NATIONAL UNIVERSITY OF ENGINEERING
COLLEGE OF GEOLOGICAL, MINING AND METALLURGICAL ENGINEERING
MINING ENGINEERING PROGRAM

GE153 – PETROGRAPHY

I. GENERAL INFORMATION

CODE	**:**	GE153 Petrography
SEMESTER	**:**	6
CREDITS	**:**	4
HOURS PER WEEK	**:**	6 (Theory – Practice)
PREREQUISITES	**:**	GE323 Descriptive Mineralogy
CONDITION	**:**	Compulsory

II. COURSE DESCRIPTION

The course prepares students for the understanding and analysis of magma as primary source in rock formation, as well as rock transformation and evolution processes. Students also identify rocks based on the typical chemical and physical properties of igneous, sedimentary and metamorphic rocks. The economic importance of rocks and their relationship with the environment and huma societies are also analyzed.

III. COURSE OUTCOMES

At the end of the course, students:

1. Organize the analysis of rocks according to their origin, composition, physical and other properties.
2. Explain the effect of internal and external dynamical agents in rock formation.
3. Understand and analyze the chemical and mineral components of rocks during their formation.
4. Interpret the origin of rock based on the primary magma, as well as from the alteration, disaggregation and accumulation of sediments from already formed rocks.
5. Construct in laboratory different types of rocks based on their chemical elements and compounds and minerals.
6. Recognize the different types of rocks based on the physical and chemical properties of the minerals making them up.

IV. LEARNING UNITS

1. INTRODUCTION

Solar system / Earth planet / Earth internal and external structure / Mineral composition of animal and plant life. Geological time of rocks and living beings / Rocks and industry / Rocks and environment / Magma / Primary magma / Felsic and mafic magma / Magma crystallization, fusion and refusion / Asquistic and Diasquistic intrusions / Bowen series / Rocks composition and classification / Sedimentary, igneous and metamorphic rocks.

2. MAIN TEXTURES

Definition / Differences and similarities between faneritic, granular, holocrystal, one-modal, equigranular, euhedral, panidiomorph, idiomorph, xenomorph, pegmatitic, aplitic and poikilitic textures / Porfiritic, hyalocrystal, merocrystal, bimodal / Vitreous, hialin, holohialin, anhedral, aliotromorphic, cryptocrystal / Subidiomorphic, afanitic, microgranular, microcrystal, subhedral, hipidiomorphic, others / Main structures / Massive, fluidal, pillow, vesicular, lacquered rope, pumaceous, gneissoid, traquitic, others.

3. IGNEOUS ROCKS
Plutonic hipabisal, subvolcanic and volcanic rocks / Granite, monzonite, grano-diorities, tonalities, pegmatites, aplites, sienites, diorites, gabros, diabasa, anortosites, ijolites, hornblendites, pyroxenites, peridotites (dunites, harzburgites, others) / Lava, pillow lava, volcanic gap, pyroclast, lapilli, volcanic ashes / Crater, freomagmatic eruption, columnar disjunction / Obsidianes, riolites, perlites, riodacites, pertites, latites, dacites, traquites, andesites, pumices, basalts, diabases, fonolites / Other rocks derive form the above mentioned.

4. SEDIMENTARY ROCKS
Chemical, biochemical and volcanic origin / Wentworth scale / Weathering, erosion, transport and accumulation / Sedimentation, diagenesis, catagenesis / Clays limes, sands, granules, graves / Current stratification: crossed, gradual / Fissibility, roundness, sphericity, grain size / pH and Eh of nonclastic sediments / Chemical and mineral compounds of sedimentary rocks / Classification according to several authors / Conglomerates, sedimentary gaps, sandstones, lodolites, limolites, lutites, flints, mineral carbon, cast, anhydrites, halytes, silvites and other salts / Calcareous rocks, Phosphorites, diatomites, other rocks.

5. METAMORPHIC ROCKS
Transformation of igneous and sedimentary rocks into metamorphic rocks / Concept of metamorphism / Contact metamorphism / Regional metamorphism / Dislocational metamorphism / Metamorphism silicates / Metamorphic structures: foliation, linearization, schism, cleavage / Metamorphic facies / Epizones, mesozones, catazones / Crystalization temperatures / Typical minerals of each zone / Metamorphism types / Anatexis / Cataclastic and exfoliated and non-exfoliated structures and textures / Chemical and mineral compounds of metamorphic rocks / Classification of metamorphic rocks.

6. APPLICATIONS
Relationship and application of the different types of rocks in geotechnics, hydrogeology, geothermics, agriculture, metal and non-metal deposits, petroleum deposits.

V. LABORATORY AND PRACTICAL EXPERIENCES

1. Recognition of different types igneous rocks in laboratory and open field.
2. Recognition of different types sedimentary rocks in laboratory and open field.
3. Recognition of different types metamorphic rocks in laboratory and open field.

VI. METHODOLOGY

The course takes place in theory, practice, laboratory and field study sessions. In theory sessions faculty presents concepts and methods. In practice sessions, students analyze and solve diverse problems related to petrography, igneous, sedimentary and metamorphic rocks. In laboratory and field study sessions, students analyze different types of rock samples and formulate conclusions. Students present written reports summarizing their findings and conclusions. Active student participation is promoted.

VII. EVALUATION FORMULA

The average grade PF is calculated as follows:

PF = (EP + EF + PP) / 3

EP: Partial examination EF: Final examination
PP : Average grade of practice, laboratory and field study work.

VIII. BIBLIOGRAPHY

1. **HUANG W.**
   Petrology
   University of Baylor, USA, 2010
2. **KRUMBEIN W., SLOSS L.**
   Stratigraphy and Sedimentology
   Northwestern University, USA, 2009.