower Construction Engineering (Construction Design Supervision Direction) Specialty**  **The Second Semester of the Third Year**  **Chinese Culture -2** | | | | | | | |
| **Course code: GenC 371** | | | | | | | |
| **Total learning time:** | | **32** | **T** | **P** | | **C** | |
| Theory: | | 32 | **1** | **0** | | **1** | |
| Practice: | | 0 |
| **Course objective:** | Promote the integration of excellent water culture into education and teaching, and spread Chinese excellent traditional culture. | | | | | | |
| **Course content** | | | | | | | |
| **1 Literary works 16 hours**  1.1 *Commentary on the Waterways Classic: Yellow River - Four*  1.2 Green Brook  1.3 View the sea  1.4 Niannujiao - Recalling Antiquity at the Red Cliff | | | | |
| **2 Water resources engineering and water resources figures 16 hours**  2.1 Dujiangyan and Li Bing and his son  2.2 Su Causeway and Su Shi  2.3 Huang Dafa - Daihatsu Canal Bridge  2.4 Luoyang Bridge in Quanzhou and Caixiang | | | | |
| **Recommended/Reference Books:** | | | | | | |
| 1.*Water Culture and Education in China*, Cai Mei, China Water and Power Press, ISBN 9787517098096. | | | | |
| **Teaching objective** | | | | | | |
| **1 Literary works**  1.1 Study the *Commentary on the Waterways Classic: Yellow River – Four;*  1.2 Experience the wonderful scenes of Longmen waterfall in *Yellow River – Four;*  1.3 Learn the water of Green Brook and feel the mood and attitude towards life conveyed by landscape poetry;  1.4 Feel the natural scenery of wind surge in Red Cliff;  1.5 Understand Su Shi’s complicated mood;  1.6 Feel the grandeur of Cao Cao’s climbing and viewing the sea;  1.7 Comprehend the poet’s broad mind and grand bearing.  **2 Water resources engineering and water resources figures**  2.1 Learn the construction process of Dujiangyan and overview of main works;  2.1 Master the water control thought and its cultural connotation in Dujiangyan  2.3 Understand the stories behind Su Causeway and Su Shi  2.4 Grasp the water culture thought of Su Causeway and Su Shi  2.5 Learn the story of Huang Dafa and Daihatsu Canal Bridge, the “model of the times” of “walk the talk, build the canal”;  2.6 Learn about the great achievements of Luoyang Bridge and Cai Xiang;  2.7 Understanding the content of water culture contained in ancient water resources projects in China;  2.8 Understanding the scientific and technological level and achievements of ancient Chinese water resources projects. | | | | |

**4.16Chinese Cultural Practice -2**

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| **Water Resources and Hydropower Construction Engineering (Construction Design Supervision Direction) Specialty**  **The Second Semester of the Third Year**  **Chinese Cultural Practice -2** | | | | | | |
| **Course code: Gen 381** | | | | | | |
| **Total learning time:** | | **48** | **T** | **P** | | **C** | |
| Theory: | | 0 | **0** | **1.5** | | **0.5** | |
| Practice: | | 48 |
| **Course**  **objective:** | Promote the integration of excellent water culture into education and teaching, and spread the excellent traditional Chinese culture. | | | | | | |
| **coursecontent** | | | | |  | | |
| 1 Chishui River-Renhuai Reach-Brewing | | | | | 12 hours | | |
| 2 Qianzhong water control project | | | | | 12 hours | | |
| 3 Goupitan Hydropower Station Dam | | | | | 12 hours | | |
| 4 Ethnic minorities and water  4.1 Miao Nationality - Dragon Boat Festival  4.2 Buyi Nationality - Chabai Song Festival  4.3 Gelao Nationality - Eating New Festival  4.4 Yao Nationality - King Pan Festival | | | | | 12 hours | | |
| **Recommended/Reference Books:** | | | | |  | | |
| 1.*Water Culture and Education in China*, Cai Mei, China Water and Power Press, ISBN 9787517098096. | | | | |  | | |
| **Teaching objective** | | | | |  | | |
| 1.Understand and learn the history and culture of Chishui River in Guizhou, and understand the brewing technology in Guizhou.  2.Understand the comprehensive utilization of the central Guizhou water resources project.  3.Learn about Goupitan Hydropower Station - a miracle of hydropower in karst landform.  4.Understand the important relationship between ethnic minorities and water culture. | | | | |  | | |

**5. List of lab topics**

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| Topic title | Laboratory name  /Workshop |
| Applied Chemistry | Chemical Laboratory |
| Applied Physics | Physics Laboratory |
| Practical training of hydraulic engineering survey | Engineering survey training room |
| Practical training of hydraulic engineering drawing | Drawing training room |
| Practical training of water resources project cost | Water resources project cost training room |
| Practical training of water resources project bidding | Water resources project bidding training room |
| Practical training of building material testing | Building materials training room |
| Geotechnical engineering training | Engineering exploration training center and geotechnical Laboratory |
| Student off campus practice | Off campus training base |
| Student on campus practice | On campus training base |
| Hydraulics training | Hydraulics training room |
| Cognition of hydraulic structure structure and practical training of intelligent hydrology | Dayu Pavilion, comprehensive training center of hydraulic engineering |
| Water resources engineering construction technology training | Hydraulic engineering construction training center |
| Irrigation engineering training | Intelligent and efficient water-saving irrigation training base |
| Water-saving technology teaching and training | Water-saving publicity and education base |

**6. Names of members of the revision committee**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
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| 7 | Mr. Khalil Ahmed | Lecturer (Civil) | Sahiwar Institute of government and technology | 0343-7045290  [khalilahmedgct@gmail.com](mailto:khalilahmedgct@gmail.com) |
| 8 | Mr. Mohammed Afzal Gondal | Chairman | Gondal pre selection, GT Road, Gujarat | 0300-4000070  [gondalgroup@hotmail.com](mailto:gondalgroup@hotmail.com) |
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**7. TEVTA course review committee recommendations**

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| --- | --- | --- |
| **Sr. No** | **TEVTA Course Review Committee Recommendations** | **Status** |
| 1. | **Mr. Muhammad Arif Butt**  Assistant Professor, Punjab University College of I.T, Old (Allama Iqbal) Campus, The Mall, Lahore | Convener |
| 2. | **Mr. Imran Ashraf**  Chief Instructor, Govt. College of Technology, Multan | Member |
| 3. | **Mr. Salman Tariq,**  HoD/ Sr. Instructor (I.T) GCT-Raiwind Road, Lahore | Member |
| 4. | **Ms. Tayyaba Amin**  HoD / Instructor(CIT), GCT (W) Lytton Road, Lahore | Member |
| 5. | **Mr. Tahir Ameen**  Manager (I.T) / Head of Department  House No. 430, Block-3, sector B-2 Township, Lahore | Member |
| 6. | **Mr. Muhammad Ali Butt,** Instructor (I.T) GTTI-Mughalpura, Lahore | Member |
| 7. | **Mr. Irfan Sarwar,**  Network Engineer, MIS Wing, TEVTA | Member |
| 8. | **Muhammad Imran Rashid**  Software Engineer, M/S Systems (Pvt.) Ltd. 97-Aziz avenue, Canal Bank, Gulberg-5, Lahore | Member |