

Handout for the lecture:

TU-Delft, lecture TA 3060 Mining Engineering (2012-2013) → Surface Mining

The lecture Surface Mining is given within the framework of the course TA 3060 in which other aspects of mining are taught.

Aspects of surface mining are taught during the first year of the curriculum for students studying Applied Earth Sciences. During the lecture TA1009-4 Introduction to Resource and Geo-Engineering for example, students are introduced to mining methods and visit surface mining operations. For the lecture TA2230 Introduction to Resource and Geo-Engineering an introduction is given to aspects such as mine dewatering and slope stability. During on site work exercise in a quarry students are given the opportunity to take samples and assess *e.g.* the slope stability of benches.

If the students continue in the direction of mining and follow the different lectures given in the framework of the EMC, they will learn more about *e.g.* surface mine planning. Important geomechanical features for mining are taught within the same faculty of Civil Engineering and Geosciences in the direction geo-Engineering. For mining students the course AES1630 Engineering Geology of Soils and Rocks is an interesting course in which mining related geomechanics are lectured.

For the present lecture Surface Mining within the course TA 3060 Mining Engineering care has been taken that unnecessary doubling of contents is avoided. Where suitable, a reference is given to a specific course within TA2230 or AES1630. The course goes more into detail concerning surface mining than TA2230 but with respect to mine planning the level of details is smaller than within the EMC course. Some doubling of content cannot be avoided because the lecture Surface Mining within the course TA 3060 is offered as a minor and is followed as well by *e.g.* Civil Engineering students. These students have not followed the aforementioned previous courses and will probably not follow the EMC courses. For some of them the course TA 3060 Mining Engineering is the only course in Mining they will probably follow. Therefore the contents of the present lecture have to incorporate some basics as well.

This lecture on surface mining is divided in following sections:

- => Introduction, contemporary surface mining, mine planning & mineral resource reporting
- => Geomechanics in surface mining: more than slope stability
- => Mine Equipment: wear, equipment selection
- => Coal mining: mining methods
- => Rock mass preparation for loading and hauling
- => Quarrying

This handout contains selected sheets from the presentation and gives guidance through the vast field of surface mining topics. The handout present a guidance but does not represent the content of the lecture. The content can be found in mining books. The students are in a favourable position since recently new editions of well established mining literature have been published (cycle of about 20 years). The students can therefore rely on the updated content of these books. It is advised that the students procure these books since these books are not only important for his lecture but for other lectures they will follow throughout their studies and for accomplishing different tasks during their career. Since the lecture Surface Mining is only one of the lectures within the course TA3060 Mining Engineering the amount of literature to study is well selected. During a lecture it is clearly stated in which book, chapter and pages the contents can be found. A first indication of the material to study is presented here below:

1) Compulsory for any undergraduate student of mining or associated engineering study:
Hartmann, H.L., Mutmansky, J.M. (2002) Introductory mining engineering. Second Edition. SME.

2) A very comprehensive book about surface mining is the following book, this is of a more date publication year but I consider it still to be up-to-date. This book is still published by the SME where it can be bought (at a student reduced rate). Because this book is the basic book for this course the central library of the TU-Delft (BTUD) bought a digital copy. Students can access the book via the TU-Delft website.

Kennedy, B.A. (1990) Surface Mining. Second Edition. SME.

For this lecture the following chapters contain the important contents and should be studied:

- Planning and Design of Surface Mines,
- Mine Operations

3) Recently a new version of this excellent book was published:

Darling, P. (2011) SME Mining Engineering Handbook. Third edition. SME.

For this lecture study the following chapters:

Part: 9.5, 9.6-9.9 & Part 10

The content of the aforementioned chapters in these two books is to a high degree similar. The student should study either the contents in the book by Kennedy or by Darling.

For the theory of block models (a part of mine planning) this book is important:

Hustrulid, W., Kuchta, M. (2006) Open pit mine planning & design. Second Edition. SME.

For this lecture read the following chapters:

- Revenues and costs
- Geometrical considerations
- Pit limits

Other literature for which permission was granted by the author / publisher can be found on the black board. On the black board the sheets of Professor Charley Pelley can be found.

Professor Pelley taught surface mining at the TU-Delft previously.

For special topics reference is made during the lecture to individual publications in literature.

Exercises are given during the lecture. Attendance is therefore important since similar questions will be asked during the exam.

A copy of the last examination has been included in this handout.