**CURRICULUM**

For

**THREE YEARS’ DIPLOMA OF ASSOCIATE ENGINEER**

IN

**LAND AND RESOURCE SURVEY AND MANAGEMENT**

Entry Level: Matriculation (Science /Technical), Intermediate

Duration of Course: Three Years

Credit Hours: **66**

Methodology: Theory 45%

Practical 55 %

Examination System: Annual System & Semester

(First 02 Years Annual System, Last Year Semester System at China)

Sindh Technical Education & Vocational Training Authority

**Sindh-TEVTA**

**DAE IN LAND & RESOURCE SURVEY & MANAGEMENT**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **FIRST YEAR** | | | | | |
| **Course code** | | **Course Name** | **T** | **P** | **C** |
| Gen | 111 | Islamiat & Pakistan Studies | 1 | 0 | 1 |
| Eng | 112 | English | 2 | 0 | 2 |
| GenC | 112 | Chinese Language I | 2 | 0 | 2 |
| Math | 113 | Applied mathematics I | 3 | 0 | 3 |
| Phy. | 122 | Applied Physics | 1 | 3 | 2 |
| Ch. | 112 | Applied Chemistry | 1 | 3 | 2 |
| LRSM | 111 | Introduction to Natural Resources | 1 | 0 | 1 |
| LRSM | 123 | Fundamentals of Surveying and Mapping | 2 | 3 | 3 |
| LRSM | 132 | Digital mapping | 1 | 3 | 2 |
| LRSM | 142 | General Geology | 2 | 0 | 2 |
| LRSM | 152 | Geographic Information System | 1 | 3 | 2 |
| **Total** | | | **17** | **15** | **22** |

|  |  |  |  |  |  |
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| **SECOND YEAR** | | | | | |
| **Course code** | | **Course Name** | **T** | **P** | **C** |
| Gen | 211 | Islamiat & Pak Studies | 1 | 0 | 1 |
| Math | 212 | Applied Mathematics-II | 2 | 0 | 2 |
| MgmC | 212 | Understanding China | 2 | 0 | 2 |
| GenC | 212 | Chinese Language- II | 2 | 0 | 2 |
| LRSM | 212 | Tectonic Geology | 1 | 3 | 2 |
| LRSM | 223 | Mineral and Rock Identification | 2 | 3 | 3 |
| LRSM | 232 | Real Estate Registration Investigation | 1 | 3 | 2 |
| LRSM | 242 | Digital Cartography | 1 | 3 | 2 |
| LRSM | 252 | Remote Sensing Application of Land and Resources | 2 | 0 | 2 |
| LRSM | 262 | Hydrology and Engineering Geology | 2 | 0 | 2 |
| **Total** | | | **16** | **12** | **20** |

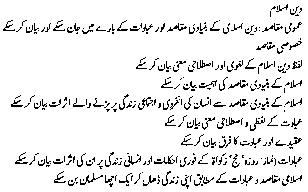
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| **THIRD YEAR (1ST SEMESTER)** | | | | | |
| **Course Code** | | **Course Name** | **T** | **P** | **C** |
| Gen | 311 | Islamiat & Pak Studies | 1 | 0 | 1 |
| GenC | 322 | Chinese Comprehensive-1 | 1 | 3 | 2 |
| GenC | 311 | Chinese Listening | 0 | 3 | 1 |
| GenC | 331 | Chinese Speaking | 0 | 3 | 1 |
| GenC | 351 | Chinese Reading and Writing | 0 | 3 | 1 |
| GenC | 341 | Chinese Culture -1 | 1 | 0 | 1 |
| GenC | 361 | Chinese Cultural Practice -1 | 0 | 3 | 1 |
| LRSM | 312 | Deposit Geology | 2 | 0 | 2 |
| **Total** | | | **05** | **15** | **20** |

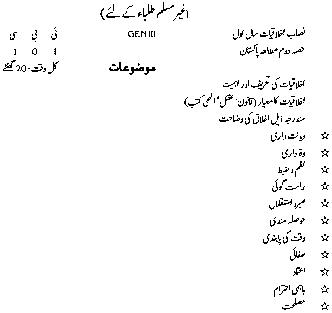
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| **THIRD YEAR (2ND SEMESTER)** | | | | | |
| **Course Code** | | **Course Name** | **T** | **P** | **C** |
| LRSM | 322 | Land and Resources Survey | 2 | 0 | 2 |
| LRSM | 332 | Land Remediation and Ecological Restoration | 1 | 3 | 2 |
| LRSM | 342 | Mineral Geological Survey | 1 | 3 | 2 |
| LRSM | 352 | Land Spatial Evaluation | 2 | 0 | 2 |
| LRSM | 362 | Land Spatial Database Application | 1 | 3 | 2 |
| GenC | 372 | Chinese Comprehensive-2 | 1 | 3 | 2 |
| GenC | 381 | Chinese Culture -2 | 1 | 0 | 1 |
| GenC | 391 | Chinese Cultural Practice -2 | 0 | 3 | 1 |
| **Total** | | | **09** | **15** | **14** |

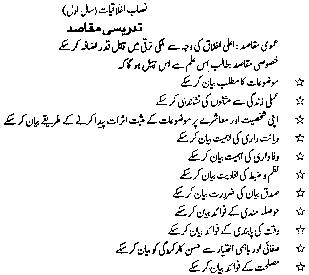


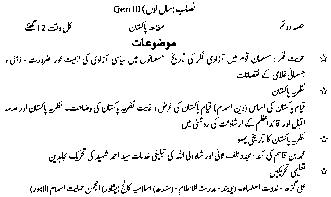




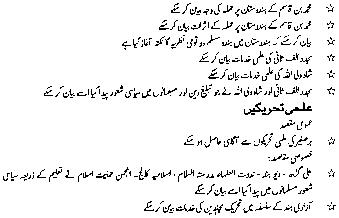












**English**

**Course Code: Eng-112**

**Total Contact Hours: 64**

**Theory: 64**   **T P C**

**Practical: 0 2 0 2**

**Course Objectives:**

At the end of the course, students will have cognitive skills that enable them to present facts

in a systematic and logical manner to meet the language needs of dynamic business and industrial

fields for functional daily use, and will develop reading, writing, and comprehension skills.

**Course content**

**English Article "A"**

**1. Essay/Article 16 hours**

1.1 The first eight intermediate articles. English II

1. **Cloze filling for 4 hours**

1.2 Select paragraphs containing 50-100 words from the article. Every 11th word or any related word will be omitted. The number of missing words will be between 5 and 10. The selected word may or may not be a word used in the text, but it should be a suitable word.

**English Article "B"**

**3. Grammar 26 hours**

3.1 Sentence structure

3.2 Tense

3.3 Part of speech

3.4 Punctuation mark

3.5 Person Shift

3.6 Polysemy

3.7 Frequently Confused Words

**4. Composition 8 hours**

4.1 Letters/SMS

4.2 Job Application Letter

4.3 Character certificate for scholarships

4.4 Telegraph, radio telegraph and radiotelegraph, telex and facsimile

4.5 Paper Writing

4.6 Technical education, science and our lives, computers, environmental pollution, and students' obligations.

**5. Translation 4 hours**

5.1 Translate from Urdu to English.

For foreign students: a paragraph or dialogue. **6 hours**

**Recommended Books**

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

**Teaching objectives**

**Article A**

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

1.1 Operation, skimming, and scanning of text

1.2 Identify New Ideas

1.3 Restate facts and words in one's own words

1.4 Write a story summary

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

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

2.2 Fill in the blanks with one’s own words

**Article B**

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

3.1 Use grammar rules to construct meaningful sentences containing subjects and predicates

3.2 Classify time states, namely present, past, and future, and correctly use verb tenses in different forms to represent relevant time.

3.3 Identify function word and content words.

3.4 Use punctuation mark to make meaning clear

3.5 Describe what a person says in both direct and indirect forms

3.6 Write articles

3.7 Distinguish confusing words

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

4.1 Use concepts to construct employment applications and obtain character certificates for scholarships

4.2 Define and write telegrams, telegrams and wireless telegrams, telex and facsimile

4.3 Describe the steps for a good essay writing

4.4 Describe the characteristics of a good idea

4.5 Describe the methods of writing an essay

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

1. **Applicable translation rules**

5.1 Description confusion

5.2 Describe the translation rules

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

**Chinese Language I**

**Course code: GenC-112**

**Total contact hours: 64**

**Theory: 64 T P C**

**Practical: 0 2 0 2**

**AIMS** This course consists of 18 classes (including mid-term test and final test). After completing this course, students can master the primary Chinese language knowledge taught in the content of the course, and be able to achieve and exceed the **HSK level One**.

**INSTRUCTION OBJECTIVE** The course is mainly for zero-based learners. Through the study of this course, learners can lay a solid language foundation and have a preliminary understanding of Chinese language structure, including Pinyin, Chinese characters, words, grammar and other knowledge. After completing this course, learners can understand and use some basic words and sentences, and complete the most basic communication, such as greeting, asking, introducing, shopping and so on.

**COURSE CONTENTS**

1. **Lesson 1 Hello Vs Nǐhǎo 1 hour**

This lesson briefly introduces pinyin and spelling methods.

1. **Hello! 1 hour**

This lesson briefly introduces the sentence patterns used in greeting, such as dialogue, greeting farewell, and introducing one's own name.

1. **Lesson 3 I am Thai 1 hour**

Teach students to understand basic classroom language, learn to use "national + person" for simple communication dialogue, and introduce which country they come from.

1. **Lesson 4 What's the date today 1 hour**

This lesson introduces the expression of numbers, years, months, etc., and teaches students to ask about a date and answer it.

1. **Lesson 5 This is my brother 2 hours**

By introducing family members, students can understand the simple words when asking about family status and introduce them briefly.

1. **Lesson 6 I'm nineteen years old 2 hours**

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.

1. **Lesson 7 What time is it 2 hours**

This lesson introduces the usage of hours, minutes and seconds, so that students can describe their lives with time points.

1. **Lesson 8 What do you like to do on weekends 2 hours**

This lesson introduces the expressions of hobbies, interests, activities and other related nouns, so as to help students communicate with each other by using simple linking sentences.

**Semi-MID-TERM REVIEW**  **2 hours**

Mid-term review is a summary of the knowledge learned in the past. The test paper uses the knowledge points learned in the past to design listening questions, answering questions by looking at pictures, connecting questions, filling in blanks, etc., which are illustrated with pictures and interesting, and can test students' learning effect.

1. **Lesson 9 Introduce yourself 2 hours**

Explain the related expressions related to self-introduction, and students can correctly introduce their names, families, ages, hobbies, school majors, etc.

1. **Lesson 10 My father is in Beijing** **2 hours**

This lesson introduces the names of major cities in China, Britain and Europe, and introduces the use of "person + place" in sentences.

1. **Lesson 11 I came to Beijing by plane 2 hours**

This lesson introduces the means of transportation and how to express long sentences in combination with the time and place learned before.

1. **Lesson 12 I eat at the company 2 hours**

This lesson introduces the polite expressions used in eating.

1. **Lesson 13 The weather is fine on Monday**  **2 hours**

It shows the conversations and topics that may appear when you want to date.

1. **Lesson 14 How much is it altogether** **2 hours**

This lesson introduces the vocabulary and sentences commonly used in shopping, and how to use Chinese for daily shopping.

1. **Lesson 15 What would you like to have 2 hours**

This lesson introduces the classic Chinese and Thai cuisine, the terms of treating guests, and the communicative terms of how to order food in restaurants.

1. **Lesson 16 The bathroom is next to the pantry** **2 hours**

This lesson introduces location and location words, and how to use location words to introduce the location of a place.

**Semi- FINAL REVIEW** **2 hours**

Similar to the mid-term test questions, it is a test of important knowledge points of the course to test students' learning effect. This lesson briefly introduces pinyin and spelling methods.

**AIMS** After completing this course, students can master the basic Chinese language knowledge taught in the content of the course, and be able to reach and exceed **HSK level TWO.**

**INSTRUCTION OBJECTIVE** Learners can master the language knowledge and use some basic grammar and sentence patterns in communication, learn to express personal feelings and attitudes in Chinese, and can complete communicative functions such as gratitude, apology, introduction and farewell, and begin to understand Chinese cultural knowledge and cultivate interest in learning.

**Semi- FINAL REVIEW** **2 hours**

Similar to the mid-term test questions, it is a test of important knowledge points of the course to test students' learning effect. This lesson briefly introduces pinyin and spelling methods.

1. **Lesson 1 I was still sleeping at 7 o'clock 1 hour**

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.

1. **Lesson 2 It will be cloudy tomorrow 1 hour**

By introducing the weather in several Chinese cities, explain how to use temperature to answer weather questions.

1. **Lesson 3 That one is five hundred dollars cheaper than this one 1 hour**

This lesson explains comparative sentences, and compares them in terms of price, height and temperature, so that students can understand comparative sentences thoroughly.

1. **Lesson 4 This is a family photo 1 hour**

This lesson introduces family members in detail through appearance, clothing and occupation, so that students can master more detailed description methods.

1. **Lesson 5 It is forbidden to take pictures here 2 hours**

This lesson leads students to understand the relevant knowledge points of expressing commands, such as forbidden and forbidden, so that students can correctly understand the meaning of words in daily life.

1. **Lesson 6 I can't find something 2 hours**

This lesson introduces the use of language points in "V + should + result complement", so that students can correctly use relevant sentence patterns in communication.

1. **Lesson 7 I have been to Sichuan and seen pandas 2 hours**

This lesson introduces Chinese culture through "V + have been to", such as the Great Wall, the Forbidden City, national treasures, etc., so that students can use this sentence pattern correctly in communication.

1. **Lesson 8 I hope you can come to my wedding 2 hours**

By introducing Chinese weddings, this lesson enables students to master the verbal usage of banquet invitation, holiday blessing, emotional expression and euphemistic refusal.

**Semi-MID-TERM REVIEW 2 hours**

This section leads students to review the knowledge points they have learned in the past and conduct mid-term tests through reading pictures, listening questions and connecting questions to test students' learning effect.

1. **Lesson 9 Be ill, take more rest 2 hours**

This lesson introduces the vocabulary related to illness and the doctor's medication advice, so that students can correctly describe and understand the doctor's meaning in the process of seeing a doctor.

1. **Lesson 10 The station is just across the road 2 hours**

This lesson introduces the way of asking places and answers by asking directions, which helps students to use relevant sentence patterns for practical communication questions and answers.

1. **Lesson 11 She sings very well 2 hours**

This lesson focuses on hobbies and introduces the correct use of related words in sentences.

1. **Lesson 12 Did you do well in the exam 2 hours**

By describing the examination process and the situation of answering questions, students can correctly understand the instructions of the examination room, the distribution of questions and the analysis of test paper problems

1. **Lesson 13 Buy two and get one free 2 hours**

This lesson introduces the commodity names of supermarkets, as well as common terms such as promotional activities, discounts and price reductions.

1. **Lesson 14 We're a new restaurant 2 hours**

This lesson helps students understand how to understand the waiter's recommendation and put forward the food requirements for ordering.

1. **Lesson 15 The girl is dressed in white clothes 2 hours**

This lesson introduces others' clothes and how to use grammar points to describe the state of something through "V + be dressed in".

1. **Lesson 16 You can be discharged from hospital next week 2 hours**

This lesson introduces a variety of expressions, such as hospitalization, visiting patients and discharge, so that students can understand the language of hospital scenes and strengthen their multi-scene communication ability.

**Semi- FINAL REVIEW 2 hours**

This section is similar to the mid-term review, which leads students to review the knowledge points they have learned in the past and conduct final tests by looking at pictures, listening questions, connecting questions, etc., to test students' learning effect.

**Applied Mathematics I**

**Course Code: Math-113**

**Total Contact Hours: 96**

**Theory: 96 T P C**

**Practical: 0 3 0 3**

Prerequisite: Must complete the mathematics elective course.

Course Objectives: After completing the course, students will be able to

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

**Course content**

|  |  |  |
| --- | --- | --- |
| **1** | **QUADRATIC EQUATIONS** | **6 Hrs** |
| 1.1 | Standard Form |  |
| 1.2 | Solution |  |
| 1.3 | Nature of roots |  |
| 1.4 | Sum & Product of roots |  |
| 1 .5 | Formation |  |
| 1.6 | Problems |  |
| **2** | **ARITHMETIC PROGRESSION AND SERIES** | **3Hrs** |
| 2.1 | Sequence |  |
| 2.2 | Series |  |
| 2.3 | nth term |  |
| 2.4 | Sum of the first n terms |  |
| 2.5 | Means |  |
| 2.6 | Problems |  |
| **3** | **GEOMETRIC PROGRESSION AND SERIES** | **3Hrs** |
| 3.1  3:2  3.3 | nth term  sum of the first n terms  Means |  |
| 3.4 | Infinite Geometric progression |  |
| 3.5 | Problems |  |
| **4** | **BINOMIAL THEOREM** | **6 Hrs** |
| 4.1 | Factorials |  |

* 1. Binomial Expression
  2. Binomial Co-efficient
  3. Statement
  4. The General Term
  5. The Binomial Series.
  6. Problems

## PARTIAL FRACTIONS 6 Hrs

* 1. Introduction
  2. Linear Distinct Factors Case I
  3. Linear Repeated Factors Case II
  4. Quadratic Distinct Factors Case III
  5. Quadratic Repeated Factors Case IV
  6. Problems

## FUNDAMENTALS OF TRIGONOMETRY 6 Hrs

* 1. Angles
  2. Quadrants
  3. Measurements of Angles
  4. Relation between Sexagesimal& circular system
  5. Relation between Length of a Circular Arc & the Radian Measure of its central Angle
  6. Problems

## TRIGONOMETRIC FUNCTIONS AND RATIOS 6 Hrs

* 1. trigonometric functions of any angle
  2. Signs of trigonometric Functions
  3. Trigonometric Ratios of particular Angles
  4. Fundamental Identities
  5. Problems

## GENERAL IDENTITIES 6 Hrs

* 1. The Fundamental Law
  2. Deductions
  3. Sum & Difference Formulae
  4. Double Angle Identities
  5. Half Angle Identities
  6. Conversion of sum or difference to products
  7. Problems

## SOLUTION OF TRIANGLES 6 Hrs

* 1. The law of Sine‟s
  2. The law of Cosines
  3. Measurement of Heights & Distances
  4. Problems

## MENSURATION OF SOLIDS 30 Hrs

* 1. Review of regular plane figures and Simpson's Rule
  2. Prisms
  3. Cylinders
  4. Pyramids
  5. Cones
  6. Frusta
  7. Spheres

## VECTORS 9 Hrs

* 1. Sealers & Vectors
  2. Addition & Subtraction
  3. The unit Vectors I, j, k
  4. Direction Cosines
  5. Sealer or Dot Product
  6. Deductions
  7. Dot product in terms of orthogonal components
  8. Deductions
  9. Analytic Expression for a x b.
  10. Problems.

## MATRICES AND DETERMINANTS 9 Hrs

* 1. Definition of Matrix
  2. Rows & Columns
  3. Order of a Matrix
  4. Algebra of Matrices
  5. Determinants
  6. Properties of Determinants
  7. Solution of Linear Equations
  8. Problems

# 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

**Math-113 APPLIED MATHEMATICS-I INSTRUCTIONAL OBJECTIVES**

# USE DIFFERENT METHODS FOR THE SOLUTION OF QUADRATIC EQUATIONS

* 1. Define a standard quadratic equation.
  2. Use methods of factorization and method of completing the square for solving the equations.
  3. Derive quadratic formula.
  4. Write expression for the discriminant
  5. Explain nature of the roots of a quadratic equation.
  6. Calculate sum and product of the roots.
  7. Form a quadratic equation from the given roots.
  8. Solve problems involving quadratic equations.

# UNDERSTAND APPLY CONCEPT OF ARITHMETIC PROGRESSION AND SERIES

* 1. Define an Arithmetic sequence and a series
  2. Derive formula for the nth term of an A.P.
  3. Explain Arithmetic Mean between two given numbers
  4. Insert n Arithmetic means between two numbers
  5. Derive formulas for summation of an Arithmetic series
  6. Solve problems on Arithmetic Progression and Series

# UNDERSTAND GEOMETRIC PROGRESSION AND SERIES

* 1. Define a geometric sequence and a series.
  2. Derive formula for nth term of a G.P.
  3. Explain geometric mean between two numbers.
  4. Insert n geometric means between two numbers.
  5. Derive a formula for the summation of geometric Series.
  6. Deduce a formula for the summation of an infinite G.P.
  7. Solve problems using these formulas.

# EXPAND AND EXTRACT ROOTS OF A BINOMIAL

* 1. State binomial theorem for positive integral index.
  2. Explain binomial coefficients: (n,0), (n,1)………..(n,r),… (n,n)
  3. Derive expression for the general term.
  4. Calculate the specified terms.
  5. Expand a binomial of a given index. -
  6. Extract the specified roots
  7. Compute the approximate value to a given decimal place.
  8. Solve problems involving binomials.

# RESOLVE A SINGLE FRACTION INTO PARTIAL FRACTIONS USING DIFFERENT METHODS.

* 1. Define a partial fraction, a proper and an improper fraction.
  2. Explain all the four types of partial fractions.
  3. Set up equivalent partial fractions for each type.
  4. Explain the methods for finding constants involved.
  5. Resolve a single fraction into partial fractions.
  6. Solve problems involving all the four types.

# UNDERSTAND SYSTEMS OF MEASUREMENT OF ANGLES.

* 1. Define angles and the related terms.
  2. Illustrate the generation of angle.
  3. Explain sexagesimal and circular systems for the measurement of angles
  4. Derive the relationship between radian and degree.
  5. Convert radians to degrees and vice versa.
  6. Derive a formula for the circular measure of a central angle.
  7. Use this formula for solving problems.

# APPLY BASIC CONCEPTS AND PRINCIPLES OF TRIGONOMETRIC FUNCTIONS

* 1. Define the basic trigonometric functions/ratios of an angle as ratios of the sidesof a right triangle.
  2. Derive fundamental identities.
  3. Find trigonometric ratios of particular angles.
  4. Draw the graph of trigonometric functions.
  5. Solve problems involving trigonometric functions.

# USE TRIGONOMETRIC IDENTITIES IN SOLVING TECHNOLOGICAL PROBLEMS

* 1. List fundamental identities
  2. Prove the fundamental law
  3. Deduce important results
  4. Derive-sum and difference formulas
  5. Establish half angle, double angle & triple angle formulas
  6. Convert sum or difference into product& vice versa
  7. Solve problems

# USE CONCEPTS, PROPERTIES AND LAWS OF TRIGONOMETRIC FUNCTIONS FOR SOLVING TRIANGLES

* 1. Define angle of elevation and angle of depression.
  2. Prove the law of sins and the law of cosines.
  3. Explain elements of a triangle.
  4. Solve triangles and the problems involving heights and distances.

# USE PRINCIPLES OF MENSTRUATION IN FINDING SURFACES, VOLUME AND WEIGHTS OF SOLIDS.

* 1. Define menstruation of plane and solid figures
  2. List formulas for perimeters & areas of plane figure.
  3. Define pyramid and cone.
  4. Define frusta of pyramid and cone.
  5. Define a sphere and a shell.
  6. Calculate the total surface and volume of each type of solid.
  7. Compute weight of solids.
  8. Solve problems of these solids.

# USE THE CONCEPT AND PRINCIPLES OF VECTORS IN SOLVING TECHNOLOGICAL PROBLEMS.

* 1. Define vector quantity.
  2. Explain addition and subtraction of vector
  3. Illustrate unit vectors I, j, k.
  4. Express a vector in the component form.
  5. Explain magnitude, unit vector, directionconsines of a vector.
  6. Derive analytic expression for dot product and cross product of two vector.
  7. Deduce conditions of perpendicularly and parallelism of two vectors.
  8. Solve problems

# USE THE CONCEPT OF MATRICES & DETERMINANTS IN SOLVING TECHNOLOGICAL PROBLEMS

* 1. Define a matrix and a determinant.
  2. List types of matrices.
  3. Define transpose, ad joint and inverse of a matrix.
  4. State properties of determinants.
  5. Explain basic concepts.
  6. Explain algebra of matrices.
  7. Solve linear equation by matrices.
  8. Explain the solution of a determinant.
  9. Use Crammers Rule for solving linear equations

**APPLIED PHYSICS**

**Course Code: Phy-122**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Total Hours** | **128** | **T** | **P** | **C** |
| **Theory** | **32** | **1** | **3** | **2** |
| **Practical** | **96** |  |  |  |

**AIMS**: The students will be able to understand the fundamental principles and concept of physics, use these to solve problems in practical situations/technological courses and understand concepts to learn advance physics/technical courses.

