Soran University

Module Specification Template

**1. Module Title: mineralogy and petrography**

**2. Module Code: PGE204**

**3. Module Level: 2nd Stage**

**4. Module Leader: Hossein Mahmoudi**

**5. Teaching Semester: 1nd Semester**

**6. Credit Rating for the module: 3**

**7. Prerequisites and co-requisites: General Geology**

**8. Module Summary**

This Module is an introduction to fundamental mineralogy and mineralogical principles. The identification of minerals, based on their physical properties, particularly optically using a transmitted light microscope, is taught.

**9. Module Aims**

The aim of this course is to introduce the fundamental of mineralogy, including an introduction to crystallography, physical and optical properties of minerals, emphasizing the carbonate group and silicates minerals. Students learn to use to petrographic microscope and to describe and identify a variety of rock forming minerals in hand sample and petrographic thin section.

**10. Learning Outcomes**

On successful completion of this module, students should be able to:

* Identify symmetry elements in crystals and use crystal symmetry information to crystal classes.
* Describe the seven crystals systemes and list an example for a common mineral for each.
* Describe crystal forms and faces and identify the crystal forms of minerals.
* Explain how element combine and pack to form minerals and how different ions can be substituded in crystal latices.
* Explain the principle of mineral classification and assign minerals to a mineral group by their chemical formula.
* Describe crystal structure, crystal growth, and the types of structural defects that occur in minerals.
* Recognize twining in minerals in hand samples and thin section.
* Use a phase diagram to calculate the crystal composition of a substitutional solid solution in a partial melt at different temperatures.
* Describe and use the various component of the petrographic microscope to identify common minerals in thin sections.
* Demonstrate the common optical properties of minerals in the petrographic microscope under plain polarized light, crossed polarized light and in conoscopic mode.
* Identify common minerals by using interference colors and interference figures.
* Classify silicates minerals according structure.
* Identify pyroxenes, amphiboles, olivine, garnet and common alominosilicates in thin sections and hand samples.
* Identify mica and other sheet silicates in thin sections.

**11. Syllabus**

|  |  |  |
| --- | --- | --- |
| **University Academic Week** | **Lecture Title & Content** | **Assessments** |
| 1 | Physical Properties of minerals |  |
| 2 | crystallography |  |
| 3 | Type of microscope and the compound of microscope,  Properties of minerals in PPL |  |
|  | Optical Properties of minerals;  Properties of minerals in XPL |  |
|  |  |  |
| 4 |  | Assessment I |
| 5 | Optical Properties of minerals;  Properties mineral in Conoscopic mode |  |
| 6 | Systematic mineralogy  Nesosilicates  Sorosilicates  syclosilicates |  |
| 7 | Systematic mineralogy  Inosilicates | Assessment II |
| 8 | Systematic mineralogy  Phylo-silicate |  |
| 9 | Systematic mineralogy  Tectosilicates | Assessment III |
| 10 | Native elements |  |
|  |  |
|  | Non-silicates  Carbonates and halids |  |
| 11 |  |  |
| 12 | Non-silicates  Oxides and hydroxides |  |
| 13 | Non-silicates  solphosaltes | Assessment IV |
| Practicals Associated with this Unit   |  |  |  | | --- | --- | --- | | **University Academic Week** | **Experiment** | | | 1 | The Mineral Identification Key(physical properties) | | | 2 | The Mineral Identification Key(physical properties) | | | 3 | Optical mineralogy: properties of minerals in PPL | | | 4 | Optical mineralogy: properties of minerals in XPL | | | 5 | Optical mineralogy : properties mineral in Conoscopic mode | | | 6 | Mineral ID:  Nesosilicates,  sorosilicates, and  cyclosilicates | | | 7 | Mineral ID: Inosilicates | | | 8 | Mineral ID: phylosilicates | | | 9 | Mineral ID: tectosilicates | | | 10 | Mineral ID:  Carbonates, sulfates,  phosphates, vanadates | | | 11 | Mineral ID: Oxides,  Hydroxides, Halides | | | 12 | | Mineral ID: Common  Sulfides | | | | |

**2. Assessment Strategy**

The sessions involves in-class formative feedback. To plan and design courses,

and to find out how well the students understand the material being covered, the

formative assessments are used as a good tool. These include short oral

presentations of what you had been taught, giving multiple choice questions and

short quizzes. For practicals all weeks prepared sheets should be complete by students.

This module has both theoretical and practical examination which form the

Summative assessments. Part of the summative assessments (continuous exams)

are during the semester and another part is at the end of the semester.

**13. Summary description of assessment items**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Assessment Type | Description of Item | % Weighting | Grading | Tariff | Week due |
| EXM | Continues assessments | 25 |  | 1 hour per exam | An assessment in Three or four week |
| CWK |  | 15 |  |  |  |
| EXM | Practical written exam | 20 |  | 1hour |  |
| EXM | University  scheduled  final  examination | 40 |  | 2hours |  |

**14. Learning Session Structure**

This course is 2 hours theoretical lecture and 3 hours practical in a week. The theoretical session is assigned to introduce the students with the theory behind, concepts, chemical formula of the minerals and related topics. The practical session is assigned to introduce the hand samples and thin sections of the minerals.

**15. Learning and Teaching Methods**

The following teaching & learning strategies are used within this module:

 15×2 hours lectures

 12×3 hours practicals

**16. Bibliography**

Books Recommended

1. Manual of Mineral Science 23rd Edition, by Klein and Dutrow
2. An Introduction to the Rock Forming Minerals, 2nd Edition, by W.A. Deer, R.A. Howie, and J. Zussman (DHZ).
3. Introduction to mineralogy, by W.D. Nesse, 2000, ISBN 13 978-0-19-510691-6

**17. Authored by**

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**18. Validated and Verified by**