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| **جامعة بنهاBenha University**  **Faculty of Science**  **Department of Geology** | | | | | |
| **Course Specification**  **435 G: Mineral prospection and raw materials** | | | | | |
| **A. Affiliation** | | | | | |
| **Relevant program:** | **B.Sc. in Geology Program** | | | | |
| **Department offering the program:** | | | **Department of Geology** | | |
| **Department offering the course:** | | | **Department of Geology** | | |
| **Academic year/level:** | | | **Fourth level** | | |
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| B. Basic information | | | | | |
| **Title:** Mineral prospection and raw materials | | **Code:** **435** **G** | | | **Year/level:** Fourth level |
| **Teaching Hours:** | | **Lectures:** 2 | | | **Tutorial:** 0 |
|  | | **Practical:** 2 | | | **Total:** 4 h/week |
| C. Professional information | | | | | |
| **1. Course Learning Objectives:** | | | | | |
| This course is designed to introduce students to principles and processes of mining and exploration of earth resources. One important goal is to train students on recognization of raw materials and industrial minerals in the field and hand specimen, and to add significantly to the students’ basic and advanced knowedge on the different methods used in exploration for geological raw and industrial material, as well as relationships between resources exploition and the environmental issues. | | | | | |

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| **2. Intended Learning Outcomes (ILOS)** |
| **a. Knowledge and understanding:**  On successful completion of the course, the student should:  **a1.** realize the principals of mineral exploration and branches of geological and mineralogical sciences,  **a2.** identify the different industrial materials to petrological and geochemical environment,  **a3.** describe each of the commonly used mining methods used for mineral extraction,  **a4.** recite both in theory (mathematical and physical background) and in practice (applications and training) how to map, sample and evaluate industrial minerals or raw materials,  **a5.** recognize the methods and techniques used for mineral prospection and extraction. |
| **b. Intellectual skills:**  Successful students in this course should be able to.  **b1.** identify the different minerals in hand specimen and under the microscope,  **b2.** assess mineral paragensis and textures and reconstruct the ore genesis,  **b3.** analyze the setting and genesis of ore textures and their evolution,  **b4.** study the distribution of ores and industrial materials in the various rock assemblages,  **b5.** recognize the economics of minerals and rocks, with emphasize on the Egyptian resources. |
| **c. Practical and professional skills:**  On successful completion of the course, the student should be professionally able to:  **c1.** identify the different minerals in hand specimen and under the microscope,  **c2.** characertize each of the mineral assemblages and rock clans and their geologic settings,  **c3.** demonstrate the economic importance of minerals and rocks and how a feasibility study can be accomplished,  **c4.** analyze the various geologic, mineralogical and economic issues of an potential raw material or mineral deposit. |
| **d. General skills:**  On successful completion of the course, the student should be able to:  **d1.** assess a case study in Egypt, i.e., working mines or quarries,  **d2.** present results and analyze data using statistical software and formulate the results in a readable final form,  **d3.** apply knoweldge and training in probem solving and new findings.  **d4.**  work smoothly in team and manage the time while going to the targeted goals. |
| **3. Contents** |

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| **Topic** | **Lecture hrs** | **Tutorial hrs** | **Practical hrs** |
| 1. Introduction to mineral exploration methods | 2 |  | 2 |
| 1. Industrial minerals and rocks- geologic settings | 2 |  | 2 |
| 1. Types of industrial minerals | 2 |  | 2 |
| 1. Methods used in mineral exploration | 2 |  | 2 |
| 1. Metallic and non-metallic minerals | 2 |  | 2 |
| 1. Mapping and sampling | 2 |  | 2 |
| 1. Feasibility studies | 2 |  | 2 |
| 1. Industrial materials marketing | 2 |  | 2 |
| 1. Geochemical exploration methods | 2 |  | 2 |
| 1. Geophysical exploration methods | 2 |  | 2 |
| 1. Statistical methods used in exploration | 2 |  | 2 |
| 1. Work opportunities in mineral exploration | 2 |  | 2 |
| 1. Important minerals and rocks in Egypt | 2 |  | 2 |
| 1. Revision and course evaluation | 2 |  | 2 |
| **Total hours** | **28** |  | **28** |

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| **4. Teaching and Learning methods:** |