**Course Contents**

1. **Measurements. 2 Hours**
   1. Fundamental units and derived units
   2. Systems of measurement and S.I. units
   3. Concept of dimensions, dimensional formula
   4. Conversion from one system to another
   5. Significant figures

## **Scalars and Vectors**. 4 Hours

* 1. Revision of head to tail rule
  2. Laws of parallelogram, triangle and polygon of forces
  3. Resolution of a vector
  4. Addition of vectors by rectangular components
  5. Multiplication of two vectors, dot product and cross product

## Motion 4 Hours

* 1. Review of laws and equations of motion
  2. Law of conservation of momentum
  3. Angular motion
  4. Relation between linear and angular motion
  5. Centripetal acceleration and force
  6. Equations of angular motion

## Torque, Equilibrium and Rotational Inertia. 6 Hours

* 1. Torque
  2. Centre of gravity and centre of mass
  3. Equilibrium and its conditions
  4. Torque and angular acceleration

|  |  |  |  |
| --- | --- | --- | --- |
| 4.5 | | Rotational inertia | |
| 5 **Wave Motion. 5 Hours** | | | |
|  | 5.1 | Review Hooke's law of elasticity |  |
|  | 5.2 | Motion under an 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 a stretched string |  |
| 6 | **Sound.** |  | **5 Hours** |
|  | 6.1 | Longitudinal waves |  |
|  | 6.2 | Intensity, loudness, pitch and quality of sound |  |
|  | 6.3 | Units of Intensity of level and frequency response of ear |  |
|  | 6.4 | Interference of sound waves silence zones, beats |  |
|  | 6.5 | Acoustics |  |
|  | 6.6 | Doppler effect. |  |
| 7 | **Light.** |  | **5 Hours** |

* 1. Review laws of reflection and refraction
  2. Image formation by mirrors and lenses
  3. Optical instruments
  4. Wave theory of light
  5. Interference, diffraction, polarization of light waves
  6. Applications of polarization in sunglasses, optical activity and stress analysis

## **8 Optical Fiber.** 2 Hours

|  |  |  |  |
| --- | --- | --- | --- |
|  | 8.1 | Optical communication and problems |  |
| 8.2 | Review total internal reflection and critical angle |
| 8.3 | Structure of optical fiber |
| 8.4 | Fiber material and manufacture |
| 8.5 | Optical fiber - uses. |
| 9 | **Lasers.** |  | **3 Hours** |
|  | 9.1 | Corpuscular theory of light |  |
|  | 9.2 | Emission and absorption of light |  |
|  | 9.3 | Stimulated absorption and emission of light |  |
|  | 9.4 | Laser principle |  |
|  | 9.5 | Structure and working of lasers |  |
|  | 9.6 | Types of lasers with brief description. |  |

* 1. Applications (basic concepts)
  2. Material processing
  3. Laser welding
  4. Laser assisted machining
  5. Micro machining
  6. Drilling, scribing and marking
  7. Printing
  8. Lasers 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

**APPLIED PHYSICS**

**Instructional Objectives**

1. **Use Concepts of Measurement to Practical Situations and Technological Problems**.
   1. Write dimensional formulae for physical quantities
   2. Derive units using dimensional equations
   3. Convert a measurement from one system to another
   4. Use concepts of measurement and Significant figures in problem solving.

## Use Concepts of Scalars and Vectors in Solving Problems Involving these Concepts.

* 1. Explain laws of parallelogram, triangle and polygon of forces
  2. Describe method of resolution of a vector into components
  3. Describe method of addition of vectors by rectangular components
  4. Differentiate between dot product and cross product of vectors
  5. Use the concepts in solving problems involving addition resolution and multiplication of vectors.

## Use the Law of Conservation of Momentum and Concepts of Angular Motion to Practical Situations.

* 1. Use law of conservation of momentum to practical/technological problems.
  2. Explain relation between linear and angular motion
  3. Use concepts and equations of angular motion to solve relevant technological problems.

## Use Concepts of Torque, Equilibrium and Rotational Inertia to Practical Situation/Problems.

* 1. Explain Torque
  2. Distinguish between Centre of gravity and centre of mass
  3. Explain rotational Equilibrium and its conditions
  4. Explain Rotational Inertia giving examples
  5. Use the above concepts in solving technological problems.

## Use Concepts of Wave Motion in Solving Relevant Problems.

* 1. Explain Hooke's Law of Elasticity
  2. Derive formula for Motion under an elastic restoring force
  3. Derive formulae for simple harmonic motion and simple pendulum
  4. Explain wave form with reference to S.H.M. and circular motion
  5. Explain Resonance
  6. Explain Transverse vibration of a stretched string
  7. Use the above concepts and formulae of S.H.M. to solve relevant problems.

## Understand Concepts Of Sound.

* 1. Describe longitudinal wave and its propagation
  2. Explain the concepts: Intensity, loudness, pitch and quality of sound
  3. Explain units of Intensity of level and frequency response of ear
  4. Explain phenomena of silence zones, beats
  5. Explain Acoustics of buildings
  6. Explain Doppler effect giving mathematical expressions.

## Use the Concepts of Geometrical Optics to Mirrors and Lenses.

* 1. Explain laws of reflection and refraction
  2. Use mirror formula to solve problems
  3. Use the concepts of image formation by mirrors and lenses to describe working of optical instruments, e.g. microscopes, telescopes, camera and sextant.

## Understand Wave Theory of Light

* 1. Explain wave theory of light
  2. Explain phenomena of interference, diffraction, polarization of light waves
  3. Describe uses of polarization given in the course contents.

## Understand the Structure, Working and Uses of Optical Fiber.

* 1. Explain the structure of the Optical Fiber
  2. Explain its principle of working
  3. Describe use of optical fiber in industry and medicine.

## Phy-122 APPLIED PHYSICS

**List of Practicals.**

1. Draw graphs representing the functions:
   1. y=mx for m=0, 0.5, 1, 2
   2. y=x2
   3. y=1/x
2. Find the volume of a given solid cylinder using vernier callipers.
3. Find the area of cross-section of the given wire using micrometer screw gauge.
4. Prove that force is directly proportional to (a) mass, (b) acceleration, using fletchers' trolley.
5. Verify law of parallelogram of forces using Grave-sands apparatus.
6. Verify law of triangle of forces and Lami's theorem
7. Determine the weight of a given body using
   1. Law of parallelogram of forces
   2. Law of triangle of forces
   3. Lami's theorem
8. Verify law of polygon of forces using Grave-sands apparatus.
9. Locate the position and magnitude of resultant of like parallel forces.
10. Determine the resultant of two unlike parallel forces.
11. Find the weight of a given body using principle of moments.
12. Locate the centre of gravity of regular and irregular shaped bodies.
13. Find Young's Modules of Elasticity of a metallic wire.
14. Verify Hooke's Law using helical spring.
15. Study of frequency of stretched string with length.
16. Study of variation of frequency of stretched string with tension.
17. Study resonance of air column in resonance tube and find velocity of sound.
18. Find the frequency of the given tuning fork using resonance tube.
19. Find velocity of sound in rod by Kundt's tube.
20. Verify rectilinear propagation of light and study shadow formation.
21. Study effect of rotation of plane mirror on reflection.
22. Compare the refractive indices of given glass slabs.
23. Find focal length of concave mirror by locating centre of curvature.
24. Find focal length of concave mirror by object and image method
25. Find focal length of concave mirror with converging lens.
26. Find refractive index of glass by apparent depth.
27. Find refractive index of glass by spectrometer.
28. Find focal length of converging lens by plane mirror.
29. Find focal length of converging lens by displacement method.
30. Find focal length of diverging lense using converging lens.
31. Find focal length of diverging lens using concave mirror.
32. Find angular magnification of an astronomical telescope.
33. Find angular magnification of a simple microscope (magnifying glass)
34. Find angular magnification of a compound microscope.
35. Study working and structure of camera.
36. Study working and structure of sextant.
37. Compare the different scales of temperature and verify the conversion formula.
38. Determine the specific heat of lead shots.
39. Find the coefficient of linear expansion of a metallic rod.
40. Find the heat of fusion of ice.
41. Find the heat of vaporization.
42. Determine relative humidity using hygrometer

**Applied Chemistry**

**Course code: Ch-112**

**Total contact hours: 128**

|  |  |  |
| --- | --- | --- |
| Theory: 32 **T** | **P** | **C** |
| Practical: 96 **1** | **3** | **2** |

Pre-requisite: The student must have studied the subject of elective chemistry at Secondary, school level.

**AIMS:** After studying this course a student will be able to;

1. Understand the significance and role of chemistry in the development of modern technology.
2. Become acquainted with the basic principles of chemistry as applied in the study of relevant Technology.
3. Know the scientific methods for production, properties and use of materials of industrial & .technological significance.
4. Gains skill for the efficient conduct of practical’s in a Chemistry lab.

# COURSE CONTENTS

## INTRODUCTION AND FUNDAMENTAL CONCEPTS 2 Hrs

* 1. Orientation with reference to this technology
  2. Terms used & units of measurements in the study of chemistry
  3. Chemical Reactions & their types

## ATOMIC STRUCTURE 2 Hrs

* 1. Sub-atomic particles
  2. Architecture of atoms of elements, Atomic No. & Atomic Weight
  3. The periodic classification of elements periodic law
  4. General characteristics of a period and group

## CHEMICAL BOND 2 Hrs

* 1. Nature of chemical Bond
  2. Electrovalent bond with examples
  3. Covalent Bond (Polar and Non-polar, sigma & Pi Bonds with examples
  4. Co-ordinate Bond with examples

## WATER 2 Hrs

* 1. Chemical nature and properties.
  2. Impurities
  3. Hardness of water (types, causes & removal)
  4. Scales of measuring hardness (Degrees Clark
  5. Boiler feed water, scales & treatment
  6. Sea-water desalination, sewage treatment

## ACIDS, BASES AND SALTS 2 Hrs

* 1. Definitions with examples
  2. Properties, their strength, basicity & Acidity
  3. Salts and their classification with examples
  4. pH-value and scale

## OXIDATION & REDUCTION 2 Hrs

* 1. The process, definition& examples
  2. Oxidizing and reducing agents
  3. Oxides and their classifications

## NUCLEAR CHEMISTRY 2 Hrs

* 1. Introduction
  2. Radioactivity (alpha, beta and gamma rays)
  3. Half life process
  4. Nuclear reaction & transformation of elements

## CEMENT 2 Hrs

* 1. Introduction
  2. Composition and manufacture
  3. Chemistry of setting and hardening
  4. Special purpose cements

## GLASS 2 Hrs

* 1. Composition and raw material
  2. Manufacture
  3. Varieties and uses

## PLASTICS AND POLYMERS 2 Hrs

* 1. Introduction and importance
  2. Classification
  3. Manufacture
  4. Properties and uses

## PAINTS, VARNISHES AND DISTEMPER 2 Hrs

* 1. Introduction
  2. Constituents
  3. Preparation and uses

## CORROSION 2 Hrs

* 1. Introduction with causes
  2. Types of corrosion
  3. Rusting of iron
  4. Protective measures against-corrosion

## REFRACTORY MATERIALS AND ABRASIVE 2 Hrs

* 1. Introduction to Refractories
  2. Classification of Refractories
  3. Properties and Uses
  4. Introduction to Abrasives
  5. Artificial and Natural Abrasives and their uses

## ALLOYS 2 Hrs

* 1. Introduction with need
  2. Preparation and Properties
  3. Some Important alloys and their composition
  4. Uses

## FUELS AND COMBUSTION 2 Hrs

* 1. Introduction of fuels
  2. Classification of fuels
  3. Combustion
  4. Numerical Problems of Combustion

## LUBRICANTS 1 Hr

* 1. Introduction.
  2. Classification.
  3. Properties of lubricants.
  4. Selection of lubricants:

## POLLUTION 1 Hr

* 1. The problem and its dangers.
  2. Causes of pollution.
  3. Remedies to combat the hazards of pollution.

# BOOKS RECOMMENDED

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)

**Ch-112 APPLIED CHEMISTRY**

# INSTRUCTIONAL OBJECTIVES

1. **UNDERSTAND THE SCOPE, SIGNIFICANCE AND FUNDAMENTAL ROLE OF THE SUBJECT**
   1. Define chemistry and its important terms
   2. State the units of measurements in the study of chemistry
   3. Write chemical formula of common compounds
   4. Describe types of chemical reactions with examples

# UNDERSTAND THE STRUCTURE OF ATOMS AND ARRANGEMENT OF SUB ATOMIC PARTICLES IN THE ARCHITECTURE OF ATOMS

* 1. Define atom.
  2. State the periodic law of elements.
  3. Describe the fundamental sub atomic particles
  4. Distinguish between atomic ho. and mass no.; isotopes and isobars
  5. Explain the arrangements of electrons in different shells and sub energy levels
  6. Explain the grouping and placing of ^elements' in the periodic table

# UNDERSTAND THE NATURE OF CHEMICAL BOUND

* 1. Define chemical bond
  2. Describe the nature of chemical bond
  3. Differentiate .between electrovalent an^ covalent bonding
  4. Explain the formation of polar and non polar, sigma and pi-bond with examples
  5. Describe the nature of coordinate bond with examples

# UNDERSTAND THE CHEMICAL NATURE OF WATER

* 1. Describe the chemical nature of water with its formula
  2. Describe the general impurities present in water
  3. Explain the causes and methods to removing hardness of water
  4. Express hardness .in different units like mg/Iiter, p.p.m, degrees Clark and degrees French
  5. Describe the formation and nature of scales in boiler feed water
  6. Explain the method for the treatment of scales
  7. Explain the sewage treatment and desalination of sea water

# UNDERSTAND THE NATURE OF ACIDS, BASES AND SALTS

* 1. Define acids, bases and salts with examples
  2. State general properties of acids and bases
  3. Differentiate between acidity and basicity and use the related terms
  4. Define salts, state their classification with examples
  5. Explain p-H value of solution and pH scale

# UNDERSTAND THE PROCESS OF OXIDATION AND REDUCTION

* 1. Define oxidation
  2. Explain the oxidation process with examples
  3. Define reduction
  4. Explain reduction process with examples
  5. Define oxidizing and reducing-agents and give it least six examples of each
  6. Define oxides
  7. Classify the oxides and give example

# UNDERSTAND THE FUNDAMENTALS OF NUCLEAR CHEMISTRY

* 1. Define nuclear chemistry and radio activity
  2. Differentiate between alphas, Beta and Gamma particles
  3. Explain hall-life process
  4. Explain at least six nuclei reactions resulting in the transformation of some elements
  5. " State important uses of isotopes

# UNDERSTAND THE MANUFACTURE, SETTING AND HARDENING CEMENT

* 1. Define port land cement and give its composition
  2. Describe the method of manufacture
  3. Describe the chemistry of setting and hardening of cement
  4. Distinguish between ordinary and special purpose cement

# UNDERSTAND THE PROCESS OF MANUFACTURE OF GLASS.

* 1. Define glass
  2. Describe its composition and raw materials
  3. Describe the manufacture of glass
  4. explain its varieties and uses

# UNDERSTAND THE NATURE AND IMPORTANCE OF PLASTICS POLYMERS

10.1. Define plastics and polymers

* 1. Explain the mechanism of polymerization
  2. Describe the preparation and uses of some plastics/polymers

# KNOW THE CHEMISTRY OF PAINTS, VARNISHES AND DISTEMPERS

* 1. Define paints, varnishes and distemper
  2. State composition of each
  3. State methods of preparation of each and their uses

# UNDERSTAND THE PROCESS OF CORROSION WITH ITS CAUSES AND TYPES

* 1. Define corrosion
  2. Describe different types of corrosion
  3. State the causes of corrosion
  4. Explain the process of rusting of iron

J2.5 Describe methods to prevent/control corrosion

# UNDERSTAND THE NATURE OF REFRACTORY MATERIALS AND ABRASIVE

* 1. Define refractory materials
  2. Classify refractory materials
  3. Describe properties and uses of refractories
  4. Define abrasive.
  5. Classify natural and artificial abrasives
  6. Describe uses of abrasives

# UNDERSTAND THE NATURE AND IMPORTANCE OF ALLOYS

* 1. Define alloy
  2. Describe different methods for the preparation of alloys
  3. Describe important properties of alloys

14 4 Enlist some important alloys with their composition, properties and uses

# UNDERSTAND THE NATURE OF FUELS AND THEIR COMBUSTION

* 1. Define fuels
  2. Classify fuels and make distinction of solid, liquid & gaseous fuels
  3. Describe important Fuels
  4. Explain combustion
  5. Calculate air quantities in combustion, gases

# UNDERSTAND THE NATURE OF LUBRICANTS.

* 1. Define a lubricant
  2. Explain the uses of lubricants
  3. Classify lubricants and cite examples
  4. State important properties of oils, greases and solid lubricants
  5. State the criteria for the selection of lubricant tor, particular purpose/job

# UNDERSTAND THE NATURE OF POLLUTION

* 1. Define Pollution (air. water, food)
  2. Describe the causes of environmental pollution.
  3. Enlist some common pollutants.
  4. Explain methods to prevent pollution

**APPLIED CHEMISTRY 96 Hours**

1. To introduce the common apparatus, glassware and chemical reagents used in the chemistry lab.
2. To purify a chemical substance by crystallization.
3. To separate a mixture of sand and salt.
4. To find the melting point of substance.
5. To find the pH of a solution with pH paper.
6. To separate a mixture of inks by chromatography.
7. To determine the co-efficient of viscosity of benzene with the help of Ostwald vasomotor.
8. To find the surface tension of a liquid with a stalagmometer.
9. To perform electrolysis of water to produce Hydrogen and Oxygen.
10. To determine the chemical equivalent of copper by electrolysis of Cu SO.
11. To get introduction with the scheme of analysis of salts for basic radicals.
12. To analyse 1st group radicals (Ag+ - Pb++ - Hg+).
13. To make practice for detection 1st group radicals.
14. To get introduction with the scheme of II group radicals.
15. To detect and confirm II-A radicals (hg++, Pb++++, Cu+, Cd++, Bi+++).
16. To detect and confirm II-B radicals Sn+++, Sb+++, As+++).
17. To get introduction with the scheme of III group radicals (Fe+++ - Al+++, Cr+++)
18. To detect and confirm Fe+++, Al+++ and Cr+++.
19. To get introduction with he scheme of IV group radicals.
20. To detect and confirm An++ and Mn++ radicals of IV group.
21. To detect and conform Co++ and Ni++ radicals of IV group.
22. To get introduction with the Acid Radical Scheme.
23. To detect dilute acid group.
24. To detect and confirm CO"3 and HCO'3 radicals.
25. To get introduction with the methods/apparatus of conducting volumetric estimations.
26. To prepare standard solution of a substance.
27. To find the strength of a given alkali solution.
28. To estimate HCO'3 contents in water.
29. To find out the %age composition of a mixture solution of KNO3 and KOH volumetrically.
30. To find the amount of chloride ions (Cl') in water volumetrically.

**Introduction to Natural Resources**

**Course code: LSRM-111**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Total contact hour:** | | **32** | **T** | **P** | | **C** | |
| Theory: | | **32** | **1** | **0** | | **1** | |
| Practical operation: | | 0 |
| **Course**  **Purpose:** | By studying the Introduction to Natural Resources, master the basic principles of natural resource management and understand the basic knowledge of natural resource management such as land resource management, water resource management, geological and mineral resource management, and forest and grass resource management. Guide everyone to have a preliminary understanding of natural resources courses. | | | | | | |
| **Course content** | | | | |  | | |
| **1. Introduction**  1.1 Overview of Natural Resources and Natural Resource Management  1.2 Overview of the Development of Natural Resource Management  1.3 Classification of Natural Resource Management Work  1.4 Main Tasks and Responsibilities of Natural Resource Management | | | | | 2 credit hours | | |
| **2. Land resource management**  2.1 Overview of Land Management  2.2 Cadastral management  2.3 Land ownership management  2.4 Land use management  2.5 Land spatial planning (including practical training) | | | | | 10 credit hours | | |
| **3. Geological and Mineral Resource Management**  3.1 Overview of Mineral Resources  3.2 Mineral Resource Planning  3.3 Mine ecological restoration (including practical training)  3.4 Supervision of Mineral Resource Protection | | | | | 10 credit hours | | |
| **4. Ocean and Forest and Grass Resource Management**  4.1 Overview of Marine Resources  4.2 Marine functional zoning  4.3 Overview of Forest and Grass Resources  4.4 Current Situation of Forest and Grass Resource Management | | | | | 6 credit hours | | |
| **5. Surveying and Mapping Geographic Information Management**  5.1 Basic knowledge of surveying and mapping geographic information  5.2 Overview of Surveying and Mapping Geographic Information Management  5.3 Management of Confidential Geographical Information Achievements | | | | | 2 credit hours | | |
| **6. Natural Resources Law Enforcement Supervision**  6.1 Overview  6.2 Satellite Image Law Enforcement Inspection (Including Practical Training)  6.3 Laws and Regulations on Law Enforcement and Supervision of Natural Resources | | | | | 2 credit hours | | |
| **Recommended/reference books:** | | | | |  | | |
| 1. *General Theory of Land Resource Management*, edited by Lu Hongsheng, published by China Agricultural Publishing House in July 2015, edition: 6th edition  2. *Handbook of Natural Resource Management Knowledge*, edited by Chen Congxi et al., China Dadi Publishing House, version: 2020  3. *Integrated Management of Natural Resources*, edited by Ma Yonghuan and others, published by Shanghai Science and Technology Literature Publishing House, version: 2021  4. Industry standard: (1) "Regulations for the Compilation of Land Development and Consolidation Planning" (TD/T 1011-2000); (2) Technical Regulations for Investigation and Evaluation of Cultivated Land Reserve Resources (TD/T 1007-2003); (3) Evaluation Regulations for Economical and Intensive Utilization of Construction Land (TD/T 1018-2008); (4) Regulations for the Evaluation of Intensive Land Use in Development Zones (TD/T 1029-2010); (5) Technical Regulations for Delineation of Basic Farmland (TD/T 1032-2011); (6) Cadastral Survey Regulations (TD/T 1001-2012); (7) Regulations for Compilation of County-level Land Remediation Planning (TD/T 1035-2013); (8) Technical Regulations for the Third National Land Survey (TD/T 1055-2019); (9) Code for Survey of Geological and Mineral Exploration (GB/T 18341-2001); (10) Regulations on Classification of Agricultural Land Quality (GB/T 28407-2012); (11) Specification for Marine Monitoring (GB 17378.1-2007); (12) Technical Specification for Management of Marine Nature Reserves (GB/T 19571-2004); (13) Quality Inspection and Acceptance of Surveying and Mapping Achievements (GB/T 24356-2009); (14) Technical Regulations for Forest Land Boundary Protection and Utilization Planning (LY/T 1955-2011). | | | | | | |  | |
| **Teaching objectives** | | | | |  | | |
| 1. **Understand the basic knowledge of natural resource management**    1. Understand the definition, scope, and connotation of natural resources and management    2. Understand the history of our natural resource management    3. Understand the main content of natural resource management work    4. Understand the main tasks and responsibilities of natural resource management work 2. **Understand land resource management**    1. Understand the production process of Portland cement    2. Master the concepts of land and land resource management, as well as the basic characteristics and functions of land    3. Master the basic knowledge of cadastral management    4. Familiar with China's land system, land property rights, and the main content of land ownership management    5. Master the basic knowledge of land use management    6. Master the relevant content of national spatial planning    7. Learn to collect basic information and process basic data for national spatial planning 3. **Understand geological and mineral resource management**    1. Familiar with the basic knowledge of geological and mineral resources    2. Understand geological and mineral resource planning and related industry standards    3. Familiar with the technical methods of ecological restoration in mines    4. Understand the protection and supervision of resources 4. **Understand ocean and forest and grass resource management**    1. Understand the basic knowledge of marine resources    2. State the marine functional zoning and be familiar with relevant industry standards    3. Understand the basic knowledge of forest and grass resources    4. Understand the current situation of forest and grass resources in China (including practical training) 5. **Understand Surveying and Mapping Geographic Information Management**    1. Understand the basic knowledge of surveying and mapping geographic information    2. State the current situation of surveying and mapping geographic information management    3. Understand the quality inspection and acceptance of surveying and mapping geographic information results 6. **Understand natural resource law enforcement supervision**    1. Master the basic knowledge of natural resource law enforcement supervision    2. Familiar with China's law enforcement and inspection of satellite images    3. Familiar with the laws and regulations of natural resource law enforcement and supervision in China | | | | |  | | |

