**EMET 504 FIRE ASSAY**

**Category:** 2 Credits – 1.5 Contact Hrs (Lecture)/1.5 Contact Hrs (Lab) – Engineering Topic

**Instructor:** Dr. Courtney A. Young

**Textbook:** *Fire Assaying*, Shepard and Dietrich, McGraw-Hill Book Company, Inc. 1940.

**References:** *A Manual of Fire Assaying*, Fulton, McGraw-Hill Book Co., Inc. 1911.

*A Textbook of Fire Assaying*, Bugbee, John Wiley and Sons, Inc., 1940.

**Handouts:** All MS PowerPoint lectures and PDF notes and references

**2023-2024 Catalog Description:** This laboratory/lecture course is offered as a short course such that professionals also register allowing interaction with students. The course covers the art and science of assaying for precious metals. Procedural differences are discussed for various ore types as well as the precious metal being assayed. In this regard, Au, Ag, Pt and Pd assay methods are examined and compared. If available, field trips to area mines and smelters are made and a hands-on lab is conducted. Students must register in EMET 504 Lab.

**Prerequisite:** Junior Standing and Instructor Approval

**Corequisite:** EMET 504 Fire Assay Lab

**Designation:** Elective

**Specific Goals:**

**Course Outcomes:** Graduates of this course will or will be able to:

1. Perform fire assay
2. Understand fire assay techniques and results
3. Enhance their familiarity with sampling
4. Write a formal technical report

**Student Outcomes:** Graduates of this course will or will be able to:

1. Meet **Criterion 3 SO** 1 and 7

SO 1 – identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

SO 7 – acquire and apply new knowledge as needed, using appropriate learning strategies.

1. Meet **Criterion 3 Program Specific SO** 8

SO 8 – apply advanced science (such as chemistry, biology and physics), computational techniques and engineering principles to systems implied by the program modifier (e.g., ceramics, metals, polymers, biomaterials, composites).

**Course Topics:** The following topics are covered with class period being approximated:

1. History, Methodology and Challenges (4 classes)

2. Sampling Applications and Smelter Schedules (2 classes)

3. Sampling Theory (4 classes)

4. Instrumentation and Analysis (2 classes)

5. Complementary Analytical Methods (2 classes)

6. Chemical Calculations and Thermodynamic Evaluations (2 classes)

7. Lab Procedures (1.5 classes)

8. Industrial Flowsheets and Sampling Points (1.5 classes)

9. Industrial Processes/Lab Tours – may be virtual or replaced with lectures (1 day)

a. Idaho: AAS Analytical, New Jersey Mill, Hecla Lucky Friday, Coeur Galena Mill

b. Montana: Barrick Golden Sunlight and Sibanye-Stillwater Lab/Smelter/Refinery

10. Hands-on Lab – may be replaced by additional tours or more lectures (1 day)