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| **Intended Learning Outcomes** | | | **Lecture** | **Presentations** | **Discussions & Seminars** | **Practical** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | a1. | realize the principals of mineral exploration and branches of geological and mineralogical sciences, | 🗸 |  |  |  |  |  |
| a2. | identify the different industrial materials to petrological and geochemical environment, |  | 🗸 | 🗸 |  |  |  |
| a3. | describe each of the commonly used mining methods used for mineral extraction, | 🗸 | 🗸 | 🗸 |  |  |  |
| a4. | recite both in theory (mathematical and physical background) and in practice (applications and training) how to map, sample and evaluate industrial minerals or raw materials, | 🗸 |  |  |  | 🗸 | 🗸 |
| a5. | recognize the methods and techniques used for mineral prospection and extraction. |  |  | 🗸 | 🗸 |  |  |
| **Intellectual Skills** | b1. | identify the different minerals in hand specimen and under the microscope, | 🗸 |  |  |  |  |  |
| b2. | assess mineral paragensis and textures and reconstruct the ore genesis, |  |  |  | 🗸 | 🗸 | 🗸 |
| b3. | analyze the setting and genesis of ore textures and their evolution, | 🗸 | 🗸 | 🗸 | 🗸 |  |  |
| b4. | study the distribution of ores and industrial materials in the various rock assemblages, |  | 🗸 |  |  |  |  |
| b5. | recognize the economics of minerals and rocks, with emphasize on the Egyptian resources. | 🗸 | 🗸 | 🗸 |  |  |  |
| **Practical and professional skills** | c1. | identify the different minerals in hand specimen and under the microscope, |  |  |  | 🗸 | 🗸 |  |
| c2. | characertize each of the mineral assemblages and rock clans and their geologic settings, | 🗸 |  |  |  | 🗸 | 🗸 |
| c3. | demonstrate the economic importance of minerals and rocks and how a feasibility study can be accomplished, |  |  |  | 🗸 |  |  |
| c4. | analyze the various geologic, mineralogical and economic issues of an potential raw material or mineral deposit. | 🗸 |  |  | 🗸 |  |  |
| **General Skills** | d1. | assess a case study in Egypt, i.e., working mines or quarries, 0 |  |  |  | 🗸 | 🗸 |  |
| d2. | present results and analyze data using statistical software and formulate the results in a readable final form, | 🗸 |  |  |  |  |  |
| d3. | apply knoweldge and training in probem solving and new findings. |  | 🗸 | 🗸 |  | 🗸 | 🗸 |
| d4. | work smoothly in team and manage the time while going to the targeted goals. | 🗸 | 🗸 | 🗸 |  | 🗸 | 🗸 |

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| **5. Students’ Assessment Methods and Grading:** |

**5.1.** Discussion, class activites and quizzes to assess the student progress and personal attitude,

**5.2.** Assignments to assess the student independen work,

**5.3.** Written mid-term exam to ensure the student progress and discover the shortage,

**5.4.** Final written and oral exam to evaluate students and promote for other consequent courses.

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| **Tools** | **To Measure** | | **Time schedule** | | **Grading** |
| Semester work | ILOs a, b, d | | Semester course | | 8 % |
| Mid-Term exam | ILOs a1-3, b1-b3, c1-c2 | | Seventh week | | 6 % |
| Practical exam | ILOs c, b | | Thirteenth week | | 24 % |
| Oral exam | ILOs c, b | | Thirteenth week | | 14 % |
| Final written exam | ILOs a, b, c | | Fourteenth week | | 48 % |
| Total | | | | | 100 % |
| **6. List of references:** | | | | | | | |
| **6.1. Course notes**  Lecture notes prepared by the course instructor(s), and approved by the department council  **6.2. Required books**  None.  **6.3. Recommended books**  Marjoribanks, R, 1997. Geological Methods in Mineral Exploration and Mining, Chapman & Hall, London, 2nd ed. 2010, XV, 238 p.  Tatiya, R., 2005. Surface and underground excavations: methods, techniques and equipment, Taylor & Francis, ISBN 90-5809-627-0  **6.4. Periodicals, Web sites, etc.**  Economic Geology  Ore Geology Reviews  Journal of Geochemical Exploration | | | | | | | |
| **7. Facilities required for teaching and learning:** | | | | | | | |
| Data show  Digital movies of operating mines and tools used in exploration.  Sound system to ensure the ease listening | | | | | | | |
| **Course coordinator:** | | | **Prof. Dr. Basem A. Zoheir**  **Dr. Amr Abdelnasser** | |  | | |
| **Head of the Department:** | | | Prof. Dr. Mohamed El-Fakharany | | | | |
| **Date:** | | | 2016-2017 | |  | | |