**Fundamentals of Surveying and Mapping**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Course code: LSRM-123** | | | | | | |
| **Total contact hour:** | **160** | **T** | **P** | | **C** | |
| **Theory:** | **64** | **2** | **3** | | **3** | |
| **Practical:** | 96 |
| **Course Purpose:**  The teaching objective of this course is to enable students to understand what surveying and mapping is? What is the development history of surveying and mapping? What are the work contents and principles of surveying and mapping? Understand the meaning of “surveying and mapping before national construction," At the same time, firmly grasp the basic knowledge of surveying and mapping, basic knowledge and basic principles of ground point position expression and acquisition; Master the use of total station, GPS-RTK, electronic level and other instruments and equipment involved in the determination of ground point location; Master the method of obtaining ground point positions; Learners can collaborate in teams to complete the mapping of ground point plane and elevation positions; Be able to understand topographic maps, understand the representation methods of terrain features, landforms, and other topographic elements on topographic maps, and on-site surveying methods; At the same time, ideological and political elements such as "surveying and mapping spirit", "craftsmanship spirit", "new era Beidou spirit", "national territory awareness", surveying and mapping science popularization, 1+X level certificate standard, surveying and mapping skills competition standard, surveying and mapping life of academicians of the Chinese Academy of Surveying and Mapping, etc. will be integrated into the entire teaching process of the course, achieving the requirements of combining education and training, and cultivating students with morality and technology. | | | | | | |
| **Course content** | | | |  | | |
| **I. Course Introduction**   * 1. Course Introduction   2. The development of surveying and mapping has a long history   3. Basic contents and principles of surveying and mapping technology   4. Promote the spirit of surveying and mapping, striving to become a great craftsman in a big country | | | | 4 contact hours | | |
| **Project 1 Basic Knowledge of Surveying and Mapping**  Task 1-1 Representation of Ground Points  Tasks 1-2 Orientation in Surveying and Mapping  Tasks 1-3 Limit of substituting horizontal plane with water  Tasks 1-4 Measurement errors and indicators of measuring accuracy  Task 1-5 Basic Requirements for Measurement Operations | | | | 24 contact hours | | |
| **Project 2 ground location determination**  Task 2-1 Basic Method for Determining Ground Points  Task 2-2 Coordinate measurement with total station (including training)  Task 2-3 GNSS coordinate measurement (including practical training)  Task 2-4 Ordinary leveling (including practical training) | | | | 24 contact hours | | |
| **Project 3: Understanding and application of topographic map**  Task 3-1 Understand Topographic Maps (Including Practical Training)  Task 3-2 Application of topographic maps (including practical training) | | | | 12 contact hours | | |
| **Recommended/reference books:** | | | |  | | |
| 1. *Measurement Technology*, 3rd edition, edited by Chen Chuansheng and Peng Zhiliang, published by Geological Publishing House in March 2016. Version: Printed for the third time in 2018, as a national textbook for vocational education during the 12th Five Year Plan period.  2. "*Fundamentals of Measurement Technology*", edited by Peng Zhiliang, published by Geological Publishing House in February 2014, version: February 2014.  3. "*Fundamentals of Surveying and Mapping*", edited by Yuan Jixiang and Cui Jiajia, published by China University of Mining and Technology Press in September 2018, is a national planning textbook for higher vocational education during the 13th Five Year Plan period.  4. Norms and standards: (1) "Code for Engineering Surveying" (GB 50026-2020); (2) Global Positioning System GPS Measurement Specification (GB/T18314-2009); (3) Safety Regulations for Surveying and Mapping Operators (CH 1016-2008); (4) General Specification for Engineering Surveying (GB 55018-2021); (5) Urban Survey Specification (CJJ/T8-2011); (6) National Standards for Third and Fourth Level Survey (GB/T12898-2009); (7) National Basic Scale Topographic Map Formats - Part 1: 1:500 1:1000 1:2000 Topographic Map Formats (GB/T20257.1-2007); (8) National Basic Scale Topographic Map Formats - Part 2: 1:5000 1:10000 Topographic Map Formats (GB/T20257.2-2007); (9) Division and Numbering of National Basic Scale Topographic Maps (GB/T13989-2012); (10) Technical Specification for Real Time Dynamic Measurement (RTK) of Global Positioning System (CH/T2009-2010); (11) Specification for Satellite Positioning Urban Surveying (CJJ/T 73-2010). | | | | | |  | |
| **Teaching objectives** | | | |  | | |
| **I. Knowledge objectives**  1. Understand what surveying and mapping is? What is the development history of surveying and mapping? What are the work contents and principles  of surveying and mapping? The contribution of surveying and mapping to the realization of the great Chinese dream.  2. Master the basic knowledge of surveying and mapping;  3. Master the basic concepts of ground point representation and the basic principles of determining ground point positions;  4. Master the basic concepts and components of topographic maps, The presentation method of topographic elements on topographic map,  the basic principle of topographic map mapping;  5. Understand the basic application of topographic maps in national economic construction.  **II. Skill Objectives**  1. Be able to use surveying and mapping software to convert different coordinate systems;  2. Proficient in using mainstream instruments and equipment for ground point coordinate surveying and mapping;  3. Be able to complete total station 3D coordinate survey, GPS RTK 3D coordinate survey and third fourth order leveling in a team manner  according to national laws, regulations, policies and specifications;  4. Be able to correctly understand and interpret topographic maps, and apply them briefly;  5. Have the ability to find, analyze and solve relevant practical problems  by using basic comprehensive knowledge and skills of surveying and mapping.  **III. Quality goals**  1. Have good language expression, written expression, communication and coordination skills, and teamwork skills;  2. Cultivate a pragmatic and down-to-earth work style;  3. Possess the ability to explore learning, lifelong learning, and sustainable development;  4. Can effectively inherit the spirit of surveying and mapping, craftsmanship, and new era Beidou spirit;  5. Possess good socialist core values. | | | |  | | |
| **Practical operation checklist** | | | | **Credit hours** | | |
| 1. Understanding and Application of total station 2. Angle measurement with total station 3. Distance measurement with total station 4. Height difference measurement with total station 5. Total station coordinate measurement 6. Understanding and use of GNSS receiver 7. GNSS-RTK coordinate measurement 8. Understanding and Use of Level Gauges 9. Fourth order leveling at the first surveying station 10. Fourth class leveling of the first survey section 11. Fourth class leveling route measurement 12. Understanding and Interpretation of Topographic Maps 13. Basic Applications of Topographic Maps 14. Application of Topographic Maps in Engineering Construction | | | | 4 contact hours  4 contact hours  4 contact hours  12 contact hours  4 contact hours  12 contact hours  4 contact hours  4 contact hours  8 contact hours  12 contact hours  8 contact hours  8 contact hours  8 contact hours | | |

**Digital Mapping**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Course code: LSRM-132** | | | | | |
| **Total Contact Hours** | **128** | | **T** | **P** | **C** |
| **Theory:** | **32** | | **1** | **3** | **2** |
| **Practical:** | **96** | |
| **Course Purpose:**  Through the study of this course, learners will be able to understand the basic theories and principles of digital terrain mapping, master the use of instruments, field data collection, and internal data mapping, and comply with regulatory requirements; At the same time, in the process of completing the task, emphasis should be placed on ideological and political education in the curriculum, the cultivation of professional ethics and behavior, ultimately making them qualified in political and professional qualities, and possessing a certain degree of self-learning ability. | | | | | |
| **Course content** | | Including Theory and Practical | | | |
| **Project 1 Course Introduction**  Task 1-1 Course Introduction  Task 1-2 Course Career Position Analysis  Task 1-3 Course Standards and Assessment Plan | | 2 contact hours | | | |
| **Project 2 Digital Topographic Mapping**  Task 2-1 Overview of Digital Topographic Mapping  Task 2-2 Basic Knowledge of Topographic Maps  Task 2-3 Topographic Map Symbols | | 6 contact hours | | | |
| **Project 3 Field Data Collection**  Task 3-1 Figure root control measurement (including practical training)  Task 3-2 Data acquisition of total station (including training)  Task 3-3 GPS-RTK data collection (including practical training)  Task 3-4 Digital Topographic Mapping Methods and Requirements | | 12 contact hours | | | |
| **Project 4 Interior Digital Mapping**  Task 4-1 Installation and Interface of Southern CASS11.0 Digital Mapping Software (including practical training)  Task 4-2 Drawing Preparation  Task 4-3 Positioning Method  Task 4-4 Drawing of Ground Objects (Including Practical Training)  Task 4-5 Feature Editing (Including Practical Training)  Task 4-6 Drawing contour lines (including practical training)  Task 4-7 Map Decoration (Including Practical Training) | | 8 contact hours | | | |
| **Project 5 Engineering Application of Topographic Map**  Task 5-1 Query of Basic Geometric Elements  Task 5-2 Drawing of Engineering Cross Section  Task 5-3 Calculation of earthwork quantities  Tasks 5-4 Other Engineering Applications | | 4 contact hours | | | |
| **Recommended/reference books:** | |  | | | |
| 1. "*Digital Mapping*", edited by Hou Linfeng, published by Xi'an Jiaotong University Press in March 2020, version: March 2020.  2. "*Digital Mapping*", edited by Ming Dongquan, published by Wuhan University Press in June 2016, version: June 2016.  3. "*Digital Topographic Surveying*", edited by Pan Zhengfeng, Cheng Xiaojun, and others, published by Wuhan University Press in July 2015. Version: 2nd edition, 4th printing, July 2021.  4. Normative standards: (1) "Global Positioning System GPS Measurement Specifications" (GB/T18314-2009); (2) Technical Specification for Real Time Dynamic Measurement (RTK) of Global Positioning System (CH/T2009-2010); (3) Safety Regulations for Surveying and Mapping Operators (CH 1016-2008); (4) General Specification for Engineering Surveying (GB 55018-2021); (5) National Basic Scale Topographic Map Formats - Part 1: 1:500 1:1000 1:2000 Topographic Map Formats (GB/T20257.1-2007); (6) National Basic Scale Topographic Map Formats - Part 2: 1:5000 1:10000 Topographic Map Formats (GB/T20257.2-2007); (7) National Basic Scale Topographic Map Formats - Part 3: 1:25000 1:50000 1:100000 Topographic Map Formats (GB/T20257.3-2007); (8) Division and Numbering of National Basic Scale Topographic Maps (GB/T13989-2012); (9) Quality Requirements for Digital Surveying and Mapping Achievements (GB/T17941-2008); (10) Technical Specification for 1:500 1:1000 1:2000 Field Digital Mapping (GB/T14912-2005); (11) Specification for digitization of 1:500 1:1000 1:2000 topographic maps (GB/T17160-2008). | | | | | |
| **Teaching objectives** | |  | | | |
| Through the teaching of digital mapping courses, students can understand the basic theories and principles of digital topographic mapping, master instrument usage, field data collection, and internal data mapping.  **I. Knowledge objectives**  1. Correctly understand the basic principles and knowledge of digital terrain map surveying and mapping;  2. Correctly understand the basic principles and knowledge of digital terrain map surveying and mapping;  3. Understand the engineering application of digital graphs.  **II. Skill Objectives**  1. Be able to correctly understand the basic theories and principles of digital terrain mapping  and apply them to subsequent practical operations;  2. Possess the ability to collect field data;  3. Possess the ability to create digital maps for internal work;  **III. Quality goals**  1. Cultivate a pragmatic and down-to-earth work style; 2. Cultivate a rigorous scientific attitude and a spirit of hard work and dedication. | | | | | |
| **Practical operation checklist** | | **CONTACT hours** | | | |
| 1. Basic operation of total station  2. Field sketch drawing  3. Total station field data acquisition  4. GPS-RTK operation and field data collection  5. Drawing of ground objects  6. Drawing of Landform  7. Map Decoration | | 8 contact hours  12 contact hours  20 contact hours  20 contact hours  16 contact hours  16 contact hours  4 contact hours | | | |

**General Geology**

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| **Course code: LSRM-142** | | | | | | |
| **Total Contact Hours:** | **64** | **T** | **P** | | | **C** |
| Theory: | 64 | **2** | **0** | | | **2** |
| Practical: | 0 |
| **Course Purpose:**  Through the study of the course "General Geology", students can understand the work content, tasks, characteristics, and methods of geological survey profession, understand the general characteristics of the Earth (morphology, structure, material composition, movement, history), and master the identification of internal and external geological processes and their products (minerals, rocks, structures, etc.), Master the identification of the Earth's resources, environment, and disasters (such as minerals, ecological geology, geological disasters, human land relationships, etc.), and have preliminary ability to observe geological phenomena and conduct field geological surveys; Develop a habit of independent thinking, daring to explore, and strictly abide by industry and national standards, as well as a pragmatic, down-to-earth and rigorous professional ethics, laying the foundation for engaging in geological related work. | | | | | | |
| **Course content** | | | |  | | |
| 1. **Course Introduction**    1. Tasks, Content, and Methods of Geological Work | | | | 4 hours | | |
| 1. **Recognition of Earth Features**    1. Recognition of general features of the Earth    2. Identification of crustal material composition    3. Recognition of Earth Motion    4. Identification of Earth History    5. Identification of the relationship between the Earth and humans    6. Geological processes and identification of geological phenomena | | | | 20 hours | | |
| 1. **External geological processes and identification of sedimentary rock**    1. Weathering and product identification    2. Identification of surface water geology and its products    3. Identification of groundwater geology and its products    4. Identification of Marine geological processes and their products    5. Identification of geological processes and products in lakes and swamps    6. Identification of glacial geological processes and products    7. Geological processes of wind and identification of its products    8. Gravity geological processes and identification of geological hazards    9. Diagenesis and Identification of sedimentary rock | | | | 20 hours | | |
| 1. **Identification of internal geological processes and products**    1. Identification of tectonic movement and tectonics    2. Identification of seismic effects and geological phenomena    3. Magmatism and Identification of igneous rock    4. Metamorphism and Identification of metamorphic rock 2. **Identification of Earth's Resources, Environment, and Disasters**    1. Mineral resources    2. Geologic hazard    3. Relationship between Earth and Human Beings | | | | 14 hours  6 hours | | |
| **Recommended/reference books:** | | | | | | |
| 1. Xie Wenwei et al., "*General Geology*" [M]. Beijing: Geological Publishing House, 2017  2. Han Yunyan et al., "*Fundamentals of Geology*" [M]. Beijing: Geological Publishing House, 2014  3. Shu Liangshu, "*General Geology*" [M]. Beijing: Geological Publishing House, 2010  4. Tao Shilong et al., "*Introduction to Earth Science*" [M]. Beijing: Geological Publishing House, 2010  5. Liu Benpei et al., *Introduction to Earth Science* [M]. Beijing: Higher Education Press, 2002  6. Xie Wenwei et al., "*Guidelines for General Geological Field Cognition Internship*" [M]. Beijing: Geological Publishing House, 2013  7. Qian Jianping et al., "*Experimental Tutorial of Basic Geology* [M]. Beijing: Geological Publishing House, 2012  8. Geoinformation Network  9. Mineral web http://qqhuashi.com/portal.php | | | | | | | |
| **Teaching objectives** | | | | |  | |
| 1. **Tasks, Content, and Methods of Geological Work**    1. Understand the content, tasks, characteristics, and methods of geological work    2. Understand the industry development overview and direction    3. Understand the course learning requirements and assessment methods 2. **Recognition of Earth Features**    1. Understand the shape and size of the Earth; Master the surface morphological characteristics and main physical properties of the Earth; Master the structural characteristics of the Earth's sphere and its recognition methods.    2. Understand the main material composition of the Earth's crust; Understand the concepts of minerals and rocks; Master the morphology and main physical properties of minerals; Master common mineral characteristics and recognition.    3. Have a preliminary understanding of the relative geological age division method and the absolute age division method; Master the division of major stages in crustal history and their main characteristics; Be familiar with geological time scale.    4. Master the concepts of geological processes and phenomena; Understand the causal relationship between geological processes and geological phenomena; Master the classification of geological processes. 3. **Understand sand and gravel aggregates and their detection**    1. Grasp the type (process) and product of weathering; Master the influencing factors of weathering; The method of geological sketching.    2. Master the characteristics (processes) of surface water geological processes; Master the identification of erosion, transportation, and sedimentation products of surface water flow; Understand the formation principle and significance of river terraces.    3. Understand the occurrence, movement, and types (processes) of groundwater; Master the characteristics of groundwater geological processes and the identification of their products.    4. Master the movement mode of seawater and the characteristics of geological processes; Master the sedimentary processes and identification of products in coastal, shallow, semi-deep, and deep-sea environments; Master the causal relationship between the advance and retreat of seawater and the geological phenomena generated.    5. Master the genesis and sedimentary characteristics (processes) of lakes and swamps; Master the formation process and identification of characteristics of minerals such as coal, petroleum, salt, alkali, and iron.    6. Master the formation, movement, and types of glaciers, and understand ice water sediments and their landforms.    7. Master the geological process characteristics and product identification of wind.    8. Grasp the types and products of diagenesis; Focus on mastering the relationship between the evolution of crustal surface materials and external geological processes; Have a preliminary understanding of the characteristics, classification and identification methods of sedimentary rock, and basically be able to identify several common sedimentary rock. 4. **Identification of internal geological processes and products**    1. Overview of tectonics and tectonic movement; Master the main characteristics and identification methods of stratigraphic contact relationships; The use of geological compasses; Master the main features and recognition methods of folds; Master the main characteristics and recognition methods of joints; Master the overview, classification, identification methods and significance of joints and faults; Master the recognition and reading methods of commonly used geological maps.    2. Master the classification of earthquake magnitude and intensity, as well as the causes of earthquakes; Proficient in identifying seismic geological phenomena; Master the distribution, prevention, and prediction of earthquakes    3. Master the identification characteristics of magma activity mode and occurrence; Focus on the recognition characteristics, classification and identification description methods of igneous rock; It can basically identify several common igneous rock.    4. Grasp the concept and influencing factors of metamorphism; Focus on the recognition characteristics of various types of metamorphism; Be able to identify several common metamorphic rock and describe them 5. **Identification of Earth's Resources, Environment, and Disasters**    1. Understand the concept and types of mineral deposits; Familiar with the characteristics of endogenetic, exogenetic, and metamorphic deposits.    2. Master the types and characteristics of common geological disasters; Master the causes and characteristics of earthquakes, volcanoes, landslides, mudslides, and tsunamis.    3. Master the concepts, research content, and classification of environmental geology; Understanding the characteristics of human geological processes that damage and transform the Earth's environment | | | | | | |

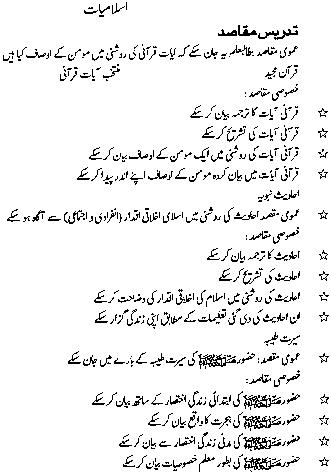
**Geographic Information System**

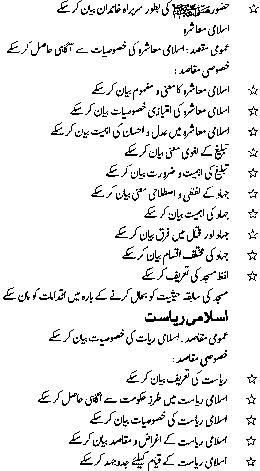
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| **Course code: LSRM-152** | | | | | | |
| **Total Contact hours:** | **128** | **T** | **P** | | **C** | |
| **Theory:** | **32** | **1** | **3** | | **2** | |
| **Practical:** | **96** |
| **Course Purpose:**  Through the study of this course, students will master the basic theories of GIS in professional software and understand the theoretical background of operation. Master the use of relevant software and achieving a certain level of proficiency, possessing the ability to obtain, process, and store spatial data, and being able to independently apply GIS software to complete professional tasks or solve professional problems; At the same time, in the process of completing the task, emphasis should be placed on ideological and political education in the curriculum, the cultivation of professional ethics and behavior, ultimately making them qualified in political and professional qualities, and possessing a certain degree of self-learning ability. | | | | | | |
| **Course content** | | | | Including Theory and Practical | | |
| **1. Basic Overview of GIS**  1.1 Basic Meaning of GIS  1.2 Commonly Used GIS Software at Home and Abroad  1.3 Basic process of GIS work  1.4 GIS Data Organization and Structure | | | | 2 hours | | |
| **2. ARCGIS/MAPGIS Fundamentals**  2.1 ARCMAP Fundamentals  2.2 ArcCatalog Basics  2.3 Basic Knowledge of Geoprocessing  2.4 Basic Knowledge of MapGIS | | | | 2 hours | | |
| **3. Geographic registration**  3.1 Geographic registration of raster images (including practical training)  3.2 Geographic registration of topographic maps, land use status maps, and satellite images (including practical training) | | | | 4 hours | | |
| **4. Spatial data collection**  4.1 Data layering (including practical training)  4.2 Graphic data tracking (including practical training)  4.3 Adding and deleting attributes (including practical training)  4.4 Graphics and Attribute Editing  4.5 Attribute Table Connection and Output  4.6 Topology (including practical training) | | | | 6 hours | | |
| **5. Transformation and processing of spatial data**  5.1 Spatial reference and map projection  5.2 Projection transformation  5.3 Data Format Conversion  5.4 Data Cropping  5.5 Data Splicing  5.6 Data Extraction | | | | 8 hours | | |
| **6. Automatic elevation assignment and engineering cutting**  6.1 Image correction of standard frames  6.2 Automatic and semi-automatic vectorization  6.3 Automatic elevation assignment  6.4 Engineering tailoring  7. Visualization of spatial data  7.1 Symbolization of data (including practical training)  7.2 Chart and report production  7.3 Graphical representation  7.4 Cartographic synthesis (including practical training)  7.5 Preparation of thematic map  8. Spatial analysis  8.1 spatial analysis of Grid Data  8.2 spatial analysis of vector data | | | | 4 hours  4 hours  2 hours | | |
| **Recommended/reference books:** | | | |  | | |
| 1. *ArcGIS10 Geographic Information System Tutorial from Beginner to Proficient*, edited by Mou Naixia, Liu Wenbao, Wang Haiyin, and Dai Honglei, published by Surveying and Mapping Publishing House, GIS Application and Development Series, September 2012.  2. *Experiment Course of spatial analysis of ARCGIS*, compiled by Tang Guoan and Yang Xin, Science Press, GIS Theory and Application Series. | | | | | |  | |
| **Teaching objectives** | | | |  | | |
| **1. Master the basic knowledge of GIS**  1.1 Understand the theoretical background of the operation  1.2 Understanding the Basic Meaning of GIS  1.3 Understand the basic knowledge of GIS spatial data  1.4 Understand the overall concept of GIS related work  **2. Master geographic registration knowledge**  2.1 State the accuracy requirements, methods, and steps for spatial data geographic registration  **3. Master spatial data collection**  3.1 Understand the precautions and contents during the process of spatial data collection  3.2 Be familiar with data layering  3.3 Master the methods and steps of graphic data tracking  3.4 Be familiar with adding and deleting attributes  3.5 Understand Graphics and Attribute Editing  3.6 Master the methods and basic steps of topology processing  **4. Master the processing of spatial data**  4.1 Understand the basic knowledge of map projection  4.2 Understand the concept of projection transformation  4.3 Master the conversion between different data formats  4.4 Master the basic software operation methods  **5. Master the visualization of spatial data**  5.1 Master the Symbolic Content of Spatial Data  5.2 Master the Method of Making Tables  5.3 Master the production of thematic map  5.4 Understand spatial analysis  5.5 Understand the principles and methods of spatial analysis | | | |  | | |
| **Practical operation checklist** | | | | **Contact hours** | | |
| 1. Geographic registration 2. Data Tiering 3. Graph Data Tracking 4. Add and Remove Properties 5. Topology 6. Spatial reference and map projection 7. Symbolization of data 8. Cartographic representation 9. Cartographic generalization 10. Spatial analysis | | | | 8 hours  12 hours  4 hours  8 hours  12 hours  12 hours  12 hours  8 hours  8 hours  12 hours | | |

**Islamist and Pakistan Studies**

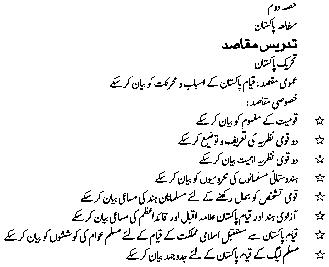
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| **Course code: Gen211** |



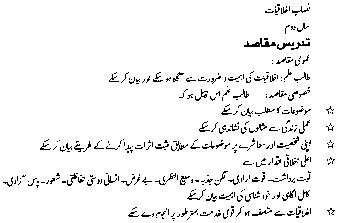












**Applied Mathematics II**

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| **Course code: Math-212** | | | | |
| **Total Contact Hours** | **64** | **T** | **P** | **C** |
| **Theory:** | **64** | **2** | **0** | **2** |
| **Practical** | **0** |  |  |  |

AIMS The students will be able to:

1. Solve problems of Calculus and Analytic Geometry.

2. Develop mathematical skill, attitudes and logical perception in the use of mathematical instruments.

3. Apply principles of Differential Calculus to work out rate measures, velocity, acceleration, maxima & minima values

4. Use Principles of Integral Calculus to compute areas & volumes.

5. Acquire proficiency in solving technological problems with mathematical clarity and insight.

COURSE CONTENTS

1. FUNCTIONS & LIMITS. 4 Hours

1.1 Constant & Variable Quantities

1.2 Functions & their classification

1.3 The concept of Limit

1.4 Limit of a Function

1.5 Fundamental Theorems on Limit

1.6 Some important Limits

1.7 Problems

2. DIFFERENTIATION 4 Hours

2.1 Increments

2.2 Differential Coefficient or Derivative

2.3 Differentiation ab-initio or by first Principle

2.4 Geometrical Interpretation of Differential Coefficient

2.5 Differential Coefficient of Xn, (ax + b)n

2.6 Three important rules

2.7 Problems

3. DIFFERENTIATION OF ALGEBRAIC FUNCTIONS 4 Hours

3.1 Explicit Functions

3.2 Implicit Functions

3.3 Parametric forms

3.4 Problems

4. DIFFERENTIATION OF TRIGONOMETRIC FUNCTIONS 6 Hours

4.1 Differential Coefficient of Sin x, Cos x, Tan x from first principle.

4.2 Differential Coefficient of Cosec x, Sec x, Cot x

4.3 Differentiation of inverse Trigonometric functions.

4.4 Problems.

5. DIFFERENTIATIONS OF LOGARITHMIC & EXPONENTIAL FUNCTIONS

4 Hours

5.2 Differentiation of Log ax

5.3 Differentiation of ax

5.4 Differentiation of ex

5.5 Problems

6. RATE OF CHANGE OF VARIABLES. 4 Hours

6.1 Increasing and decreasing functions

6.2 Maxima and Minima values

6.3 Criteria for maximum & minimum values

6.4 Methods of finding maxima & minima

6.5 Problems

7. INTEGRATION 8 Hours

7.1 Concept

7.2 Fundamental Formulas

7.3 Important Rules

7.4 Problems

8. METHODS OF INTEGRATION 6 Hours

8.1 Integration by substitution

8.2 Integration by parts

8.3 Problems

9. DEFINITE INTEGRALS 6 Hours

9.1 Properties

9.2 Application to area

9.3 Problems

10. PLANE ANALYTIC GEOMETRY & STRAIGHT LINE 6 Hours

10.1 Coordinate System

10.2 Distance Formula

10.3 The Ratio Formula

10.4 Inclination and slope of a line

10.5 The slope Formula

10.6 Problems

11. EQUATIONS OF STRAIGHT LINE 6 Hours

11.1 Some important Forms

11.2 General Form

11.3 Angle Formula

11.4 Parallelism & Perpendicularity

11.5 Problems

12. THE EQUATIONS OF CIRCLE 6 Hours

12.1 Standard form of Equation

12.2 Central form of Equation

12.3 General form of Equation

12.4 Radius & Coordinates of the centre

12.5 Problems

REFERENCE BOOKS

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

Math-212 APPLIED MATHEMATICS INSTRUCTIONAL OBJECTIVES

1. USE THE CONCEPT OF FUNCTIONS AND THEIR LIMITS IN SOLVING SIMPLE PROBLEMS.

1.1 Define a function.

1.2 List all type of functions.

1.3 Explain the concept of limit and limit of a function.

1.4 Explain fundamental theorems on limits.

1.5 Derive some important limits.

1.6 solve problems on limits.

2. UNDERSTAND THE CONCEPT OF DIFFERENTIAL COEFFICIENT

2.1 Derive mathematical expression for a differential coefficient.

2.2 Explain geometrical interpretation of differential coefficient.

2.3 Differentiate a constant, a constant associated with a variable and the sum of finite number of functions.

2.4 Solve related problems.

3. USE RULES OF DIFFERENTIATION TO SOLVE PROBLEMS OF ALGEBRAIC FUNCTIONS.

3.1 Differentiate ab-initio xn and (ax+b)n.

3.2 Derive product, quotient and chain rules.

3.3 Find derivatives of implicit functions and explicit functions.

3.4 Differentiate parametric forms, functions w.r.t another function and by rationalization.

3.5 Solve problems using these formulas.

4. USE RULES OF DIFFERENTIATION TO SOLVE PROBLEMS INVOLVING TRIGONOMETRIC FUNCTIONS.

4.1 Differentiate from first principle sin x,Cos x,tan x.

4.2 Derive formula Derivatives of Sec x, Cosec x, Cot x.

4.3 Find differential coefficients of inverse trigonometric functions

.

5. USE RULES OF DIFFERENTIATION TO LOGARITHMIC AND EXPONENTIAL FUNCTIONS.

5.1 Derive formulas for differential coefficient of Logarithmic and exponential functions.

5.2 Solve problems using these formulas.

6. UNDERSTAND RATE OF CHANGE OF ONE VARIABLE WITH RESPECT TO ANOTHER.

6.1 Derive formula for velocity, acceleration and slope ofa line.

6.2 Define an increasing and a decreasing function, maxima and minima values, point of inflexion.

6.3 Explain criteria for maxima and minima values of a function.

6.4 Solve problems involving rate of change of variables.

7. APPLY CONCEPT OF INTEGRATION IN SOLVING RELEVANT PROBLEMS.

7.1 Explain the concept of integration.

7.2 State basic theorems of integration.

7.3 List some important rules of integration.

7.4 Derive fundamental formulas of integration.

7.5 Solve problems of integration based on these rules/formulas.

8. UNDERSTAND DIFFERENT METHODS OF INTEGRATION

8.1 List standard formulas of Integration.

8.2 Integrate a function by substitution method.

8.3 Find integrals by the method of integration by parts.

8.4 Solve problems using these methods.

9. UNDERSTAND METHODS OF SOLVING DEFINITE INTEGRALS.

9.1 Define definite integral.

9.2 List properties of definite integrals.

9.3 Find areas under the curves using definite integrals.

9.4 Solve problems of definite integrals.

10. UNDERSTAND THE CONCEPT OF PLANE ANALYTIC GEOMETRY.

10.1 Explain the rectangular coordinate system.

10.2 Locate points in different quadrants.

10.3 Derive distance formula.

10.4 Prove section formulas.

10.5 Derive Slope Formula

10.6 Solve problem using these formulas.

11. USE EQUATIONS OF STRAIGHT LINE IN SOLVING PROBLEMS.

11.1 Define a straight line.

11.2 Write general form of equation of a straight line.

11.3 Derive slope intercept and intercept forms of equations of a straight line.

11.4 Derive expression for angle between two straight lines.

11.5 Derive conditions of perpendicularity and parallelism of two straight lines.

11.6 Solve problems involving these equations/formulas.

12. SOLVE TECHNOLOGICAL PROBLEMS USING EQUATIONS OF CIRCLE.

12.1 Define a circle.

12.2 Describe standard, central and general forms of the equation of a circle.

12.3 Convert general form to the central form of equation of a circle.

12.4 Derive formula for the radius and the coordinates of the center of a circle from the general form.

12.5 Derive equation of the circle passing through three given points.

12.6 Solve problems involving these equations.

**Understanding China**

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| **Course code: MgmC-212** | | | | | |
| **Total Contact Hours** | **64** | **T** | **P** | **C** | |
| **Theory:** | **64** | **2** | **0** | **2** | |
| **Practical** | **0** |  |  |  | |
| **Course objective:**  Through this course, international students can have a basic understanding of China's humanities and social development. It helps them better adapt to their study and life in China, and cultivates their interest in learning and researching China, as well as their emotions of knowing China, friendship with China, and love for China.  **Course content**  **1. Chinese Geography 6 hours**   1. Looking at China from the World 2. The Natural Environment of China 3. Mountain and River I 4. Mountain and River II 5. Famous City in China - Beijing 6. Famous City in China - Shanghai 7. Famous City in China - Hong Kong 8. Nature Tour - Wuyue, Zhangjiajie, Jiuzhaigou 9. Nature Tour - Tibet 10. Nature Tour - Xinjiang 11. Cultural Journey   **2. History 6 hours**  2.1 Chinese Ancestors  2.2 Qin Shi Huang  2.3 Emperor Wu of Han Dynasty  2.4 The Silk Road of the Western Han Dynasty  2.5 Tang Dynasty and Prosperous Era  2.6 Qingming Festival Ascending the River  2.7 Genghis Khan and Kublai Khan  2.8 Ming Taizu  2.9 Seven voyages  2.10 The Prosperity Course of Kangxi and Qianlong  2.11 Opium War  2.12 Sun Yat sen and the Kuomintang  2.13 The Communist Party of China  2.14 September 18th Incident  2.15 Mao Zedong and the Establishment of New China  2.16 New China's Diplomacy  2.17 Deng Xiaoping and China's Reform and Opening up  2.18 Entering a New Era  **3. Philosophy 6 hours**  3.1 Confucianism - Key Figures in Confucius  3.2 Key Figures in Confucianism - Mencius  3.3 Core Confucianism Doctrine - Etiquette (Li)  3.4 The core teachings of Confucian benevolence and benevolent governance  3.5 Exploration of the Core Doctrine and Knowledge Extension of Confucianism, Taoism, and Rites  3.6 The Book of Changes, Yin and Yang, and the Five Elements  3.7 Taoism - Laozi  3.8 Taoism - Zhuangzi  3.9 Other Military Thought Schools  3.10 Other Schools of Legal Thought  **4. Religion 2 hours**  4.1 Local beliefs and religions in China  4.2 Taoism  4.3 Introduction of Buddhism to China  4.4 Buddhist teachings, Zen (Zen) Buddhist schools, and Buddhist attractions.  4.5 Other non-local religions and the current situation of Chinese religions  **5. China's political system 2 hours**  5.1 National Flag, Emblem, and Anthem  5.2 Administrative divisions in China  5.3 National Institutions I  5.4 National Institutions II  5.5 Political Party I  5.6 Political Parties II  5.7 Foreign Policy of the People's Republic of China  **6. Literature and Art 6 hours**  6.1 Different stages and schools of Chinese literature  6.2 Ancient Chinese Literature - Pre-Qin Literature  6.3 Ancient Chinese Literature - Tang Poetry  6.4 Ancient Chinese Literature - Song Poetry  6.5 Ancient Chinese Literature - Four Classical Novels  6.6 Contemporary Literature I  6.7 Contemporary Literature II  6.8 Chinese Opera I  6.9 Chinese Opera II  6.10 Chinese Opera III  6.11 Concept of Traditional Chinese Music  6.12 Traditional Chinese Musical Instruments and Classical Works  6.13 Rich and colorful modern music  **7. Chinese and Chinese characters 2 hours**  7.1 Mandarin and dialects  7.2 Ancient and Modern Chinese  7.3 Common sayings  7.4 The Interesting Origin of Chinese Characters: The Development of Chinese Characters  7.5 Six categories of Chinese characters  7.6 Traditional and Simplified Chinese  **8. Calligraphy and painting 6 hours**  8.1 What is calligraphy?  8.2 The Evolution of Chinese Calligraphy - Oracle Bone Inscription and Bronze Inscription.  8.3 The Evolution of Chinese Calligraphy - Small Seals and Calligraphy  8.4 The Evolution of Chinese Calligraphy - Conventional Writing  8.5 The Evolution of Chinese Calligraphy - Cursive Script  8.6 The Evolution of Chinese Calligraphy - Spreading Style Calligraphy  8.7 The Beauty of Calligraphy  8.8 The Four Treasures of Research  8.9 The connection between calligraphy and other arts  8.10 Basic Knowledge of Chinese Painting  8.11 Artistic Characteristics of Chinese Painting  8.12 Three major themes and representative works of Chinese painting  **9. Economics 2 hours**  9.1 Chinese Agriculture  9.2 Chinese Industry  9.3 China's tertiary industry  9.4 New Normal of China's Economy  9.5 Digital Economy 2.0  9.6 "the Belt and Road" Initiative  **10. Science and Technology 4 hours**  10.1 the Four Great Inventions  10.2 Bronze Products  10.3 Seismograph  10.4 Ceramics  10.5 Hybrid Rice  10.6 China Sky Eye  10.7 China High-Speed Railway  10.8 Jiaolong's Deep Sea Exploration  10.9 "Shenwei-the Taihu Lake Light" supercomputer  10.10 Aerospace Science and Technology  10.11 Internet Payment  **11. Education 2 hours**  11.1 Imperial Examination System  11.2 Chinese Higher Education Institutions  11.3 Chinese Exam  11.4 Chinese International Education  **12. Healthcare 4 hours**  12.1 China's medical system  12.2 Traditional Chinese Medicine  12.3 Development of Traditional Chinese Medicine  12.4 Core Concepts of Traditional Chinese Medicine  12.5 Acupuncture and moxibustion and massage  12.6 Traditional Chinese Medicine and Life I  12.7 Traditional Chinese Medicine and Life II  12.8 Understanding Traditional Chinese Medicine  12.9 The Mysteries of Traditional Chinese Medicine  12.10 Traditional Chinese Medicine in the World  **13. Exercise and martial arts 2 hours**  13.1 Traditional Chinese Sports - Kite  13.2 Myth of Houyi Shooting the Sun  13.3 Chinese Women and the Olympics  13.4 Tai Chi  13.5 Martial Arts Movies  13.6 Martial Arts Elements and Spirit in Martial Arts Movies  13.7 The Cultural Connotation of Chinese Martial Arts  **14. Traditional festivals and Chinese cuisine 2 hours**  14.1 Traditional Chinese Festivals  14.2 Traditional Chinese festivals - Spring Festival and Lantern Festival  14.3 Chinese traditional festivals - Dragon Boat Festival&Mid-Autumn Festival  14.4 Chinese cuisine  **15. Material Cultural Heritage 6 hours**  15.1 Human Civilization: Beijingers  15.2 Grottoes: the Mogao Grottoes of Dunhuang  15.3 Magic project: Dujiangyan Irrigation Project  15.4 Imperial Mausoleum: Ming Xiaoling and Ming Dynasty Mausoleum  15.5 The largest ceremonial bronze vessel: Simuwu Ding  15.6 Musical Instruments during the Warring States Period: Chimes of Marquis Yi of Zeng  15.7 Ancient Chinese Architecture  15.8 Types of Ancient Chinese Architecture  15.9 Royal Architecture: Beijing's Old Palace  15.10 Ancient Residential Buildings: Siheyuan  15.11 Chinese Ancient Garden  **16. Intangible Cultural Heritage 6 hours**  16.1 China's Intangible Cultural Heritage  16.2 Intangible Cultural Heritage Project - Epic of King Gesar  16.3 Intangible Cultural Heritage Project - Guqin  16.4 Intangible Cultural Heritage Project - Dance of Chinese Korean Farmers  16.5 Intangible Cultural Heritage Project - Shadow Puppetry  16.6 Intangible Cultural Heritage Project - Yue Opera  16.7 Intangible Cultural Heritage Project - Seal Carving  16.8 Intangible Cultural Heritage Project - Nanjing Yunjin  16.9 Intangible Cultural Heritage Projects -24 Solar Terms  16.10 Intangible Cultural Heritage Project - Cross talk  16.11 Intangible Cultural Heritage Project - Acrobatic Art  16.12 Protection of China's Intangible Cultural Heritage  **Recommended/reference books:**  1. "*Understanding China*", edited by Cheng Aimin, published by Shanghai Foreign Language Education Press, book number ISBN978-7-5446-5808-9.  **Teaching objectives:**  1. Quality objective: To cultivate students' interest in learning and studying China in depth, as well as the emotions of knowing China, friendship with China, and love for China.  2. Knowledge objective: Through the systematic teaching of this course, students will have a comprehensive understanding of China from aspects such as geography, history, philosophy, religion, culture and art. 3. Ability objective: Through this course, students will be able to tell Chinese cultural stories to their own nationals or international students from other countries. | | | | |

**Chinese Language-II**

**Course code: GenC-212**

**Total contact hours**

Theory 64 T P C

Practical 0 2 0 2

**AIMS** There are 20 lessons (including 4-unit reviews) in this course. It is recommended to complete 8 lessons and the unit reviews in 32 class hours. After completing this course, students can master the advanced-basic Chinese language knowledge in the content of the course, and be able to reach and exceed **HSK level THREE**.

**INSTRUCTION OBJECTIVE** Through this course, learners can systematically learn the language knowledge at this stage and cope with general communication, and can communicate on familiar topics and meet the basic communication needs of daily life and study, and gradually understand and be familiar with Chinese communication etiquette, cultural customs, etc.

**COURSE CONTENTS**

1. **Lesson 1 Pick up international students at the airport 3 hours**

This lesson introduces grammatical knowledge such as "flexible use of interrogative pronouns" and "basic forms of clutch words", which requires students to use sequential words correctly and understand the contextual meaning of some special words.

1. **Lesson 2 What would you like to drink 3 hours**

This lesson introduces the rhetorical question form "can…?" and the related words "not only… but also...", and learn to express your needs correctly in communication.

1. **Lesson 3 I'm kidding you 4 hours**

This lesson explains the fixed structures "more and more", "more A, more B", etc., and understands how to praise in Chinese and how to deal with others' praise.

1. **Lesson 4 I like winter best 4 hours**

Through the description of weather, students can learn the usage of adverbs such as "often" and "always", which express frequency, and compare and describe similar phenomena.

**UNIT REVIEW 1 (INCLUDING TESTS) 2 hours**

Summarize the contents of Lesson 1-4, review key words and grammar knowledge, and help learners really consolidate their mastery. There are tests designed, which can detect what has been learned before, so as to check for leaks and fill gaps.

1. **Lesson 5 I caught a cold 3 hours**

This lesson learns the basic usage of "active" sentence, understands the expressions related to illness and medical treatment, and learns the language communication in hospital scenes.

1. **Lesson 6 You are really careless**  **3 hours**

Learn and summarize the usage of simple directional complements "V come" and "V leave", and master the basic expression of request and evaluation functions in daily communication.

1. **Lesson 7 English black tea is healthy and delicious 4 hours**

Understand how to express approximate numbers in Chinese, how to persuade others and how to express their basic attitude.

1. **Lesson 8 I'm not a shopaholic 4 hours**

This lesson is related to online shopping. Learn the expression "A is A, that is" and learn how to express your views from different angles.

**UNIT REVIEW 2 (INCLUDING TESTS) 2 hours**

This section leads students to review the knowledge points they have learned in the past, and conduct mid-term tests to test students' learning effect.

1. **Lesson 9 Why did grandparents move 3 hours**

This lesson introduces a life event related to "moving house", the expression of learning conditions and the extended meaning of directional complement through events.

1. **Lesson 10 Eat hot pot for the first time 3 hours**

This lesson introduces the way of having dinner in China through "hot pot" and some basic situations of Chinese restaurants, so as to help learners get a preliminary understanding of Chinese dining customs.

1. **Lesson 11 Teacher Wang is going to change the house 4 hours**

This lesson is related to "housing" in "food, clothing, housing and transportation". While understanding the story, students can learn language knowledge such as hypothetical relationship and overlapping of disyllabic verbs.

1. **Lesson 12 Single Li Wenchao 4 hours**

This lesson introduces emotional problems, learn about young people's concepts of marriage and love, and learn how to compare them in Chinese.

**UNIT REVIEW 3 (INCLUDING TESTS) 2 hours**

Review the previous knowledge, students answer questions through the platform, check the learning situation, and help teachers and students analyze their learning situation.

1. **Lesson 13 This is her new home 3 hours**

This lesson introduces the living conditions of young people at present, and understands how to describe the living environment, learn the Chinese expression of concepts such as location and existence.

1. **Lesson 14 Allen's weekend 3 hours**

This lesson introduces school life, understand the sentence structure expressing complete negation, and summarize the usage of three auxiliary words "adjective", "adverb" and "should".

1. **Lesson 15 Fall in love with public square dancing 4 hours**

By introducing the living conditions of the elderly in China, students can learn Chinese comparative structure, enumerating relations and various usages of complements.

1. **Lesson 16 Taste English afternoon tea 4 hours**

This lesson introduces grammatical knowledge such as "passive" sentence and "adjective reduplication". Through the study of this lesson, students can understand the dining habits of restaurant ordering and national dishes.

**UNIT REVIEW 4 (INCLUDING TESTS) 2 hours**

This section is a review test class, leading students to review the knowledge points learned in the past for final tests to test students' learning effect.

**Tectonic Geology**

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| **Course code: LRSM-212** | | | | | |
| **Total Contact Hours::** | **128** | **T** | **P** | | **C** |
| Theory: | **32** | **1** | **3** | | **2** |
| Practical: | 96 |
| **Course Purpose:**  Through the study of structural geology, master the method of observation and description of field tectonics phenomena; Able to read geological maps, analyze rock occurrence, fault properties, fold morphology, and utilize the "V" shape rule. Subsequent courses such as "Deposit Geology" and "Solid Mineral Exploration" will play a leading role in learning. | | | | | |
| **Course content** | | | |  | |
| **1. Introduction**  1.1 Research Object and Content of Structural Geology  1.2 Guiding ideology and specific methods for learning structural geology  1.3 Research significance of structural geology | | | | 1 hours | |
| **2. Primary structure and occurrence of sedimentary rock stratum**  2.1 Primary structure of sedimentary rock stratum  2.2 Identification of bedding  2.3 Determination of rock strata sequence;  2.4 Contact relationship of strata;  2.5 Occurrence of rock strata and occurrence factors;  2.6 The outcrop morphology and thickness of horizontal rock layers;  2.7 The outcrop morphology and thickness of vertical rock layers;  2.8 The outcrop morphology and thickness of inclined rock layers | | | | 6 hours | |
| **3. Mechanical basis of tectonics analysis**  3.1 Stress analysis;  3.2 Deformation analysis;  3.3 Factors affecting rock mechanics properties and rock deformation. | | | | 4 hours | |
| **4. Fold**  4.1 Folds and fold elements;  4.2 The geometric form and description of folds;  4.3 Types of folds and combinations of folds;  4.4 The formation mechanism of folds;  4.5 Observation and Study of Fold Structures | | | | 5 hours | |
| **5. Joints**  5.1 Classification and identification characteristics of joints;  5.2 Staging and matching of joints;  5.3 Joints developed on different geological backgrounds.  5.4 Field Observation of Joints  5.5 Organization of joint measurement data | | | | 4 hours | |
| **6. Fault**  6.1 Fault elements;  6.2 Fault classification;  6.3 Fault theories;  6.4 Fault effect;  6.5 Preliminary mechanism of fault formation;  6.6 Observation and study of faults;  6.7 Characteristics of synsedimentary faults;  6.8 Characteristics of ductile faults (ductile shear zones)  6.9 Introduction to Regional Major Faults  **7. Splitting and lineation 2 hours**  7.1 Splitting and classification  7.2 Linearity and classification  8. **Structural study of magmatic rock body 2 hours**  8.1 Occurrence and structural control of magmatic rock mass;  8.2 Primary structure of magmatic rock mass;  8.3 Secondary structure of magmatic rock mass;  8.4 Observation and study of magmatic rock structure  9. **Structural study of metamorphic rock area 2 hours**  9.1 Overview of structure in metamorphic rock area  9.2 Structural characteristics of metamorphic rock area  9.3 Introduction to the steps and principles of structural geological mapping in metamorphic rock area | | | | 6 hours | |
| **Recommended/reference books:** | | | |  | |
| 1. *Tectonic Geology* ", co edited by Geological Publishing House, Wuhan Institute of Geology, Chengdu Institute of Geology, Nanjing University, and Hebei Institute of Geology, 1979.  2. *Structural Geology*, written by M.P Bi Lingqi from Geological Publishing House, translated by Zhang Bingxi, 1959  3. *Atlas of tectonics*, Geological Publishing House, Wuhan Academy of Geosciences, 1978 | | | | | | |  |
| **Teaching objectives** | | | |  | |
| **1. Introduction**  1.1 Understand the Purpose and Tasks of Structural Geology  1.2 Understand the significance of structural geological research  1.3 Master the learning methods of structural geology  **2. Primary structure and occurrence of sedimentary rock stratum**  2.1 Understanding the meaning of bedding, sequence, and occurrence elements  2.2 Grasp the knowledge of stratum thickness and stratum contact relationship and its significance in the study of tectonics  2.3 Learn the measurement methods of rock occurrence factors, thickness, and burial depth.  **3. Mechanical basis of tectonics analysis**  3.1 Understand the concepts of stress and deformation  3.2 Understand the main factors affecting the properties and deformation of rock mechanics  3.3 Master the characteristics of strain ellipsoids  **4. Fold**  4.1 Master the types of folds  4.2 Understand the combination forms and formation mechanisms of folds  4.3 Have preliminary understanding of the methods of reading and compiling geological maps in folded areas.  **5. Joints**  5.1 Master the types and characteristics of joints  5.2 Observation and research content and methods of joints  5.3 Understand the phased matching of joints.  **6. Fault**  6.1 Master fault identification markers and fault types  6.2 Understand the formation mechanism of various faults  6.3 Understand the general combination law of folds and faults  6.4 Have a preliminary understanding of the methods of reading and analyzing geological maps of fault areas and preparing geological profiles.  **7. Cleavage and lineation**  7.1 Have preliminary understanding of the concepts of cleavage and lineation  7.2 Master the basic characteristics of cleavage and lineation  **8. Structural study of magmatic rock mass**  8.1 Master preliminarily the content of structural research in igneous rock area  8.2 Master the observation and research of magmatic rock structure  **9. Tectonic study of metamorphic rock**  9.1 Understand the current research situation and mapping steps of metamorphic rock structure  9.2 Have preliminary understanding of structural characteristics of metamorphic rock area | | | |  | |
| **Practical operation checklist** | | | | **hour** | |
| 1. Basic knowledge of geological maps  2. Steps and methods for reading geological maps, calculating the thickness of rock layers on horizontal and inclined geological maps  3. Use indirect methods to determine the occurrence factors of rock layers  4. Read the geological map of inclined strata and unconformity contact and make geological section map  5. Compile geological maps based on known rock occurrence  6. Interpret geological maps of simple fold areas  7. Interpret geological maps of complex fold areas and draw geological profiles  8. Compile and analyze contour maps for construction  9. Collation of joint measurement results and preparation of joint rose diagram  10. Compile joint pole maps and contour maps  11. Interpret the fault geological map and calculate the fault occurrence and distance  12. Analyze the geological map of the folded fault area and cut the profile map  13. Analyze the geological map of igneous rock area and cut the profile map  14. Observation of structural specimens | | | | 10  10  8  10  10  8  8  8  8  8  8  8  8  8  8 | |

**Mineral and Rock Identification**

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| **Total Contact Hours:** | **160** | **T** | **P** | | **C** | |
| Theory: | **64** | **2** | **3** | | **3** | |
| Practical: | 96 |
| **Course Purpose:**  Enable students to have a solid grasp of mineralogy, petrology knowledge and relevant skills necessary for land and resources survey, be familiar with common minerals and rocks and master the methods of identifying minerals and rocks, have the ability to solve practical problems, and lay the foundation for mastering the overall professional knowledge and skills. At the same time, infiltrate ideological education and strengthen students' professional ethics cultivation. | | | | | | |
| **Course content** | | | |  | | |
| **Fundamentals of mineralogy**  **1 Introduction**  1.1 Concept, task, and content of minerals  1.2 Brief development history of mineralogy and its relationship with other disciplines  1.3 The Role of Minerals in National Economic Construction  1.4 Concept of rock, tasks of petrology and rock classification  1.5 Relationship between petrology and other disciplines  1.6 Petrology research methods  1.7 Brief history and research status of petrology | | | | 32 hours  2 hours | | |
| **2 Overview of crystals**  2.1 Crystals and Amorphoids  2.2 Space Grid  2.3 Basic properties of crystals  2.4 Crystal Formation | | | | 2 hours | | |
| **3 Symmetry of crystals**  3.1 The concept and characteristics of symmetry  3.2 Symmetric Operations and Symmetric Elements  3.3 Classification of crystals | | | | 2 hours | | |
| **Ideal Shapes of 4 Crystals - Monomorphic and Polymorphic**  4.1 Simplex  4.2 Aggregation | | | | 2 hours | | |
| **5 Crystal orientation and crystal plane symbols**  5.1 Crystal orientation  5.2 Crystal plane symbols and simplex symbols  5.3 Crystal bands and crystal band symbols | | | | 2 hours | | |
| **6 Chemical composition and internal structure of minerals**  6.1 Chemical composition of the crust  6.2 Chemical composition types of minerals  6.3 Ion Types of Elements  6.4 chemical bond and lattice type  6.5 Principle of tight packing of spheres  6.6 Homogeneity of class and quality  6.7 Homogeneous Polymorphisms  6.8 Colloidal minerals  6.9 Water in minerals  6.10 Chemical formula of minerals  **7 Understand the Morphology of Minerals**  7.1 Monomer morphology of minerals  7.2 Aggregate morphology of minerals  **8. Physical properties of minerals**  8.1 Optical properties of minerals  8.2 Mechanical properties of minerals  8.3 Relative density of minerals  8.4 Electrical and magnetic properties of minerals  8.5 Luminescence and Radioactivity of Minerals  8.6 Other physical properties of minerals  **9 Genesis, classification, and nomenclature of minerals**  9.1 Geological processes that form minerals  9.2 Formation conditions of minerals  9.3 Changes in minerals  9.4 Classification of minerals  9.5 Naming of minerals  **10 Natural element mineral categories**  10.1 Overview  10.2 Natural metallic elements  10.3 Natural Semimetallic Elements  10.4 Natural non-metallic elements  **11 Sulfides and Similar Compounds Mineral Group**  11.1 Overview  11.2 Simple sulfide minerals  11.3 Complex sulfide minerals  11.4 Sulfur salt minerals  **12 Categories of oxide and hydroxide minerals and halide minerals**  12.1 Overview  12.2 Simple oxide minerals  12.3 Complex oxide minerals  12.4 Hydroxide minerals  12.5 Fluoride minerals  12.6 Chloride minerals  **13 Oxygenate mineral categories**  13.1 Overview  13.2 Silicate minerals  13.3 Other oxygen-containing salt minerals  **Petrology**  **1 igneous rock and its material composition**  1.1 Characteristics of magma and igneous rock  1.2 Material composition of igneous rock  1.3 Relationship between mineral composition and chemical composition  **2. Structure of igneous rock** | | | | 2 hours  2 hours  2 hours  2 hours  2 hours  2 hours  4 hours  6 hours  **32 hours**  2 hours  2 hours | | |
| 2.1 Structure of igneous rock  2.2 Determination of Mineral Crystallization Order  2.3 Structure of igneous rock  **3 Field characteristics of igneous rock**  3.1 Field characteristics and facies of intrusive rock  3.2 Field characteristics and facies of volcanic rocks  **4 Classification of igneous rock**  4.1 International Union of Geosciences Classification  4.2 Classification and igneous rock naming adopted in this book  4.3 Ultrabasic rock, basic rock and intermediate rock  4.4 Neutral transitional rocks, acidic rocks, alkaline rocks, and vein rocks  4.6 Observation and description of igneous rock  **5 Concept, characteristics and classification of sedimentary rock**  5.1 Concept and research significance of sedimentary rock  5.2 Formation and evolution process of sedimentary rock  5.3 Basic characteristics of sedimentary rock  5.4 Classification of sedimentary rock  **6 Various theories of sedimentary rocks**  6.1 Terrestrial clastic rock and clay rock  6.2 Carbonate rock and other sedimentary rock  6.3 Field identification of sedimentary rock  **7 Introduction to metamorphic rocks and their classification and nomenclature**  7.1 Introduction to metamorphic rock  7.2 Classification and naming of metamorphic rock  **8 Main types of metamorphic rock**  8.1 Contact with metamorphic rock, gas-liquid metamorphic rock and dynamic metamorphic rock  8.2 Regional metamorphic rock and migmatite  8.3 Observation and description of metamorphic rock | | | | 2 hours  6 hours  4 hours  4 hours  4 hours  8 hours | | |
| **Recommended/reference books:** | | | |  | | |
| 1. *Fundamentals of mineralogy*, edited by Peng Zhenwan, published by the Geological Publishing House in January 2008, edition: First printing in 2008;  2. *Fundamentals of mineralogy*, the second edition, edited by Peng Zhenwan, Xu Ming, Xu Youhua, published by the Geological Publishing House, version: the second edition in August 2018; 2nd printing in October 2020;  3. *Crystallography and Mineralogy*, edited by Pan Zhaolu, published by Beijing Geological Publishing House in 1993;  4. *Comprehensive Geology* "by Peng Zhenwan, edited by Han Yunyan, published by China Construction Industry Press (Beijing) in 2003; 5. *Petrology*, edited by Xu Yaojian, Xu Hannan, Ren Xigang, published by the Geological Publishing House, edition: the first edition in Beijing in August 2007, and the 13th edition in Hebei in July 2020; 6. *Experimental Technology of Mineral petrology*, Di Mingxin, University of Petroleum Press, edition: the first edition in June 1998;  7. *Petrology Course Practice Guide*, edited by Hu Dazuo and Peng Zhenwan. | | | | | |  | |
| **Teaching objectives** | | | |  | | |
| **1 Introduction**  1.1 Master and understand the concepts, tasks, and content of minerals  1.2 Understand the development history of mineralogy and its relationship with other disciplines  1.3 Understand the role of minerals in national economic development  1.4 Master and understand the concept of rock, tasks of petrology and rock classification  1.5 Understand the relationship between petrology and other disciplines  1.6 Understand petrology research methods  1.7 Understand the development history and research status of petrology  **2 Overview of crystals**  2.1 Master the difference between crystals and amorphous materials  2.2 Understand the lattice structure of crystal space  2.3 Master the basic properties of crystals  2.4 Master the Formation Method of Crystals  **3 Symmetry of crystals**  3.1 Master the concept and characteristics of symmetry  3.2 Master the symmetry operation and symmetry elements of crystals  3.3 Master the classification of crystals  **Ideal Shapes of 4 Crystals - Monomorphic and Polymorphic**  4.1 Master the concept of simplex, recognize several 47 types of simplex, and master the common 18 types of simplex  4.2 Understand the characteristics of polymorphs and learn the methods and steps to analyze single forms from polymorphs  **5 Crystal orientation and crystal plane symbols**  5.1 Learn the method of crystal orientation and estimating crystal plane symbols with the naked eye  5.2 Master the determination method of crystal plane symbols and common simplex symbols  5.3 Understand the crystal belt and its symbols  **6 Chemical composition and internal structure of minerals**  6.1 Master the main chemical components of the Earth's crust  6.2 Master the chemical composition types of minerals  6.3 Understand the ion types of elements  6.4 Master chemical bond and lattice type  6.5 Master the principle of tight packing of spheres  6.6 Master the concepts of isomorphism and homomorphisms  6.7 Master the concept of colloidal minerals  6.8 Master the types of water in minerals  6.9 Learn to express chemical formulas of minerals  **7 Understand the Morphology of Minerals**  7.1 Master the Single Form of Minerals  7.2 Master the aggregate morphology of minerals  **8. Physical properties of minerals**  8.1 Master and learn to correctly observe and describe the optical properties of minerals  8.2 Master and learn to correctly observe and describe the mechanical properties of minerals  8.3 Master and learn to correctly observe and describe the relative density of minerals  8.4 Master the Electrical and Magnetic Properties of Minerals  8.5 Master the Luminescence and Radioactivity of Minerals  8.6 Master other physical properties of minerals  **9 Genesis, classification, and nomenclature of minerals**  9.1 Master the types of geological processes that form minerals  9.2 Master the formation conditions of minerals  9.3 Understand changes in minerals  9.4 Master the classification and naming of minerals  **10 Natural element mineral categories**  10.1 Master the characteristics of natural elements and methods for identifying and describing minerals  **11 Sulfides and Similar Compounds Mineral Group**  11.1 Master the characteristics of sulfide and its similar compound minerals and methods for identifying and describing minerals  **12 Categories of oxide and hydroxide minerals and halide minerals**  12.1 Master the characteristics of oxide, hydroxide, and halide minerals, as well as methods for identifying and describing minerals  **13 Oxygenate mineral categories**  13.1 Master the characteristics of oxygen-containing salt minerals and methods for identifying and describing minerals  **Petrology**  **1 igneous rock and its material composition**  1.1 Master and understand the characteristics of magma, magmatism and igneous rock  1.2 Master the material composition of igneous rock  1.3 Master the relationship between mineral composition and chemical composition  **2. Structure of igneous rock**  2.1 Master and learn to identify the structure of igneous rock  2.2 Master the principle of mineral crystallization sequence  2.3 Master and learn to identify the structure of igneous rock  **3 Field characteristics of igneous rock**  3.1 Learn to identify the field characteristics and facies of intrusive rock  3.2 Learn to distinguish the field characteristics and facies of volcanic rocks  **4 Classification of igneous rock**  4.1 Understand the classification of International Science and Technology Union  4.2 Master the classification and igneous rock naming adopted in this book  4.3 Master the classification principles and identification methods of ultrabasic rock, basic rock and intermediate rock  4.4 Master the classification principles and identification methods of neutral transitional rocks, acidic rocks, alkaline rocks, and vein rocks  4.6 Learn to observe and describe igneous rock correctly  **5 Concept, characteristics and classification of sedimentary rock**  5.1 Grasp the concept of sedimentary rock and its research significance  5.2 Understand the formation and evolution process of sedimentary rock  5.3 Master and understand the basic characteristics of sedimentary rock  5.4 Learn the classification principles of sedimentary rock  **6 Various theories of sedimentary rocks**  6.1 Learn to correctly observe and describe terrigenous clastic rock and clay rock  6.2 Learn to observe and describe carbonate rocks and other sedimentary rock correctly  6.3 Learn to correctly identify sedimentary rock in the field  **7 Introduction to metamorphic rocks and their classification and nomenclature**  7.1 Master the concept and basic characteristics of metamorphic rock and metamorphism  7.2 Understand the classification and naming principles of metamorphic rock  **8 Main types of metamorphic rock**  8.1 Learn to correctly observe and describe contact metamorphic rock, gas-liquid metamorphic rock and dynamic metamorphic rock  8.2 Learn to correctly observe and describe regional metamorphic rock and migmatite  8.3 Learn to observe and describe metamorphic rock correctly | | | |  | | |
| **Practical operation checklist** | | | | **hour** | | |
| **Fundamentals of mineralogy**  Skills Internship 1: Symmetrical Element Operation  Skills Internship 2: The Ideal Form of Crystals - Single Form  Skills Internship 3: Aggregation analysis  Skills Internship 4: Advanced Crystal Family Crystal Orientation  Skills Internship 5: Orientation of middle and low level crystal families Skills Internship 6: Mineral morphology  Skills Internship 7: Physical Properties of Minerals (1) (Optical Properties of Minerals)  Skills Internship 8: Natural Elements and Sulfide Minerals  Skills Internship 9: Oxides and Hydroxides and Halides Minerals  Skills Internship 10: Island and Circular Silicate Subclass Minerals  Skills Internship 11: Chain, Layered, and Frame Shaped Silicate Subclass Minerals  Skills Internship 12: Other Oxygenated Salt Minerals  **Petrology**  Skills Internship 13: Structure of igneous rock  Skills Internship 14: Peridotite - picrite and gabbro - basalt  Skills Internship 15: Diorite - andesite and syenite - trachyte  Skills Internship 16: Diorite - andesite and syenite - trachyte  Skills Internship 17: Terrigenous clastic rock  Skills Internship 18: Argillaceous Rock and Volcanic clastic rock  Skills Internship 19: Carbonate and Siliceous Rocks  Skills Internship 20: Structure of metamorphic rock  Skills Internship 21: Contact metamorphic rock, gas hydrothermal and dynamic metamorphic rock  Skills Internship 22: Area metamorphic rock and migmatite | | | | 48 hours  4 hours  4 hours  4 hours  4 hours  4 hours  4 hours  4 hours  4 hours  4 hours  4 hours  4 hours  4 hours  48hours  4 hours  4 hours  4 hours  4 hours  8 hours  4 hours  4 hours  4 hours  4 hours  8 hours | | |

**Real Estate Registration Investigation**

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| --- | --- | --- | --- | --- | --- |
| **Course code:LRSM-232** | | | | | |
| **Total Contact Hours:** | **128** | | **T** | **P** | **C** | |
| **Theory:** | **32** | | **1** | **3** | **2** | |
| **Practical:** | **96** | |
| **Course Purpose:**  Through the study of this course, learners will be able to understand the basic theories and principles of real estate registration surveys. On the basis of mastering the use of instruments, they will be able to conduct real estate surveys, real estate surveying and mapping, and comply with regulatory requirements; At the same time, in the process of completing the task, emphasis should be placed on ideological and political education in the curriculum, the cultivation of professional ethics and behavior, ultimately making them qualified in political and professional qualities, and possessing a certain degree of self-learning ability. | | | | | |
| **Course content** | | Including Theory and Practice | | | |
| **Project 1: Basic Knowledge of Real Estate Investigation**  Task 1-1 Overview of Real Estate  Task 1-2 Basic Knowledge of Real Estate Investigation  Task 1-3 Real Estate Registration | | 2 credit hours | | | |
| **Project 2 Real Estate Ownership Survey**  Task 2-1 Overview of Real Estate Ownership Survey  Task 2-2 Preparation work for real estate registration investigation  Task 2-3 Design of Real Estate Registration Survey Technology  Task 2-4 Land ownership survey (including practical training)  Task 2-5 Real estate registration measurement (including practical training)  Task 2-6 Preparation of Real Estate Ownership Survey Report  Task 2-7 Compilation of Real Estate Ownership Survey Results | | 10 credit hours | | | |
| **Project 3 Land Use Status Survey**  Task 3-1 Overview of Land Use Status Survey  Task 3-2 Classification of Land Use Status Survey  Task 3-3 Implementation of Land Use Status Survey  Task 3-4 Special Land Use Survey (including practical training)  Task 3-5 Preparation of Land Use Status Survey Results Report  Task 3-6 Investigation of changes in land use status | | 10 credit hours | | | |
| **Project 4 Cadastral Survey**  Task 4-1 Overview of Cadastral Survey  Task 4-2 Preparation for Cadastral Survey  Task 4-3 Cadastral Survey Technical Design  Task 4-4 Cadastral Survey (including practical training) | | 4 credit hours | | | |
| **Project 5 Real Estate Survey and Mapping**  Task 5-1 Overview of Property Survey and mapping  Task 5-2 Real Estate Survey and Surveying Technology Design  Task 5-3 Real estate investigation (including practical training)  Task 5-4 Real estate surveying and mapping (including practical training)  Task 5-5: Compilation and Management of Real Estate Surveying and Mapping Results  Task 5-6 Property Change Investigation | | 4 credit hours | | | |
| **Project 6: Typical Cases of Real Estate Investigation**  Task 6-1 Land Use Status Survey Cases  Task 6-2 Urban Cadastral Survey Cases  Task 6-2 Real Estate Surveying and Mapping Cases | | 2 credit hours | | | |
| **Recommended/reference books:** | |  | | | |
| 1. "*Cadastral and Real Estate Surveying and Mapping*", edited by Chen Chuansheng, published by Wuhan University of Technology Press in April 2014, version: 7th printing in July 2022.  2. "*Investigation and Measurement of Real Estate Registration*", edited by Wu Xiangyang, Jiang Hui, and others, published by Surveying and Mapping Publishing House in July 2021.  3. *Real Estate Surveying and Mapping*, edited by Hong Bo, published by Surveying and Mapping Publishing House in September 2020.  4. Normative standards: (1) "Global Positioning System GPS Measurement Specifications" (GB/T18314-2009); (2) Technical Specification for Real Time Dynamic Measurement (RTK) of Global Positioning System (CH/T2009-2010); (3) Safety Regulations for Surveying and Mapping Operators (CH 1016-2008); (4) General Specification for Engineering Surveying (GB 55018-2021); (5) National Basic Scale Topographic Map Formats - Part 1: 1:500 1:1000 1:2000 Topographic Map Formats (GB/T20257.1-2007); (6) National Basic Scale Topographic Map Formats - Part 2: 1:5000 1:10000 Topographic Map Formats (GB/T20257.2-2007); (7) National Basic Scale Topographic Map Formats - Part 3: 1:25000 1:50000 1:100000 Topographic Map Formats (GB/T20257.3-2007); (8) Code for Cadastral Surveying and Mapping (CH5002-94); (9) Cadastral Map Format (CH5003); (10) Specification for Real Estate Surveying and Mapping Unit 1: Regulations on Real Estate Surveying (GB/T17986.1-2000); (11) Specification for Real Estate Surveying and Mapping - Unit 2: Real Estate Map Format (GB/T17986.2-2000); | | | | | |
| **Teaching objectives** | |  | | | |
| **I. Knowledge objectives**  1. Through this course, students should master the basic principles and methods of real estate registration investigation  ;  2. Able to further learn the rapidly developing surveying and mapping technology in today's society by utilizing their knowledge  and apply it, that is, have the ability to learn for life.  **II. Skill Objectives**  1. Students can use their knowledge to independently complete or lead others to complete the real estate registration survey task  in accordance with the measurement specifications and the requirements of the measurement task book of Party A, and meet the corresponding measurement specifications and the requirements of the measurement task book of Party A;   1. Be able to use the knowledge learned to analyze and solve problems encountered in real estate registration investigations   in practical work;   1. Be able to apply the learned knowledge of real estate registration investigation to other technologies   related to real estate registration investigation.  **III. Quality goals**  1. Through the study of this course, emphasis is placed on cultivating students to strictly follow measurement standards in their work and  the technical quality of real estate registration investigation;  2. Cultivate students' attention to detail, serious and meticulous work style, and a team spirit of division of labor and cooperation, the excellent quality of being hardworking and hardworking. | | | | | |
| **Practical operation checklist** | | **Credit hours** | | | |
| 1. Land ownership survey  2. Real estate registration measurement  3. Special investigation on land use  4. Cadastral survey  5. Property Survey  6. Real estate surveying and mapping | | 16 credit hours  20 credit hours  16 credit hours  16 credit hours  16 credit hours  12 credit hours | | | |

**Digital cartography**

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| **Course code:** **LSRM-242** | | | | | |
| **Total Contact Hours:** | **128** | **T** | **P** | | **C** |
| Theory: | **32** | **1** | **3** | | **2** |
| Practical: | 96 |
| **Course Objective**  Through the study of digital geological mapping, students can read geological maps, correctly edit and draw all kinds of geological maps (topographic maps, handy section maps, regional geological maps, plan maps, cut geological section maps and stratigraphic column, etc.), correctly output maps, and have the ability to convert between various digital formats. | | | | | |
| **Course content** | | | |  | |
| 1. The course introduces geological mapping and digital geological mapping cognition | | | | 2 credit hours | |
| **2. Project 1: Drawing of Common Elements in Geological Maps**  Task 1: Image scanning and processing  Task 2: Create engineering files and produce legend boards  Task 3: Frame Generation  Task 4: Legend Drawing  Task 5: Drawing of Map Labels  Task 6: Isoline drawing | | | | 12 credit hours | |
| **3. Project 2: Topographic and Geological Map Reading and Drawing**  Task 1: Topographic Map Reading and Drawing  Task 2: Geological Map Reading and Drawing | | | | 4 Credit hours | |
| **4. Project 3: Preparation of geological column chart**  Task 1: Preparation of stratigraphic column chart  Task 2: Preparation of Drilling Holes Rock Core Column Map | | | | 4 Credit hours | |
| **5. Project 4: Preparation of Geological Profile Map**  Task 1: Handwriting Profile Drawing  Task 2: Preparation of Measured Geological Profile Map  Task 3: Preparation of geological profile map | | | | 10 credit hours | |
| **Recommended/reference books:** | | | |  | |
| 1. "*Digital Geological Mapping*" edited by Liu Sunan and others, published by Geological Publishing House. Version: April 2014, 2nd edition in May 2022  2. "*MapGIS Geographic Information System*", written by Wu Xincai, published by Electronic Industry Press. Version: 1st edition in January 2004, 25th printing in July 2014  3. "*MapGIS Geographic Information System*", by Wu Xincai et al., published by Electronic Industry Press. Version: 2nd edition in August 2015, 2nd printing in February 2016  4. Color standards for geological maps: 5. Legend for regional geological survey charts | | | | | |
| **Teaching objectives** | | | |  | |
| **1. Knowledge objectives**  1.1 Familiar with geological map compilation standards and schematic legends  1.2 Understand the basic concepts of MapGIS system and master the basic knowledge of the system  1.3 Understand data input methods; Format requirements and processing methods for raster files  1.4 Presentation of geological maps, mapping, reading, layering, and document management  1.5 Describe the creation and management methods of point, line, surface files, and engineering files  1.6 Learn the methods of graphic vectorization and graphic editing  1.7 Understand the management of system libraries  1.8 Understand the concept and process of error correction  1.9 State the basic concepts of projection transformation  1.10 Learn the method of graph frame generation and graph clipping  1.11 Learn the methods of graphic finishing and graphic output  **2. Skill Objectives**  2.1 Able to install MAPGIS system software correctly and set up the system correctly  2.2 Able to input graphics (base images) and preprocess raster files  2.3 Able to read and layer graphics and manage files  2.4 Can edit and process graphics data, have vectorization operation ability, topology processing ability, 2.5 point, line, surface data editing ability  2.6 Able to correct errors in graphical data  2.7 Able to project and transform graphic data  2.8 Able to generate frames for graphics and crop graphics  2.9 Able to correctly design colors for graphics  2.10 Capable of finishing the surface of the drawing  2.11 Ability to output graphics correctly  **3. Quality objectives**  3.1 Cultivate teamwork spirit  3.2 Cultivate exchange and communication skills  3.3 Cultivate a rigorous, serious, down-to-earth, and meticulous attitude towards doing things  3.4 Cultivate good qualities of honesty, trustworthiness, and perseverance  3.5 Cultivate the Concept of Adherence to Discipline  3.6 Cultivate the concept of adhering to the confidentiality of important information | | | | | |
| **Practical operation checklist** | | | | **hour** | |
| 1. Install MAPGIS software, set up working directory, system font library, and system library  2. Scan image files, correct image files, and convert file formats  3. Engineering file creation and legend board production  4. Frame generation and graphic clipping  5. Legend drawing  6. Drawing labels and graphic output  7. Assignment of contour lines and drawing of contour maps  8. Vectorization of topographic maps  9. Vectorization of geological maps  10. Preparation of stratigraphic column chart  11. Preparation of Borehole Core Histogram  12. Drawing of Handwriting Profile  13. Preparation of Measured Geological Profile Map  14. Preparation of geological section maps | | | | 4 hours  4 hours  4 hours  6 hours  6 hours  6 hours  6 hours  6 hours  8 hours  6 hours  6 hours  6 hours  16 hours  12 hours | |

**Remote sensing application of land and resources**

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| **Course code: LSRM-252** | | | | |
| **Total Contact Hours:** | **64** | **T** | **P** | **C** |
| **Theory:** | **64** | **2** | **0** | **2** |
| **Practical:** | 0 |
| **Course Objective**  Through the study of this course, students can master the basic concepts of remote sensing technology, remote sensing image preprocessing, image enhancement processing, remote sensing image interpretation, automatic image recognition and classification, as well as professional knowledge and skills in the application of remote sensing technology in fields such as land and resource monitoring. | | | | |
| **Course content** | | |  | |
| Project 1 Introduction  Task 1-1 Introduction to Remote Sensing | | | 2 credit hours | |
| Project 2 Fundamentals of Remote Sensing Technology  Task 2-1 Physical Foundations of Remote Sensing  Task 2-2 Remote sensing platforms and common remote sensing satellites  Task 2-3 Remote sensing sensors and image features | | | 6 credit hours | |
| Project 3 Fundamentals of Remote Sensing Image Processing  Task 3-1 Fundamentals of Remote Sensing Image Processing | | | 4 credit hours | |
| Project 4 Remote sensing image preprocessing  Task 4-1 Image Geometry Correction  Task 4-2 image registration  Task 4-2 Image Mosaic and Cropping  Task 4-3 Image Fusion | | | 20 credit hours | |
| Project 5 Remote sensing image enhancement processing  Task 5-1 Space Domain Enhancement Processing  Task 5-2 Radiation Domain Enhancement Processing  Task 5-4 Remote sensing image and DEM composite | | | 10 credit hours | |
| Project 6 Remote sensing image interpretation  Task 6-1 Principles of Visual Interpretation of Remote Sensing Images  Task 6-2 Process and Method of Visual Interpretation | | | 10 credit hours | |
| Project 7 Automatic Recognition and Classification of Remote Sensing Images  Task 7-1 Principle and Process of Remote Sensing Image Automatic Classification  Task 7-2 Supervised classification  Task 7-3 Unsupervised classification  Task 7-4 Remote sensing mapping | | | 10 credit hours | |
| Project 8 Application of Remote Sensing Technology  Task 8-1 Application of remote sensing technology in various fields | | | 2 credit hours | |
| **Recommended/reference books:** | | |  | |
| *Principles and Applications of Remote Sensing (Third Edition)*, Sun Jiazhi, published by Wuhan University Press, 2013  *Principles and Methods of Remote Sensing Application Analysis*, Zhao Yingshi, published by Science Press, 2003 | | |  | |
| **Teaching objectives** | | |  | |
| Knowledge objectives:  (1) Correctly understand the basic concepts and main processes of remote sensing  (2) Understand the physical foundation, remote sensing platforms, and sensors of remote sensing  (3) Understand the basic knowledge of remote sensing digital images and commonly used remote sensing image processing software  (4) Master the concepts and principles of remote sensing image preprocessing, such as image geometric correction, image fusion, image registration, image mosaic and image clipping  (5) Master the concepts and methods of remote sensing image enhancement processing  (6) Master the principles and methods of remote sensing image interpretation  (7) Understand the principles and processes of supervised and unsupervised classification of remote sensing images  (8) Understand the application of remote sensing technology in surveying, land, geology, agriculture and forestry and other fields  Skill Objectives:  (1) Ability to obtain remote sensing image data  (2) Ability of remote sensing image preprocessing, such as image geometric correction, image fusion, image registration, image mosaic and image clipping  (3) Ability to enhance remote sensing images  (4) Mastering the ability to interpret remote sensing images  (5) Ability to automatically classify remote sensing images and create thematic maps  (6) Ability to extract information from remote sensing images  (7) Ability to apply remote sensing technology  Quality objectives:  (1) Having a strong sense of social responsibility and dedication to work  (2) Having good moral character and professional ethics, being able to abide by laws and regulations, possessing integrity, professionalism, and sense of responsibility  (3) Having a scientific spirit of seeking truth and innovation, a diligent and practical spirit of research, and a team spirit of unity and cooperation  (4) Having good cultural, physical, and psychological qualities, and possessing good communication and handling skills in public interpersonal relationships  (5) Having a serious and meticulous work style that strives for excellence | | |  | |

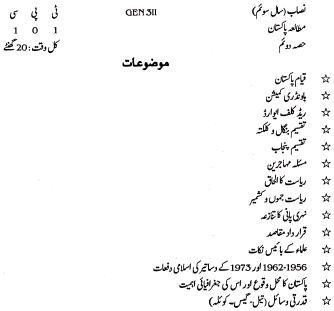
**Hydrology and Engineering Geology**

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| **Course code:LSRM-262** | | | | | |
| **Total Contact Hours:** | **64** | **T** | **P** | | **C** |
| Theory: | **64** | **2** | **0** | | **2** |
| Practical: | **0** |
| **Course Purpose:**  This course is mainly aimed at hydrogeology, engineering geology, geology, land and resources survey and management and other related majors, so that students can understand the concept and basic theory of "engineering geology", grasp the connotation of engineering geological conditions, clarify the significance of "engineering geology and hydrogeology" for various types of engineering construction, and master the main research contents of the course. This course emphasizes application as the main focus, closely integrating with engineering practice, and adhering to the basic concept of serving practical problems. To lay a solid professional theoretical foundation for students to engage in production or scientific research in fields such as water, engineering, and environment in the future. | | | | | |
| **Course content** | | | |  | |
| **1. Engineering geological properties of rocks**  1.1 Genesis and Engineering Geological Characteristics of Rocks  1.2 Physical and hydraulic properties of rocks (including practical training)  1.3 Mechanical properties of rocks (including practical training)  1.4 Strength Theory of Rock a | | | | 8 credit hours | |
| **2. Tectonics**  2.1 Tectonics (fold, fracture) and engineering construction  2.2 Earthquakes and active faults | | | | 10 credit hours | |
| **3. Natural geological processes**  3.1 weathering and residuals and their engineering geological characteristics (including training)  3.2 River geological processes and alluvial deposits and their engineering geological characteristics (including practical training)  3.3 Sheet flow geological processes and slope deposits and their engineering geological characteristics (including practical training)  3.4 Flood geological processes, alluvial deposits, and their engineering geological characteristics (including practical training)  3.5 Gravity geological processes and their prevention and control measures (including practical training)  3.6 Karstification and Engineering Construction (Including Practical Training)  3.7 Engineering Geological Properties and Foundation Treatment of Special Soils | | | | 14 credit hours | |
| **4. Engineering geological properties of groundwater**  4.1 Water distribution and circulation  4.2 Types and characteristics of groundwater  4.3 Movement patterns of groundwater (including practical training)  4.4 Groundwater recharge and discharge  4.5 Physical and chemical properties of groundwater (including practical training)  4.6 Analysis and Calculation of Groundwater Equilibrium  4.7 Groundwater in Different Aquifer Media  4.8 Evaluation of groundwater resources (allowable mining output and water quality) | | | | 16 credit hours | |
| **5. Engineering geological analysis of rock mass stability**  5.1 Rock mass structure and engineering geological analysis (including practical training)  5.2 Engineering Rock Mass Classification Method  5.3 Evaluation of Rock Slope Stability  5.4 Engineering Geological Analysis of Surrounding Rock Stability in Underground Caves | | | | 8 credit hours | |
| **6. Engineering Geology and Hydrogeological Survey**  6.1 Purpose and Tasks of Engineering Geology and Hydrogeological Survey  6.2 Basic methods and means of investigation  6.3 Key Points of Various Surveys  6.4 Compilation of Engineering Geology and Hydrogeological Survey Data | | | | 8 credit hours | |
| **Recommended/reference books:** | | | |  | |
| 1. Engineering Geology and Hydrogeology, edited by Liu Minghua, first published by Yellow River Water Conservancy Publishing House in September 2017  2. Engineering Geology and Hydrogeology, edited by Ma Jianjun and others, will be published for the first time by Sun Yat-sen University Press in September 2021  3. Engineering Geology and Hydrogeology, edited by Li Zhongqiu, published by China Electric Power Press for the first time in August 2009  4. Fundamentals of Hydrogeology, edited by Zhang Renmin, published by Geological Publishing House, 7th edition, June 2018  5. Rock Mechanics, edited by Liu Yourong and others, published by Chemical Industry Press. Version: February 2021, 1st edition, 14th printing  6. Industrial standards and specifications: (1) Code for geotechnical investigation (GB/50021-2001); (2) Code for Design of Building Foundation (GB/50007-2011); (3) Technical Specification for Building Foundation Treatment (JGJ/79-2012);  (4) Code for Seismic Design of Buildings (GB/50011-2001); (5) Hygienic Standards for Drinking Water (GB/5749-2006); (6) Standard for Water Quality of Farmland Irrigation (GB/5084-2005); (7) Code for Geological Survey of Highway Engineering (JTG C20-2011); (8) Technical Specification for Construction of Geological Disaster Prevention and Control Engineering (DB42/T 911 2013); (9) Standard for Engineering Rock Mass Test Methods (GB/T50266-99); (10) Standard for Classification of Engineering Rock Masses (GB/50218-94); (11) Quality Standards for Groundwater (GB/T 14848-1993); (12) Code for Hydrogeological Survey of Water Supply (GB/50027-2001); (13) Specification for Drilling and Pumping Testing of Water Conservancy and Hydroelectric Engineering (SL/320-2005); (14) Code for Geological Investigation and Evaluation of Groundwater Pollution (DD2008-01); (15) Standard for Classification and Grading of Groundwater Resources (GB/15218-94); (16) Specification for Geological Exploration of Natural Mineral Water (GB/T 13727-92); | | | | | |
| **Teaching objectives** | | | |  | |
| **1. Understand the engineering geological properties of rocks**  1.1 Understanding the Three Major Rocks and Their Engineering Geological Characteristics  1.2 Master the physical properties of rocks (weight, density, porosity, etc.) and the water physical properties of rocks (permeability, water absorption, softening, solubility, and frost resistance, etc.)  1.3 Master the deformation properties and rock strength indicators of rocks (uniaxial compressive strength, tensile strength, shear strength, etc.)  1.4 Master the Coulomb criterion, understand the Mohr criterion and Griffith criterion  **2. Tectonics**  2.1 Understand the impact of tectonics (fold, fracture) on engineering construction  2.2 Understand the relevant concepts of earthquakes (magnitude, intensity) and active faults, and understand the relationship between earthquakes and active faults  **3. Natural geological processes**  3.1 Master weathering, residuals and their engineering geological characteristics  3.2 Master river geological processes, alluvial deposits, and their engineering geological characteristics  3.3 Master sheet flow geological processes, slope deposits, and their engineering geological characteristics  3.4 Master the geological processes of floods, alluvial deposits, and their engineering geological characteristics  3.5 Master gravity geological processes and their prevention and control measures  3.6 Understanding karst processes and the relationship between karst and engineering construction  3.7 Understand the engineering geological properties and foundation treatment of various special soils  **4. Engineering geological properties of groundwater**  4.1 Understand the distribution of water, grasp the hydrological cycle and its significance  4.2 Understand the classification of groundwater and grasp the basic characteristics of aerated zone water, phreatic water, and confined water  4.3 Master the motion laws of gravity water, bound water, and capillary water  4.4 Understand the recharge and discharge methods of groundwater, with a focus on mastering the types of atmospheric precipitation and springs  4.5 Understand the physical properties of groundwater and master the chemical composition properties of groundwater, and be able to classify and name groundwater based on its chemical composition properties  4.6 Ability to analyze and calculate groundwater balance  4.7 Understand the basic characteristics of groundwater in different water-bearing media (pores, fractures, karst caves)  4.8 Be able to evaluate groundwater resources (allowable mining output, water quality, etc.)  **5. Engineering geological analysis of rock mass stability**  5.1 Master the main types and characteristics of structural planes, understand the main types and characteristics of rock mass structures, and master stereographic projection  5.2 Master the engineering rock mass grading methods (BQ grading, RMR grading, etc.)  5.3 Master the evaluation method of rock slope stability  5.4 Understand the Engineering Geological Analysis of the Stability of Surrounding Rocks in Underground Caverns  **6. Engineering Geology and Hydrogeological Survey**  6.1 Understand the Purpose and Tasks of Engineering Geology and Hydrogeological Survey  6.2 Understand the basic methods and means of survey  6.3 Understand various survey points 6.4 Understand Engineering Geology and Hydrogeological Survey DataCompilation | | | | | |

**Islamiat and Pakistan Studies**













**Chinese Comprehensive-1**

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| **Course code: GenC-322** |

**Total Contact Hours: 128**

Theory: 32 T P C

Practical: 96 1 3 2

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| Course purpose: To cultivate the comprehensive ability of Chinese language for international  students studying in China, and to pass the HSK4 exam through this course.  **Course content:** | | | |
| Learning Context | Learning content (specific work tasks) | Class hours | |
| Lesson 1  Simple Love | 32 new words; Language point: Not only Also/Also/And; Never; Just; Even if... Also; On... | 2 hours | |
| Lesson 2  A true friend | 30 new words; Language point: Exactly; Almost; Although; But; While. | 2 hours | |
| Lesson 3  The manager has a good impression of me | 31 new words; Language point: quite; Originally; In addition; Firstly, Secondly; No matter. | 2 hours | |
| Lesson 4  Don't be too eager to make money | 31 new words; Language point: thinking; Originally; And; According to; even | 2 hours | |
| Lesson 5  Buy only the right things, not the expensive ones | 30 new words; Language point: affirmative; Say it again; Actual; for; especially | 2 hours | |
| Lesson 6  One penny, one penny worth of goods | 30 new words; Language point: Unexpectedly; Times; Worth it; Among them:; Below. | 2 hours | |
| Lesson 7  The best doctor is oneself | 30 new words; Language points: estimation; Inadequate to drive; Overlapping of clutch words; If; Both.. Also/Also/Also | 2 hours | |
| Lesson 8  Beauty is not lacking in life | 30 new words; Language point: make; As long as; Not really; Therefore; Often. | 2 hours | |
| Lesson 9  Sunshine always comes after wind and rain | 30 new words; Language point: Is it possible; Pass; But; Results; On. | 2 hours | |
| Lesson 10  The standard of happiness | 30 new words; Language point: However; really; At It seems that; Due to, for example. | 2 hours | |
| Lesson 11  Good reading, reading good books, be skilled at reading | 30 new words; Language point: Lian; Otherwise, regardless of; However; Simultaneously. | 2 hours | |
| Lesson 12  Discovering the World with Heart | 30 new words; Language points: and; Again.. Also; For; Reduplication of noun quantifiers; On the contrary. | 2.5 hours | |
| Lesson 13  Drinking tea and watching Beijing Opera | 30 new words; Language point: roughly; Occasionally; By; Conduct; With. | 2.5 hours | |
| Lesson 14  Protecting Mother Earth | 30 new words; Language point: sufficient; With; Since; So; What kind of. | 2.5 hours | |
| Lesson 15  The Art of Teaching Children | 30 new words; Language point: remember; Make; Ten million; Come; Left and right. | 2.5 hours | |
| **Recommended/reference books:** | | |  |

1. HSK Standard Tutorial, edited by Jiang Liping, published by Beijing Language and Culture University Press, book number ISBN978-7-5619-3809-9

2. International Chinese Language Education Level Standard, prepared by the State Language Commission, Beijing Language and Culture University Press, ISBN9877561957196

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| **Teaching objectives** |  |
| 1. Quality objectives: To tell the story of China well, convey the voice of China, showcase the image of China, and cultivate international students to be knowledgeable, loving, and friendly towards China.  2. Knowledge objective: Master HSK4 pronunciation, vocabulary, sentence structure, syntax, culture, and other knowledge.  3. Ability objective: Possess certain listening, speaking, reading, and writing abilities, as well as preliminary translation skills. Able to engage in basic, coherent, and effective social communication on complex daily life, learning, work, and other topics. |  |
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| **Practical operation checklist** |  |
| |  |  |  | | --- | --- | --- | | No. | Learning Context | Teaching hours | | 1 | Simple Love | 6 hours | | 2 | A true friend | 6 hours | | 3 | The manager has a good impression of me | 6 hours | | 4 | Don't be too eager to make money | 6 hours | | 5 | Buy only the right things, not the expensive ones | 6 hours | | 6 | One penny, one penny worth of goods | 6 hours | | 7 | The best doctor is oneself | 6 hours | | 8 | Sunshine always comes after wind and rain | 6 hours | | 9 | Beauty is not lacking in life | 6 hours | | 10 | The standard of happiness | 6 hours | | 11 | Good reading, reading good books, be skilled at reading | 6 hours | | 12 | Discovering the World with Heart | 7.5 hours | | 13 | Drinking tea and watching Beijing Opera | 7.5 hours | | 14 | Protecting Mother Earth | 7.5 hours | | 15 | The Art of Teaching Children | 7.5 hours | |  |

**Chinese Listening**

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| **Course code: GenC-311** | | | | | | | | | |
| **Total contact hours:** | | **96** | **T** | | **P** | | | **C** | |
| Theory: | | 0 | **0** | | **3** | | | **1** | |
| Practical: | | 96 |
| Course purpose:  This course aims to comprehensively improve the listening ability of Chinese learners, especially based on daily conversations and discourse segments. The details are as follows:  1. Able to listen accurately to the sounds, rhymes, and tones of Mandarin  2. Able to understand Mandarin and engage in conversations about common issues in daily life and learning  3. Able to understand the basic content of the narrative in a specific context and understand the speaker's basic intentions.  **Course practical content:** | | | | | | | | |
| Learning Context | Learning content (specific work tasks) | | | Class hours | | | | |
| Lesson 1  Welcome and send | Dialogue: welcome and send; Short passage 1: Hospitality; Short Story 2: Shake Hands | | | 3 hours | | | | |
| Lesson 2  Neighbors | Dialogue: Left and right neighbors; Short passage 1: My neighbors; Short Story 2: Their Home | | | 3 hours | | | | |
| Lesson 3  Different from China | Dialogue: Different from China; Short passage 1: The knowledge of arranging seats; Essay 2: The Language of the Hand | | | 3 hours | | | | |
| Lesson 4  What gift would be good | What is a good gift for dialogue; Short passage 1: Social interaction on university campuses; Short passage 2: How to give gifts | | | 3 hours | | | | |
| Lesson 5  Thank you for your birthday | Dialogue: Thank you for your "birthday"; Short passage 1: A red apple; Short passage 2: Raise your hand | | | 3 hours | | | | |
| Lesson 6  Talking about Marriage | Dialogue: Talking about marriage; Short passage 2: He in my heart; Short Article 3: Miss G's Matchmaking Standards | | | 3 hours | | | | |
| Lesson 7  The Family of the 'Two People World' | Dialogue: Family in the 'Two Person World'; Short article 1: Accompanying my wife to go shopping mall; Short passage 2: Eating anything is okay | | | 3 hours | | | | |
| Lesson 8  ishing for the son to become talent | Dialogue: Wishing for the son to become talent; Short passage 1: Issues related to the education of the only children; Short passage 2: Father Son Dialogue | | | 3 hours | | | | |
| Lesson 9  Mom and Son | Dialogue: Mom and Son; Short passage 1: Love; Short passage 2: Heartbeat and lifespan | | | 3 hours | | | | |
| Lesson 10  I don't want my life anymore | Dialogue: I don't want my life anymore; Short passage 1: Spend yesterday's money and spend tomorrow's money; Short passage 2: When is the most suitable time to buy something | | | 3 hours | | | | |
| Lesson 11  Charging | Dialogue: Charging; Short passage 1: How to improve learning efficiency; Short Story 2: Change one's mind all the time | | | 3 hours | | | | |
| Lesson 12  Take it easy | Conversation: Take it easy; Short passage 2: About losing weight; Short Article 3: New Methods of Losing Weight | | | 3 hours | | | | |
| Lesson 13  You’d better quit | Dialogue: You'd better quit; Short passage 1: Issues related to the education of the only children; Short passage 2: Father Son Dialogue | | | 3 hours | | | | |
| Lesson 14  How to Rest Well | Dialogue: How can I rest well; Short passage 1: Talk about "catching a cold"; Short article 2: Mobile phones have changed our lives | | | 3 hours | | | | |
| Lesson 15  Who should I listen to | Dialogue: Who should listen to; Short passage 1: A pair of pants; Short passage 2: A dilemma | | | 3 hours | | | | |
| Lesson 16  Difference | Dialogue: Differences; Short passage 1: Men in the East West North South; Short Article 2: Differences in Southern China | | | 3 hours | | | | |
| Lesson 17  How to say it | Dialogue: How to say it; Short passage one: Eat for another bowl; Short Article 2: Unfortunate Words | | | 3 hours | | | | |
| Lesson 18  Give a name | Dialogue: Give a name; Short article 1: pen name, stage name, and internet name; Short Article 2: Naming and Translation of Products | | | 3 hours | | | | |
| Lesson 19  Change jobs | Dialogue: Change jobs; Short passage 1: Ways for college students to seek employment; Short passage 2: Interview | | | 3 hours | | | | |
| Lesson 20  Talking about the Chinese New Year | Dialogue: Talking about the Chinese New Year; Short passage 1: The origin of Spring Festival couplets; Short passage 2: Stealing Spring Festival couplets | | | 3 hours | | | | |
| Lesson 21  The Marriage and Love of Penguins | Dialogue: Penguin's Marriage and Love; Short Story 1: If Cheetahs Participate in the Olympics; Short Story 2: Birds | | | 3 hours | | | | |
| Lesson 22  Talking about Advertising | Dialogue: Talking about advertisements; Short passage 1: The wonderful use of advertising; Short article 2: public service advertisement | | | 3 hours | | | | |
| Lesson 23  The purpose of the computer | Dialogue: Talking about advertisements; Short passage 1: The wonderful use of advertising; Short article 2: public service advertisement | | | 3 hours | | | | |
| Lesson 22  Talking about Advertising | Dialogue: The purpose of a computer; Short passage 1: 5G has arrived; Short Article 2: Virtual Schools under 5G Technology | | | 3 hours | | | | |
| Lesson 24  Environmental protection | Dialogue: Environmental protection; Short passage 1: Garbage classification; Short Article 2: Overview of China | | | 3 hours | | | | |
| Lesson 25  People rely on clothing | Dialogue: People rely on clothing; Short passage 1: How much is it exactly; Short Story 2: Diet in Four Seasons | | | 3 hours | | | | |
| HSK4 listening training | HSK4 True Question Listening Training | | | 3 hours | | | | |
| HSK4 listening training | HSK4 True Question Listening Training | | | 3 hours | | | | |
| HSK4 listening training | HSK4 True Question Listening Training | | | 3 hours | | | | |
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| HSK4 listening training | HSK4 True Question Listening Training | | | 3 hours | | | | |
| **Recommended/reference books:** | | | | | |  | | |
| 1. Chinese Listening Course III, edited by Hu Bo and Yang Xuemei, published by Beijing Language and Culture University Press, ISBN: 9787561955956  **Teaching objectives** | | | | | | |  | |
| 1. Quality objectives: To tell the story of China well, convey the voice of China, showcase the image of China, and cultivate international students to be knowledgeable, loving, and friendly towards China.  2. Knowledge objective: Master HSK4 level listening content.  3. Ability objective: Able to understand informal conversations or speeches related to Level 4 topic tasks; Being able to avoid the influence of unnecessary repetition, pauses, and other factors, and accurately obtain the main information; Be able to hear the meaning behind the words and be aware of the cultural factors involved in the conversation or speech. | | | | | | |  | |
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**Chinese Speaking**

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| **Course code: GenC-331** | | | | | | | | |
| **Total contact hours:** | | **96** | **T** | | **P** | | **C** | |
| Theory: | | 0 | **0** | | **3** | | **1** | |
| Practical: | | 96 |
| Course purpose:  This course aims to comprehensively improve the oral expression ability of Chinese learners, especially the comprehensive oral expression ability based on daily conversations and discourse segments. The details are as follows:  1. Through the training of commonly used sentence structures and grammatical structures, enable learners to form correct pronunciation and intonation.  2. Through word analysis and application, enable learners to proficiently use commonly used words in intermediate Chinese.  3. Through dialogue exercises and functional project training in specific contexts, learners can use commonly used sentence structures to communicate and express themselves clearly, accurately, and appropriately.  4. Through situational exercises, learners can engage in discussions on general topics in social life (such as campus life, interpersonal relationships, learning and work, social hotspots, etc.), and develop preliminary segmental expression skills.  **Course Practice Content** | | | | | | | |
| Learning Context | Learning content (specific work tasks) | | | Class hours | | | |
| Lesson 1  Is there a place to eat near here | This lesson teaches students to learn about places to eat and exercise near 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 and teaches them how to make specific plans. | | | 3 hours | | | |
| Lesson 3  It's okay to address someone in a wrong way | This lesson mainly teaches students how to address their friends' family and how to address waiters; Learn how to address people correctly in different situations. | | | 3 hours | | | |
| Lesson 4  Is this okay | This lesson mainly teaches students how to address strangers and how to address them correctly in any situation. | | | 3 hours | | | |
| Lesson 5  Where are you from | This lesson mainly teaches students to introduce their respective hometowns. Students can briefly introduce their hometowns, climate, historical sites, and population. | | | 3 hours | | | |
| Lesson 6  My hometown | This lesson mainly teaches students about the vocabulary 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 of working here | This lesson mainly teaches students about their plans to stay or leave after graduation and analyzes the advantages and disadvantages of staying and leaving. | | | 3 hours | | | |
| Lesson 8  Hometown Song | This lesson mainly teaches students to sing a song from their hometown to express their longing for their hometown. | | | 3 hours | | | |
| Lesson 9  A ghost who loves to work | This lesson mainly teaches students that this article introduces workaholics through storytelling, a ghost who loves to work. | | | 3 hours | | | |
| Lesson 10  What kind of craziness are you | This lesson mainly teaches students how to introduce themselves of a family of three, including what kind of craziness they are, how to learn relevant vocabulary and grammar points, and how to introduce their family members. | | | 3 hours | | | |
| Lesson 11  I would like to meet more Chinese students | This lesson mainly teaches some vocabulary and grammar points related to school clubs, and learns how to make new friends in unfamiliar environments. | | | 3 hours | | | |
| Lesson 12  Welcome to join | This lesson mainly teaches the process of applying to join a school club and learns how to choose the club you want to join in the school club. | | | 3 hours | | | |
| Lesson 13  My treat today | This lesson mainly teaches vocabulary level grammar points related to hospitality, as well as the specific location and precautions for hospitality. | | | 3 hours | | | |
| Lesson 14  Do you have takeout | This lesson mainly teaches vocabulary and grammar points related to ordering takeout, and learns how to order takeout online. | | | 3 hours | | | |
| Lesson 15  I would like to return this pair of pants | This lesson mainly teaches the vocabulary and grammar points related to product returns, and learns how to return goods in a shopping mall. | | | 3 hours | | | |
| Lesson 16  Review | Review the course content from Lesson 1-15 | | | 3 hours | | | |
| Lesson 17  Two, please enjoy yourself | This lesson mainly teaches grammar and vocabulary related to communication with waiters in fast food restaurants, enabling them to accurately express their own meanings and ideas. | | | 3 hours | | | |
| Lesson 18  I want to rent a house | This lesson mainly introduces the grammar and vocabulary related to renting a house, and learns how to find and rent a suitable house. | | | 3 hours | | | |
| Lesson 19  Heterosexual cohabitation | This lesson mainly teaches the grammar and vocabulary related to co-renting with others, and learns how to find co-tenants. | | | 3 hours | | | |
| Lesson 20  What to do | This course mainly teaches the grammar and vocabulary that students plan to use after graduation, so that they can have a clear understanding of their future life choices. | | | 3 hours | | | |
| Lesson 21  There are still such good things in the world | This lesson mainly teaches the precautions to be taken when looking for a job, so that students can avoid being deceived when searching for a job. | | | 3 hours | | | |
| Lesson 22  How do you learn | This lesson mainly teaches grammar and vocabulary related to learning methods, and explores one's own learning methods. | | | 3 hours | | | |
| Lesson 23  I just love exams | This lesson mainly teaches grammar points and vocabulary related to exams, so that students can correctly use relevant sentence patterns in communication. | | | 3 hours | | | |
| Lesson 24  What new job have you found | This lesson mainly teaches how to find grammar and vocabulary related to work-study programs in school, so that students can use this sentence pattern correctly in communication. | | | 3 hours | | | |
| Lesson 25  I am looking for a job | This course mainly teaches interview and application related grammar and vocabulary, and 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 extremely fun | This lesson introduces the climate, scenic spots, beliefs, and specialties of Xinjiang. Enable students to further understand Xinjiang. | | | 3 hours | | | |
| Lesson 28  I usually read bestsellers | This lesson mainly teaches grammar and vocabulary related to favorite and best-selling books, allowing students to learn how to recommend books to their classmates and students. | | | 3 hours | | | |
| Lesson 29  My favorite book | This lesson mainly teaches the grammar and vocabulary of a favorite book, and learns to introduce a book about one's favorite to friends. | | | 3 hours | | | |
| Lesson 30  Are you about to return to your home country | This lesson mainly teaches about the arrangements after studying in China, and recalls the most unforgettable things during my study in China. | | | 3 hours | | | |
| Lesson 31  The most unforgettable lesson | This course mainly teaches medical students to learn the usage of stethoscope and the difference between the heartbeat of patients and that of normal people. | | | 3 hours | | | |
| Lesson 32  Review | Review the course content from Lesson 16-31 | | | 3 hours | | | |
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| **Recommended/reference books:** | | | | | |  | |

1. Intermediate Spoken English I in "Developing Chinese"; Editor in Chief: Lu Zhiying; Publishing House: Beijing Language and Culture University Press; Book number: ISBN: 9787561930687, etc.

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| **Teaching objectives** |  |
| 1 Knowledge objective: Students should master commonly used sentence structures and grammatical structures, correct pronunciation and intonation, and commonly used sentence structures and grammatical structures.  2 Competence objectives: Through the learning of this course, learners will be able to proficiently use commonly used words and phrases in intermediate Chinese, use commonly used sentence structures to communicate and express clearly, accurately, and appropriately, and be able to discuss general topics in social life (such as campus life, interpersonal relationships, learning and work, social hotspots, etc.), forming preliminary segmental expression skills.  3 Quality objectives: To cultivate a group of international students who are knowledgeable, friendly, pro Chinese, and passionate about China, cultivate the ability of international students to correctly express their viewpoints in Chinese, self-study ability, and the ability to proactively discover and solve problems. |  |
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**Chinese Reading and Writing**

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| **Course code:GenC-351** | | | | | | | | |
| **Total contact hours:** | | **96** | **T** | | **P** | | **C** | |
| Theory: | | 0 | **0** | | **3** | | **1** | |
| Practical: | | 96 |
| **Course objectives:**  This course 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 standardized teaching of Chinese language, Chinese character knowledge, and related cultural knowledge, as well as scientific and systematic language skills training such as listening, speaking, reading, and writing, comprehensively cultivate and improve learners' ability to distinguish and match the form and meaning of Chinese elements (phonetics, Chinese characters, vocabulary, grammar).  2. The ability to accurately receive and output Chinese information in specific texts, contexts, and socio-cultural conventions.  3. The ability to use Chinese language for appropriate discourse situations and textual features in both oral and written expression;  4. Continuously strengthen learners' motivation for learning Chinese and their ability to learn independently through the use of textbook content and teaching implementation  **Course Practice Content** | | | | | | | |
| Learning Context | Learning content (specific work tasks) | | | Class hours | | | |
| Lesson 1  As soon as you learn, you understand it | This course mainly teaches the grammar and vocabulary related to 'As soon as you learn, you understand it', reads and understands China several decades ago, and learns the important significance of 'take it as it comes'. | | | 6 class hours | | | |
| Lesson 2  Traveling around the world | This lesson mainly teaches the grammar and vocabulary related to "Traveling the World", reads and understands the words related to "self-help", and learns the important 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 Time-honored Brand", "Fair Price", "Famous Tobacco and Wine", and learns the significance of "Seeing is better than hearing". | | | 6 class hours | | | |
| Lesson 4  Interested in everything | This lesson mainly teaches the grammar and vocabulary related to 'Being interested in everything', reads and understands the importance and significance of life, and learns the important significance of 'not working hard when young, but sad when old'. | | | 6 class hours | | | |
| Lesson 5  99 bends of the Yellow River | This course mainly teaches the grammar and vocabulary related to "The Ninety Ninth Bend of the Yellow River", reads and understands slogans and meanings from different eras, and learns the important significance of "not knowing the true face of Mount Lu, only being in this mountain". | | | 6 class hours | | | |
| Lesson 6  I can't change it for a while | This lesson mainly teaches the grammar and vocabulary related to "Can't Change in a Moment and a Half", reads and understands the meaning of ancient Chinese architecture and plaques, and learns the important significance of "the waves behind the Yangtze River push the waves before, and one generation is stronger than the other". | | | 6 class hours | | | |
| Lesson 7  Who stole my days | This lesson mainly teaches the grammar and vocabulary related to 'Who Stole My Day', reads and understands the meaning of 'upright and bright', and learns the important significance of 'a year's plan is in spring, a day's plan is in the morning, and a life's plan is in diligence'. | | | 6 class hours | | | |
| Lesson 8  Development is the absolute principle | This course mainly teaches the grammar and vocabulary related to 'Development is the Ultimate Truth', reads and understands the traditional calligraphy of ancient Chinese celebrities, and learns the important significance of 'the timing is not as favorable as the location, and the location is not as favorable as the harmony of people'. | | | 6 class hours | | | |
| Lesson 9  Wait for me to call back at home | This course mainly teaches the grammar and vocabulary related to "Waiting for me to Call Back at Home", reads and understands the meaning of the motto of Beijing Normal University, and learns the important significance of "If one has no distant thoughts, there must be immediate worries". | | | 6 class hours | | | |
| Lesson 10  There is a kind of wisdom called the mean | This course mainly teaches the grammar and vocabulary related to "There is a Kind of Wisdom called Mean", reads and understands the differences between foreign signatures and Chinese signatures and stamps, and learns the important significance of "person who has benevolence sees benevolence, person who has wisdom sees wisdom". | | | 6 class hours | | | |
| Lesson 11  Learn Chinese well before returning home | This lesson mainly teaches the grammar and vocabulary related to 'Learning Chinese Well before Returning Home', reads and understands the meaning of 'inscriptions', and learns' those who know others are wise, those who know themselves are clear.'. The significance of 'the winner is strong, the self winner is stronger'. | | | 6 class hours | | | |
| Lesson 12  I have a wish in my heart | This lesson mainly teaches the grammar and vocabulary related to 'I Have a Wish in My Heart', reads and understands the meaning of 'tavern' and 'restaurant', and learns the important significance of 'do not do to others what you do not want'. | | | 6 class hours | | | |
| Lesson 13  Feeling better and better | This lesson mainly teaches the grammar and vocabulary related to "Feeling Better and Better", reads and understands what should be done in the school department after coming to China, and learns the important significance of "letting fish leap in the vast sea and birds fly in the high sky". | | | 6 class hours | | | |
| Lesson 14  Action is better than a heartbeat | This lesson mainly teaches the grammar and vocabulary related to "Action is better than a heartbeat", reads and understands how to register in China if you are sick, and learns the important significance of "reading thousands of books and traveling thousands of miles". | | | 6 class hours | | | |
| Lesson 15  I love you, China on the tongue | This course mainly teaches the grammar and vocabulary related to "I Love You, China on the Tongue", reads and understands the meaning and customs of Chinese traditional culture Spring Festival couplets, and learns the important significance of "my life has a limit, but knowledge has no limit". | | | 6 class hours | | | |
| Lesson 16 | Review the course content from Lesson 1-15 | | | 6 class hours | | | |
| **Recommended/reference books:** | | | | | |  | |

1. Basic Reading and Writing II of 'Developing Chinese Language'; Editor in Chief: Li Quan, Wang Shuhong, Mo Shujun; Publishing House: Beijing Language and Culture University Press; Book number: ISBN: 9787561934616, etc.

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| **Teaching objectives** |  |
| 1. Knowledge objective: Students will master basic Chinese language knowledge such as characters, words, phrases, sentences, paragraphs, and discourse. Through standardized teaching of Chinese language, Chinese character knowledge, and related cultural knowledge, they will master scientific and systematic language skills training such as listening, speaking, reading, and writing.  2. Ability objective: Through the learning of this course, comprehensively develop and improve learners' Chinese language ability, Chinese communication ability, Chinese comprehensive application ability, Chinese learning interest, and Chinese learning ability; Comprehensively cultivate and improve learners' ability to distinguish and match the forms and meanings of Chinese elements (phonetics, Chinese characters, vocabulary, grammar).  3. Quality objectives: To cultivate a group of international students who are knowledgeable, friendly, pro Chinese, and love China, as well as the ability to correctly express their viewpoints in Chinese, self-learning ability, and the ability to proactively discover and solve problems. |  |

**Chinese Culture -1**

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| **Course code:GenC-341** | | | | | |
| **Total contact hours:** | **32** | **T** | **P** | | **C** |
| Theory: | 32 | **1** | **0** | | **1** |
| Practical: | 0 |
| **Course objectives:**  Promote the integration of excellent water culture into education and teaching, and disseminate excellent traditional Chinese culture. | | | | | |
| **Course content** | | | |  | |
| **1 Folk Etiquette Chapter**   * 1. Jiangxi Ethnic Customs   2. Jiangxi Traditional Festivals   3. Gannan Regional Customs   4. Chinese Landscape Culture | | | | 16 hours | |
| **2 Water by the Scholars**   * 1. Artistic Conception Landscape - Ink Painting   2. Laozi's Discussion on Water: The Supreme Good is Like Water   3. Artistic Conception Landscape – Poetry   4. Artistic Conception Landscape - Songs | | | | 16 hours | |

**Chinese Cultural Practice -1**

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| **Course code: GenC-361** | | | | | | |
| **Total contact hours:** | | **96** | **T** | **P** | | **C** |
| Theory: | | 0 | **0** | **3** | | **1** |
| Practical: | | 96 |
| **Course**  **Purpose:** | Promote the integration of excellent landscape culture into education and teaching, and disseminate excellent traditional Chinese culture. | | | | | |
| **Course content** | | | | |  | |
| 1 Mount Sanqing, Ganzhou, Jiangxi | | | | | 24 hours | |
| 2 Danxia Mountain in Shaoguan, Guangdong | | | | | 24 hours | |
| 3 Mount Sanqing, Jiangxi | | | | | 24 hours | |
| 4. Longhu Mountain in Jiangxi Province | | | | | 24 hours | |

**Deposit Geology**

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| **Course code:LRSM-312** | | | | | | |
| **Total Contact Hours:** | **64** | **T** | **P** | | **C** | |
| Theory: | **64** | **2** | **0** | | **2** | |
| Practical: | **0** |
| **Course Purpose:**  By studying the geology of mineral deposits, one can become familiar with common basic concepts related to mineral deposits, correctly identify different types of mineral deposits, analyze the geological characteristics, mineralization processes, and ore-controlling factors of different types of mineral deposits, and have the ability to summarize ore prospecting indicators for mineral deposits. | | | | | | |
| **Course content** | | | |  | | |
| **1. Basic knowledge about mineral deposits**  1.1 Characteristics and types of mineral resources  1.2 Content and methods of geological work for ore deposits  1.3 Basic knowledge about ores  1.4 Basic knowledge about ore bodies  1.5 Basic knowledge about mineral deposits  1.6 Sources, main components, and effects of ore-forming fluids  1.7 Metallogenic processes and genetic classification of ore deposits | | | | 10 credit hours | | |
| **2. Magmatic deposits**  2.1 Concept, Characteristics, and Industrial Significance of Magmatic Deposits  2.2 Metallogenic processes of magmatic deposits  2.3 Main ore-controlling factors of magmatic deposits  2.4 Introduction to Examples of Magmatic Deposits | | | | 4 credit hours | | |
| **3. Pegmatite deposit**  3.1 Concept, characteristics and industrial significance of pegmatite deposit  3.2 Mineralization and genesis of pegmatite deposit  3.3 Ore control factors of pegmatite deposit  3.4 Example of pegmatite deposit | | | | 4 credit hours | | |
| **4. Contact metasomatic deposits**  4.1 Concept, characteristics, and industrial significance of contact metasomatic deposits  4.2 Mineralization of contact metasomatic deposits  4.3 Formation process of contact metasomatic deposits  4.4 Control factors of contact metasomatic deposits  4.5 Examples of contact metasomatic deposits | | | | 8 credit hours | | |
| **5. Hydrothermal deposits**  5.1 Basic knowledge of hydrothermal deposits  5.2 Magmatic hydrothermal deposits  5.3 Stratified hydrothermal deposits  5.4 Composite hydrothermal deposits  5.5 Control Factors of Hydrothermal Deposits  5.6 Examples of hydrothermal deposits | | | | 6 credit hours | | |
| **6. Volcanic deposits**  6.1 Classification of volcanic origin deposits  6.2 Volcanic Magmatic Deposits  6.3 Volcanic exhalative hydrothermal deposits  6.4 Volcano sedimentary deposits  6.5 Ore-controlling Factors of Volcanic Origin Deposits  6.6 Examples of volcanic origin deposits  **7. Weathered mineral deposits**  7.1 Genetic classification of weathered ore deposits  7.2 Types of weathered crust profiles and characteristics of weathered ore deposits  7.3 Mineralization of weathered ore deposits  7.4 Supergene changes and secondary enrichment of metal sulfide deposits  7.5 Controlling Factors of Weathering Deposits  7.6 Examples of weathered mineral deposits  **8. Sedimentary deposits**  8.1 Metallogenic processes and genetic classification of sedimentary deposits  8.2 Mechanical sedimentary deposits  8.3 Evaporative sedimentation (salt) deposits  8.4 Colloidal chemical sedimentary deposits  8.5 Biochemical sedimentary deposits  8.6 Biochemical energy deposits  8.7 Examples of Sedimentary Deposits  **9. Metamorphic deposits**  9.1 Genetic Types of Metamorphic Deposits  9.2 Basic characteristics of metamorphic deposits  9.3 Metamorphic mineralization  9.4 Ore-controlling Factors of Metamorphic Deposits  9.5 Examples of Metamorphic Deposits | | | | 8 credit hours  6 credit hours  10 credit hours  8 credit hours | | |
| **Recommended/reference books:** | | | |  | | |
| 1. Introduction to Mineral Deposits, edited by Chen Hongye and others, published by Geological Publishing House: August 2019  2. Internship Guide for Mineral Deposits, edited by Li Lizhi and Chen Hongye, published by Geological Publishing House, version: August 2009  3. A Course in Mineral Deposits, edited by Yao Fengliang and others, published by Geological Publishing House in August 2006 | | | | | |  | |
| **Teaching objectives** | | | |  | | |
| **1. Understand the basic concepts of mineral deposits**  1.1 Understand the relationship between ore minerals and gangue minerals  1.2 Familiar with the meaning of ore grade, industrial grade, boundary grade, and ore reserves  1.3 Familiarize oneself with the concepts of ore structure, structure, and mineral composition  1.4 State the occurrence characteristics of the ore body and the relationship between the ore, ore body, and ore deposit  1.5 State the genetic types of mineral deposits and the factors that determine their industrial value  1.6 State the source types of ore-forming fluids  1.7 Describe Element Enrichment and Metallogenic Methods  1.8 Understand the distribution and enrichment patterns of elements in various rocks  1.9 State the types of mineralization and genetic classification of ore deposits  **2. Understand magmatic deposits**  2.1 Understand the concept and geological characteristics of magmatic deposits  2.2 Understand the mineralization and genetic classification of magmatic deposits  2.3 Describe the geological characteristics and similarities and differences between early and late magmatic deposits  2.4 State the geological characteristics of magma melting and separation deposits  2.5 Familiar with the main control factors of magmatic deposit formation  **3. Understand pegmatite deposit**  3.1 Understand the concept, geological characteristics and industrial significance of pegmatite deposit  3.2 Describe the mineralization type and genesis of pegmatite deposit  3.3 Be familiar with the main control factors of pegmatite deposit formation  **4. Understand contact metasomatic deposits**  4.1 Understanding the concept, geological characteristics, and industrial significance of contact metasomatic deposits  4.2 State the types of mineralization in contact metasomatic deposits  4.3 Describe the mineralization process of contact metasomatic deposits and the division of mineralization periods and stages  4.4 Familiar with the main controlling factors for the formation of contact metasomatic deposits  **5. Understand hydrothermal deposits**  5.1 Understand the mineralization methods and characteristics of hydrothermal deposits  5.2 Understand the concept of wall rock alteration and its relationship with mineralization  5.3 State the mineral symbiotic association relationship in the ore, and can divide the mineralization period and stages of hydrothermal deposits  5.4 State the genetic classification of hydrothermal deposits  5.5 Describe the main types, characteristics, and genesis of magmatic hydrothermal deposits  5.6 Describe the main types, characteristics, and genesis of layered hydrothermal deposits  5.7 Describe the main types, characteristics, and genesis of composite hydrothermal deposits  5.8 Familiar with the main controlling factors for the formation of hydrothermal deposits  **6. Understand volcanic deposits**  6.1 Understand the classification of volcanic origin deposits  6.2 State the mineralization, geological characteristics, and genesis of volcanic magmatic deposits  6.3 State the mineralization, geological characteristics, and genesis of volcanic hydrothermal deposits  6.4 State mineralization, geological characteristics, and genesis of volcanic sedimentary deposits  6.5 Familiar with the main control factors of volcanic deposits  **7. Understand weathered mineral deposits**  7.1 Understand the genetic types of weathered ore deposits  7.2 State the concept and geological characteristics of weathered mineral deposits  7.3 State the main mineralization processes of weathered ore deposits  7.4 Familiar with the epigenetic changes and secondary enrichment of metal sulfide deposits  7.5 Familiar with the main control factors of weathered ore deposits  **8. Sedimentary deposits**  8.1 Understand the sedimentary differentiation and genetic classification of sedimentary deposits  8.2 State the main types, geological characteristics, and ore-controlling factors of mechanical sedimentary deposits  8.3 State the main types, geological characteristics, and ore-controlling factors of evaporative sedimentary deposits  8.4 Describe the main types, geological characteristics, and ore-controlling factors of colloidal chemical sedimentary deposits  8.5 Describe the main types, geological characteristics, and ore-controlling factors of biochemical sedimentary deposits  **9. Metamorphic deposits**  9.1 Understand the genetic types of metamorphic deposits  9.2 State the basic geological characteristics of metamorphic deposits  9.3 Familiar with the main mineralization processes of metamorphic deposits  9.4 Familiar with the main control factors of metamorphic deposits | | | |  | | |

**Land remediation and ecological restoration**

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| **Course code:LRSM-332** | | | | | | |
| **Total contact hours:** | **128** | | | **T** | **P** | **C** |
| Theory: | **32** | | | **1** | **3** | **2** |
| Practical: | **96** | | |
| **Course Purpose:**  Guided by professional activities, based on work processes, and using actual projects as carriers, integrating knowledge, theory, and practice into the design, learning and mastering land remediation standards through field surveys, software operations, budget production, and other content. By cultivating communication skills, information acquisition and processing abilities, and operational execution abilities, learning ability can be improved. | | | | | | |
| **Course content** | | | Including theory and practice | | | |
| **1. Land improvement foundation**   * 1. Basic Theory of Land Remediation   2. Agricultural land consolidation   3. land reclamation   4. Ecological restoration | | | 16 credit hours | | | |
| **2. Land improvement field survey**  2.1 Project Introduction (Case Carrier)  2.2 Pre-survey review  2.3 Site Survey  2.4 Survey Report | | | 32 credit hours | | | |
| **3. Planning standards for land improvement projects**  3.1 Field standards  3.2 Planning and Design Standards for Land Leveling Engineering  3.3 Irrigation and Drainage Standards  3.4 Field Road Engineering Standards  3.5 Engineering standards for farmland protection and ecological environment preservation | | | 8 credit hours | | | |
| **4. Software operation**  4.1 Software arrangement and description  4.2 System Settings  4.3 Natural Terrain Collection  4.4 Land division  4.5 Engineering Design | | | 40 credit hours | | | |
| **5. Engineering estimate**  5.1 Estimation software  5.2 Engineering Quantity Statistics  5.3 Project unit price  5.4 Engineering Budget Report | | | 24credit hours | | | |
| **6. Engineering acceptance**  6.1. Engineering Review  6.2 Quality level and grade of cultivated land  6.3 Engineering Quality Acceptance  6.4 Acceptance report | | | 8 credit hours | | | |
| **Recommended/reference books:** | | |  | | | |
| 1. High standard basic farmland construction standard (TD/T1033-2012);  2. General Principles for High Standard Farmland Construction (GB/T 30600-2014);  3. Design Standard for Irrigation and Drainage Engineering (GB50288-2018);  4. Flood Control Standard (GB50201-2014);  5. Technical Specification for Agricultural Drainage Engineering (SL/T4-2013);  6. Technical Specification for Comprehensive Management of Soil and Water Conservation (GB/T16453.1-6-2008);  7. High Standard Farmland Construction Standards (MY/T2014-2012).  8. Online computing system. Design and calculation of trapezoidal open channel cross-section  9. Ministry of Land and Resources of the People's Republic of China. Land Management Industry Standard of the People's Republic of China. "Regulations for the Preparation of Feasibility Study Reports for Major Land Remediation Projects TD/T1037-2013". 2013  10. Ministry of Land and Resources of the People's Republic of China. Land Management Industry Standard of the People's Republic of China. "Regulations for Preparation of Design Reports for Land Remediation Projects TD/T1038-2013". 2013  11. Ministry of Land and Resources of the People's Republic of China. Land Management Industry Standard of the People's Republic of China, "Rules for Calculating the Quantity of Land Remediation Projects TD/T1039-2013". 2013  12. Ministry of Land and Resources of the People's Republic of China. Land Management Industry Standard of the People's Republic of China. "Land Remediation Project Mapping Specification TD/T1040-2013". 2013 | | | | | | |
| **Teaching objectives** | |  | | | | |
| **1. Land improvement foundation**  1.1 Understand the Development History of Land Remediation  1.2 Master the basic theory of land consolidation  1.3 Master the path and methods of agricultural land consolidation   * 1. Master the technology of land reclamation   2. Master the principles of ecological restoration   3. Understand the system of land remediation in China   **2. Land improvement field survey**  2.1 Master the legality and planning review methods before exploration  2.2 Master the content of on-site survey  2.3 Learn the ways to communicate with various agents  2.4 Master the drafting of survey report templates  3. Planning standards for land improvement projects  3.1 Master the method of designing standard fields  3.2 Understand the requirements of engineering planning and design standards  3.3 Understand the requirements of irrigation and drainage standards for the project  3.4 Understand project engineering standard requirements  3.5 Understand the standard requirements for farmland protection and ecological environment maintenance engineering  4. Software operation  4.1 Master software installation  4.2 System Settings  4.3 Master the collection of various terrain features and elevations from electronic topographic maps  4.4 Understand the technical route of land division  4.5 Understand and Master Trench, Road, and Canal Design  4.6 Master Grid Field Collection and Design Methods  4.7 Master various methods of grid field organization  4.8 Master Vertical Section Design  4.9 Understand earthwork calculations and be able to operate them  5. Engineering estimate  5.1 Master the operation of estimation (prediction) software  5.2 Master the methods of engineering quantity statistics  5.3 Understand the unit price of the project  5.4 Understand the production of engineering budget reports  6. Engineering acceptance  6.1. Review of Field Work Quantity  6.2 Understand the Grade and Level of Cultivated Land Quality  6.3 Master the engineering quality acceptance process 6.4 Understand the acceptance report | | | | | | |
| **Practical operation checklist** | | | **Credit hours** | | | |
| 1. Preparatory work for field operation (conversion of scope line format, installation and application of mobile Ovi software, production of soliciting opinions, etc.)  2. Field "First survey" investigation and summary of the project  3. Field "Second Survey" Investigation and Summary of the Project  4. Field "Third Survey" Investigation and Summary of the Project  5. Cognition of the Physical Object of the Single Section of the Project Engineering  6. Production of current status and planning maps  7. Production of individual cross-sectional drawings  8. Operation of estimation (prediction) software  9. Operation of project quantity statistics software  10. Operation of project earthwork calculation software | | | 12 credit hours  8 credit hours  8 credit hours  8 credit hours  8 credit hours  16 credit hours  8 credit hours  4 credit hours  12 credit hours  12 credit hours | | | |

**Mineral Geological Survey**

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| **Course code:LRSM-342** | | | | | | |
| **Total contact hours:** | **128** | **T** | **P** | | **C** | |
| **Theory:** | **32** | **1** | **3** | | **2** | |
| **Practical:** | **96** |
| **Course Purpose:**  Through case method of typical production projects, students can understand the general process of solid mineral exploration projects, define professional tasks, and improve their professional work ability. | | | | | | |
| **Course content** | | | |  | | |
| **1. Introduction**  1.1 Basic concepts and significance of solid mineral exploration  1.2 Nature, principles, and stage division of mineral exploration  1.3 Mineral Exploration Tasks and Working Methods  1.4 Mineral Resources Law | | | | 2 class hours | | |
| **2. Technical methods for mineral exploration**  2.1 Geological prospecting methods  2.2 Geochemical and geophysical prospecting methods  2.3 Remote sensing and engineering technology methods | | | | 2 class hours | | |
| **3. Metallogenic prediction**  3.1 Metallogenic Geological Background and Metallogenic Conditions  3.2 Basic Theory of Mineral Prediction  3.3 Analysis of geological conditions for mineral exploration and delineation of mineral exploration prospects (practical operation)  3.4 Compilation of heavy sand results and explanation of anomalies (practical operation) | | | | 4 class hours | | |
| **4. Geological study of ore bodies**  4.1 Basic content of ore body geological research  4.2 Characterization method of ore body variability | | | | 2 class hours | | |
| **5. Degree of exploration control**  5.1 Concept, principles, classification basis and classification of mineral deposit exploration types  5.2 Determination of Exploration Engineering Spacing and Requirements for Exploration Control Degree | | | | 4 class hours | | |
| **6. Exploration Engineering System**  6.1 Basic types of ore body morphology  6.2 Overall layout, design, construction, and management of exploration engineering  6.3 Selection and overall layout of exploration engineering (practical operation)  6.4 Original geological record  6.5 Geological logging of trenching and exploration wells (practical operation)  6.6 Tunnel geological logging (practical operation)  6.7 Drilling geological logging (practical operation)  6.8 Calculation of Core Replacement Depth and Preparation of Borehole Column Chart (Practical Operation)  6.9 Preparation of exploration line profile map (practical operation) | | | | 9 class hours | | |
| **7. Mineral quality**  7.1 Mineral Sampling  7.2 Sample processing and testing  7.3 Mineral Quality Research | | | | 2 class hours | | |
| **8. Estimation of Solid Mineral Resources/Reserves**  8.1 Classification of Solid Mineral Resources/Reserves  8.2 Mineral Resources/Reserve Units and Industrial Indicators  8.3 Delineation of boundary lines for mineral resources/reserves  8.4 Measurement and Calculation of Mineral Resource/Reserve Estimation Parameters  8.5 Mineral Resources/Reserve Estimation Methods  8.6 Boundary delineation of ore bodies in single engineering for reserve calculation (practical operation)  8.7 Calculation of ore body reserves using vertical cross-section method (practical operation) | | | | 7 class hours | | |
| **Recommended/reference books:** | | | |  | | |
| 1. Solid Mineral Exploration Technology, edited by Yang Yunbao and Tang Yonghu, published by Geological Publishing House in 2007.  2. Mineral Exploration, edited by Li Shouyi and Ye Qingsong, Geological Publishing House, 2003.  3. Mineral Exploration Theory and Methods, edited by Zhao Pengda et al., China University of Geosciences Press, 2001.  4. Norms and standards:  (1) Classification of Solid Mineral Resource Reserves (GB/T 17766-2020);  (2) General Rules for Geological Exploration of Solid Mineral Resources (GB/T 13908-2020);  (3) Specification for Solid Mineral Exploration Work (GB/T 33444-2016);  (4) Code for Hydrogeological geological engineering Geological Exploration in Mining Areas (GB/T12719-2021);  (5) Code for Geological Exploration of Mineral Resources - Iron, Manganese, and Chromium (DZ/T 0200-2020);  (6) Specification for Mineral Geological Exploration of Tungsten, Tin, Mercury, and Antimony (DZ/T 0201-2020);  (7) Specification for Mineral Geological Exploration of Bauxite (DZ/T 0202-2020);  (8) Code for Mineral Geological Exploration of Rare Metals (DZ/T 0203-2020);  (9) Specification for Mineral Geological Exploration - Limestone and Cement Ingredients (DZ/T 0213-2020);  (10) Specification for Compilation of Geological Reports on Closed Pit Mines (DZ/T 0347-2020). | | | | | |  | |
| **Teaching objectives** | | | |  | | |
| 1. Introduction  1.1 Master the basic concepts and significance of solid mineral exploration  1.2 Master the nature, principles, and stage division of mineral exploration  1.3 Master mineral exploration tasks and work methods  1.4 Understand Mineral Resources Law  2. Technical methods for mineral exploration  2.1 Master geological prospecting methods  2.2 Understand geochemical and geophysical prospecting methods  2.3 Understand Remote Sensing and Engineering Technology Methods  3 Metallogenic prediction  3.1 Understand the geological background and conditions of mineralization  3.2 Master the basic theory of mineral prediction  3.3 Master the analysis of geological conditions for mineral exploration and the delineation of mineral exploration prospects  3.4 Master the compilation of heavy sand results and the explanation of anomalies  4. Geological study of ore bodies  4.1 Master the basic content of ore body geological research  4.2 Characterization methods for understanding the variability of ore bodies  5 Degree of exploration control  5.1 Master the concept, principles, classification basis, and classification of mineral deposit exploration types  5.2 Understand the determination of exploration engineering spacing and the requirements for exploration control level  6 Exploration Engineering System  6.1 Understand the basic types of ore body morphology  6.2 Master the overall layout, design, construction, and management of exploration projects  6.3 Master the selection and overall layout of exploration projects  6.4 Master Original Geological Cataloging  6.5 Master geological logging of trenching and exploration wells  6.6 Master geological logging of tunnels  6.7 Master geological logging of boreholes  6.8 Master the calculation of the depth of borehole core replacement and the preparation of borehole column charts  6.9 Master the preparation of exploration line profile maps  7 Mineral Quality  7.1 Understand Mineral Sampling  7.2 Understand sample processing and testing  7.3 Understand Mineral Quality Research  8 Solid Mineral Resource/Reserve Estimation  8.1 Master the classification of solid mineral resources/reserves  8.2 Master mineral resources/reserve units and industrial indicators  8.3 Master the delineation of mineral resource/reserve boundary lines  8.4 Master the measurement and calculation of mineral resource/reserve estimation parameters  8.5 Master Mineral Resource/Reserve Estimation Methods  8.6 Master the delineation of ore body boundaries in single engineering for reserve calculation  8.7 Master the vertical section method to calculate ore body reserves  9. Mineral Exploration Economy  9.1 Understand the technical and economic aspects of mineral exploration  9.2 Understand the technical and economic evaluation of mineral deposits | | | |  | | |

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| **Practical operation checklist** | **Credit hours** |
| 1. Identification of ores and ore bodies  2. Identification of Characteristics of Magmatic Deposits  3. Identification of Characteristics of Magmatic Leaching Deposits  4. Identification of pegmatite deposit characteristics  5. Contact metasomatic deposit feature recognition  6. Identification of alteration characteristics of surrounding rocks  7. Identification of Characteristics of Magmatic Hydrothermal Deposits  8. Identification of Characteristics of Stratabound Hydrothermal Deposits  9. Identification of Weathering Deposit Characteristics  10. Identification of Characteristics of Salt Sedimentary Deposits  11. Identification of characteristics of colloidal chemical sedimentary deposits  12. Identification of Characteristics of Biochemical Sedimentary Deposits  13. Identification of Characteristics of Combustible Organic Rock Deposits  14. Identification of Metamorphic Deposit Characteristics | 4 credit hours  8 credit hours  8 credit hours  8 credit hours  8 credit hours  4 credit hours  8 credit hours  8 credit hours  8 credit hours  8 credit hours  8 credit hours  4 credit hours  4 credit hours  8 credit hours |
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**Land Spatual Evaluation**

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| **Course code:LRSM-352** | | | | | | |
| **Total Contact Hours:** | **64** | **T** | **P** | | **C** | |
| Theory: | **64** | **2** | **0** | | **2** | |
| Practical: | 0 |
| **Course Purpose:**  Through the course of land spatial evaluation, students can master the basic principles of land spatial evaluation, understand the basic knowledge of land spatial evaluation such as resource and environmental carrying capacity evaluation, land spatial development suitability evaluation, etc. Guide everyone to have a preliminary understanding of the course of national spatial planning. | | | | | | |
| **Course content** | | | |  | | |
| **1. Introduction**  1.1 Overview of Land Space Evaluation  1.2 Overview of the Development of Land Space Evaluation  1.3 Objectives and Principles of Land Space Evaluation  1.4 Technical indicators for land spatial evaluation | | | | 4 credit hours | | |
| **2. Evaluation of resource and environmental carrying capacity**  2.1 Land resource evaluation (including practical training)  2.2 Water resource evaluation  2.3 Marine Resource Evaluation  2.4 Environmental assessment (including practical training)  2.5 Ecological evaluation  2.6 Disaster Evaluation  2.7 Integrated Evaluation | | | | 20 credit hours | | |
| **3. Evaluation of Land Spatial Suitability**  3.1 Assessment of the Importance of Ecological Protection  3.2 Evaluation of suitability for agricultural production  3.3 Evaluation of suitability for urban construction (including practical training) | | | | 20 credit hours | | |
| **4. Comprehensive analysis of national land and space**  4.1 Analysis of resource and environmental endowments  4.2 Analysis of spatial pattern characteristics  4.3 Potential Analysis | | | | 20 credit hours | | |
| **Recommended/reference books:** | | | | | | |
| 1. Research on the "Dual Evaluation" and Zoning Optimization of Land and Space Functions, edited by Wang Luyao, China Economic Publishing House, version: December 2022;  2. Research on the "Dual Evaluation" of Land and Space and Its Application in Planning and Compilation, edited by Cao Genrong, published by Science Press in October 2021;  3. Guidelines for Evaluating the Carrying Capacity of Resources and Environment and the Suitability of Land and Space Development, edited by Fan Jie et al., published by Shanghai Science Press, version: September 2022  4. Industry standards: (1) "Code for Comprehensive Exploration and Evaluation of Mineral Resources" (GB/T 25283-2010); (2) Code for Evaluation of High Standard Farmland Construction (GB/T 33130-2016); (3) Evaluation Regulations for Economical and Intensive Utilization of Construction Land (TD/T 1018-2008); (4) Regulations for the Evaluation of Intensive Land Use in Development Zones (TD/T 1029-2010); (5) Regulations for Comprehensive Evaluation of Marine Energy Development and Utilization (GB/T 35050-2018); (6) Technical Guidelines for Environmental Impact Assessment of Marine Engineering (GB/T 1948 5-2014); (7) Technical Guidelines for Environmental Impact Assessment of Seawater Comprehensive Utilization Engineering (GB/T 22413-2008); (8) Technical Regulations for Investigation and Evaluation of Cultivated Land Reserve Resources (TD/T 1007-2003); (9) Specification for Investigation and Evaluation of Regional Groundwater Pollution (DZ/T 0288-2015); (10) Regulations on Classification of Agricultural Land Quality (GB/T 28407-2012). | | | | | |
| **Teaching objectives** | | | |  | | |
| **1. Understand the basic knowledge of land spatial evaluation**  1.1 Understand the relevant concepts of land spatial evaluation  1.2 Understand the Development Course of Land Space Evaluation in China  1.3 Familiar with the goals and principles of land spatial evaluation  1.4 Master the technical indicators for land spatial evaluation  **2. Master the content of resource and environmental carrying capacity evaluation**  2.1 Master the methods of agricultural land and urban land grading and land resource evaluation  2.2 Familiar with the concept of water resources and methods of water resource evaluation  2.3 Familiar with the influencing factors and indicator system of marine resource evaluation  2.4 Understand the relevant content of marine resources  2.5 Familiar with the current situation, existing problems, and evaluation methods of China's ecological environment  2.6 Familiar with the types and distribution of geological disasters in China  2.7 Understand the agricultural function level, urban function level, and agricultural function level  **3. Master the content of land spatial suitability evaluation**  3.1 Familiar with basic knowledge of geological and mineral resources  3.2 Understand geological and mineral resource planning and related industry standards  3.3 Familiar with the technical methods of ecological restoration in mines  3.4 Understand the Protection and Supervision of Resources  **4. Familiar with the relevant content of comprehensive analysis of land and space**  4.1 Understand the resource and environmental endowments of national space  4.2 Familiar with the characteristics of national spatial pattern, main functional characteristics, and existing problems  4.3 Master the Evaluation of Land Space Development Potential | | | |  | | |

**Land Spatial Database Application**

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| **Course code:LRSM-362** | | | | | |
| **Total Contact hours:** | **128** | | **T** | **P** | **C** |
| **Theory:** | **32** | | **1** | **3** | **2** |
| **Practical:** | 96 | |
| **Course Purpose:**  By studying the construction of geographic information databases, students are required to master basic database theory, the process of building geographic data databases, and proficiently master the practical skills and software usage of building geographic data databases. | | | | | |
| **Course content** | | Including Theory and practice | | | |
| Project 1 Overview of Geographic Information Database  Task 1-1 Overview and Definition of GIS Database  Task 1-2 GIS Database Features, Overall Techniques, and Methods  Task 1-3: Formation and Development of GIS Database  Task 1-4 Database Update and Management | | 2 credit hours | | | |
| Project 2 Basic Geographic Information Data  Task 2-1 Expression and Management of Spatial Data  Task 2-2 Spatial Data Structure and Organization  Task 2-3 Vector and Grid Data  Task 2-4 Spatial Data Management and Query Language | | 6 credit hours | | | |
| Project 3 GIS Fundamentals  Task 3-1 Common Shortcut Keys for ARCGIS Editing Operations  Task 3-2 Spatial database management and attribute editing  Task 3-3 Spatial Data Processing  Task 3-4 Topology error checking and modification  Task 3-5 Attribute Assignment  Task 3-6 Editing Vector Data | | 8 credit hours | | | |
| Project 4 Basic Geographic Information Data Database Construction and Processing  Task 4-1 Spatial Data Quality Control and Inspection  Task 4-2 ArcGIS Routine (Traditional) Quality Inspection  Task 4-3 Introduction and Session Management of ArcGIS Data Reviewer for Desktop  Task 4-4 Data Reviewer Inspection Whole Process  Task 4-5 Data Reviewer Main Data Verification Rules  Task 4-6 Batch Processing Inspection and Visualization (Interactive Inspection)  Task 4-7 Reviewer Table | | 12 credit hours | | | |
| Project 5 Engineering Application  Task 5-1 Data Collection  Task 5-2 Data Quality Inspection  Task 5-3 Data Update and Maintenance | | 4 credit hours | | | |
| **Recommended/reference books:** | |  | | | |
| Engineering Technology for Dynamic Update of National Basic Geographic Information Database; Wang Donghua, Liu Jianjun, etc; Surveying and Mapping Publishing House  Geographic Information System Database; Zhang Xinchang and Zhang Qingnian; Published by Science Press  ArcGIS10 Geographic Information System Tutorial from Beginner to Proficient, edited by Mou Naixia, Liu Wenbao, Wang Haiyin, and Dai Honglei, published by Surveying and Mapping Publishing House  Spatial database Experiment Course; Edited by Zhang Hong, Qiao Yanchun, and Luo Zhengdong; Science Press  Principles of spatial database; Editor in Chief Wu Fang; Wuhan university press | |  | | | | |
| **Teaching objectives** | |  | | | |
| **1. Overview of geographical database**  1.1 Understand the construction process and current situation of the national basic geographic information database.  1.2 Master the technical characteristics of key elements and full element updates  1.3 Master the technical characteristics of dynamic updates;  1.4 Master the update methods between different databases;  1.5 Master database update methods.  **2. Interpretation of basic geographic information and geographic information engineering technical guide**  2.1 Understand the construction overview and technical requirements of basic geographic information engineering in 2-3 countries in recent 5 years  **3. GIS Fundamentals**  3.1 Master the usage methods of commonly used shortcut keys during ArcGIS editing operations, as well as the skills for setting shortcut keys.  3.2 Master the method of creating attribute domains  3.3 Master the conversion of different data formats and the processing of raster data  3.4 Proficient in topology error checking  **4. Basic Geographic Information Data Processing**  4.1 Understand the significance of spatial quality inspection  4.2 Master the conventional (traditional) quality inspection of ArcGIS  4.3 Understand the Installation of the Data Reviewer Module  4.4 Master the entire process of data verification  **5 Project Engineering Application**  5.1 Understand the specific project production work content;  5.2 Master the methods and techniques for collecting specific production project data  5.3 Master the method of assigning single valued attributes;  5.4 Master the methods and techniques of attribute assignment.  5.5 Master topology checking methods.  5.6 Master the significance, application scope, and methods of updating change information and maintaining databases | |  | | | |
| **Practical operation checklist** | |  | | | |
| 1. Basic establishment and setting method of geographical database under standard specifications  2. geographical database vector and attribute data import and coordinate projection  3. Geographical database topology check and modification  4. Common data processing methods  5. Basic practical exercises for using the Data Reviewer tool  6. Data Reviewer Full Process Inspection and Modification  7. Data Reviewer Data Quality Inspection Practice | | 8 credit hours  12 credit hours  20 credit hours  16 credit hours  8 credit hours  24 credit hours  8 credit hours | | | |

**Chinese Comprehensive-2**

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| **Course code: GenC-372** |

**Total Contact Hours: 96**

Theory: 32 T P C

Practical: 96 1 3 2

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| Course purpose:  To cultivate the comprehensive ability of Chinese language for international students studying in China, and to pass the HSK4 exam through this course.  **Course content:** | | |
| Learning Context | Learning content (specific work tasks) | Class hours |
| Lesson 1  Life can be better | 30 new words; Language point: can; I'm afraid; To the end; Take... Speaking; Dare. | 2 hours |
| Lesson 2  Man and Nature | 30 new words; Language point: inverted; Dry; Trip; For the sake of And; Still. | 2 hours |
| Lesson 3  Technology and the World | 30 new words; Language point: whether; Can't bear it; Next; In addition; It's called | 2 hours |
| Lesson 4  The Taste of Life | 30 new words; Language point: interrogative pronouns are used flexibly to indicate any reference; On; Come out; Overall; Lies in. | 3 hours |
| Lesson 5  Scenery on the Road | 30 new words; Language points: V+zhe+V+zhe; Once ...Just; After all; Get up; V+up. | 3 hours |
| HSK4 simulation training 1 | Explanation of HSK4 True Questions | 2 hours |
| HSK4 simulation training 2 | Explanation of HSK4 True Questions | 2 hours |
| HSK4 simulation training 3 | Explanation of HSK4 True Questions | 2 hours |
| HSK4 simulation training 4 | Explanation of HSK4 True Questions | 2 hours |
| HSK4 simulation training 5 | Explanation of HSK4 True Questions | 2 hours |
| HSK4 simulation training 6 | Explanation of HSK4 True Questions | 2 hours |
| HSK4 simulation training 7 | Explanation of HSK4 True Questions | 2 hours |
| HSK4 simulation training 8 | Explanation of HSK4 True Questions | 2 hours |
| HSK4 simulation training 9 | Explanation of HSK4 True Questions | 2 hours |
| HSK4 simulation training 10 | Explanation of HSK4 True Questions | 2 hours |

**Recommended/reference books:**

1. HSK Standard Tutorial, edited by Jiang Liping, published by Beijing Language and Culture University Press, book number ISBN978-7-5619-3809-9

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| 2. International Chinese Language Education Level Standard, prepared by the State Language Commission, Beijing Language and Culture University Press, ISBN9877561957196  **Teaching objectives** |  |
| 1. Quality objectives: To tell the story of China well, convey the voice of China, showcase the image of China, and cultivate international students to be knowledgeable, loving, and friendly towards China.  2. Knowledge objective: Master HSK4 pronunciation, vocabulary, sentence structure, syntax, culture, and other knowledge.  3. Ability objective: Possess certain listening, speaking, reading, and writing abilities, as well as preliminary translation skills. Able to engage in basic, coherent, and effective social communication on complex daily life, learning, work, and other topics. |  |
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| **Practical operation checklist** |  |
| |  |  |  | | --- | --- | --- | | No. | Learning Context | Teaching hours | | 1 | Life can be better | 6 hours | | 2 | Man and Nature | 6 hours | | 3 | Technology and the World | 8 hours | | 4 | The Taste of Life | 8 hours | | 5 | Scenery on the Road | 8 hours | | 6 | HSK4 True Question Training | 6 hours | | 7 | HSK4 True Question Training | 6 hours | | 8 | HSK4 True Question Training | 6 hours | | 9 | HSK4 True Question Training | 6 hours | | 10 | HSK4 True Question Training | 6 hours | | 11 | HSK4 True Question Training | 6 hours | | 12 | HSK4 True Question Training | 6 hours | | 13 | HSK4 True Question Training | 6 hours | | 14 | HSK4 True Question Training | 6 hours | | 15 | HSK4 True Question Training | 6 hours | |  |

**Chinese Culture -2**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Course code: GenC-381** | | | | | | |
| **Total Contact Hours:** | | **32** | **T** | **P** | | **C** |
| Theory: | | 32 | **1** | **0** | | **1** |
| Practical: | | 0 |
| **Course objectives:** | Promote the integration of excellent water culture into education and teaching, and disseminate excellent traditional Chinese culture. | | | | | | |
| **Course content** | | | | | | |
| **1 Literary Works Section 16 hours**  1.1 Autumn Dusk in Mountain Dwelling  1.2 Question: Inscribe on Xilin Wall  1.3 Viewing the Ocean  1.4 Niannujiao · Red Cliff Nostalgia | | | | |
| **2 Legends and Mission Biographies 16 hours**  2.1 Pangu opens the world  2.2 Xu Xiake's Travels  2.3 Li Siguang  2.4 Huang Danian | | | | |

**Chinese Cultural Practice -2**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Course code: GenC-391** | | | | | | |
| **Total Contact Hours:** | | **96** | **T** | **P** | | **C** | |
| Theory: | | 0 | **0** | **3** | | **1** | |
| Practical: | | 96 |
| **Course**  **Purpose:** | Promote the integration of excellent Gannan culture and mining culture into education and teaching, and disseminate excellent traditional Chinese culture. | | | | | | |
| **Course content** | | | | |  | | |
| 1 Jiangnan Song City | | | | | 24 hours | | |
| 2 Hakka Culture | | | | | 24 hours | | |
| 3 Green Mines | | | | | 24 hours | | |
| 4. Ecological restoration of mines | | | | | 24 hours | | |

**5. Laboratory Topic List**

|  |  |
| --- | --- |
| Topic title | Laboratory name  /Workshop |
| Applied Chemistry & Applied Physics | Science laboratory |
| Fundamentals of Surveying and Mapping | Engineering Measurement Training Room |
| Digital mapping | Digital Mapping Training Room |
| General Geology | Ordinary geological training room, geological park (museum), and field internship base around Ganzhou |
| Geographic Information System | Smart Geological Training Room |
| Mineral and Rock Identification | Training Room for Mineral and Rock Identification |
| Digital Cartography | Smart Geological Training Room |
| Hydrology and Engineering Geology | Hydrogeology and Engineering Geology Training Room |
| Deposit Geology | Deposit Geology Training Room |
| Land Remediation and Ecological Restoration | Land Improvement Training Room |
| Mineral Geological Survey | Green Exploration Training Room |
| Land Spatial Evaluation | Land and Space Planning Training Center |
| Land Spatial Database Application | Land and Space Planning Training Center |

**6. TEVTA Course Review Committee Recommendations**

|  |  |  |
| --- | --- | --- |
| **Sr. No** | **TEVTA Course Review Committee Recommendations** | **Status** |
| 1. | **Engr. Kamran Rahat**  Associate Professor Civil, Government College of Technology SITE Karachi | Convener |
| 2. | **Engr. Nadeem Warsi**  Associate Professor Civil, Government College of Technology SITE Karachi | Member |
| 3. | **Engr. Shah Muhammad Bosan**  Assistant Professor Civil, Government College of Technology Larkano | Member |
| 4. | **Mr. Muhammad Farooque**  LecturerCivil, Government College of Technology, SITE Karachi. | Member |

**NOTE**

It is important to mention here that the whole task was performed by the Teachers having Civil Engineering / Technology as their Academic Qualification. Whereas the said course "Land & Resource Survey & Management" has subjects related to Geology and Geography which are beyond the scope of Civil Trade.

It is therefore recommended that a comprehensive review may be done by the persons having Qualifications as 4 Years Degree MSc/BS Geology and MSc/BS Geography. Same is recommended for Tool Machinery Equipment List with the advice that the Tool Machinery Equipment must be finalized after review from above type of Geology and Geography Degree-holders.