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# The Department of Mining of the State University and a Short Course in Mining Engineering.

PROF. N. W. LORD.

READ AT LOGAN MEETING.

Thanks to the efforts of this society, an appropriation was made by the General Assembly last winter to enable the State University to increase the teaching force in, and extend the equipment of, its department of mining and metallurgy.

The interest which you have thus shown in the welfare and usefulness of the school justifies me in now presenting a short account of what has been done, and what we can now offer to the young men of the State in the direction of this kind of technical training.

The school of mines in connection with the University was originally established in 1877, since which time a regular course of study for mining engineers has been open to all students who wished to pursue it, and a number of young men have graduated from this department of the University, many of whom are now occupying responsible positions in connection with mining and metallurgical works in this and other States as engineers, chemists and managers. This spring we have been able to extend and strengthen this course materially, through the recent appointment of Mr. F. W. Sperr as assistant professor of mining engineering. Prof. Sperr will give practical instruction in all matters relating to mine development and management, including mine surveying and mapping, mining tools and machinery of all sorts, timbering, drainage, and the various details of operating and maintaining. This will be in relation not only to coal, but ore and other mining, quarrying, and all such matters.

The department is equipped with full sets of the different instruments used in mine surveying and inspection, and the students are required to perform the various operations themselves and to work up their results, mapping their surveys. The notes of actual surveys will also be put in their hands to work from, as illustrations of Ohio mining, and as showing how to keep the record of coal extracted, as well as that left unrecovered. A well arranged drawing room especially for this work has been added to the equipment of the department.

The metallurgy, mineralogy and assaying of ores is treated fully and practically. The course in these subjects comprises a first

term's work in general mineralogy, in which the student, by actual handling and testing, is made familiar with all the ordinary ores and minerals; a fairly complete collection being available for that purpose, which we hope to increase as the means can be obtained. After this comes two terms of metallurgy, taught by lectures and illustrated by drawings, photographs of machinery and furnaces, and visits to such works as are available; the nature and preparation of natural and artificial fuels, gas, coke, &c., are discussed; refractory material, fire-clays, fire-brick and their manufacture; reduction of ores, and the chemical and physical properties of iron and steel, with their ores and modes of manufacture. We are forming a collection of irons, steels, ores, slags, &c., to illustrate the different districts and conditions of these subjects, which will increase rapidly. The methods of testing iron and steel and the influences of various impurities upon their quality is fully treated in this part of the course.

Following this set of lectures there is provided three terms of "laboratory work," in which the student has instruction and practice in analyzing and testing iron, steel, fuels, ores, slags, &c., by the methods in use in the laboratories of steel works and assay offices. This work is under my immediate charge, and it is the intention to make the instructions so practical that men can be fitted to do at once the ordinary work of a laboratory with accuracy and speed.

We are now furnished with all the necessary apparatus for this work, including gas analysis, as applied to furnaces and producers.

This short statement shows the present condition of the mining department proper and its ability to deal with the purely technical work of the course in mining engineering, but it should be remembered that a large portion of the time of the student is devoted to other necessary studies involving the other laboratories and equipment of the University. The chemical, physical and mechanical laboratories which are among the best in the country and contain engines and tools of all sorts, electric dynamos and motors, and in which students have the opportunity of seeing practical application of all that they study, are open to all of them, as well as the large collection of the State Geological Survey.

Having thus stated the present equipment available to the student, let us consider the courses of study a young man may pursue with the object of training as a mining engineer.

There is provision made for three classes of students. In the first place there are those who enter for the degree of mining engineer. To these is offered a four years' course beginning with the freshmen, the requirements for entrance to it are graduation at a good high school, completion of the college preparatory course, or else passing examination in the studies which such courses would include.

The four years' work then takes him through the following works :

*First*—A thorough two years' course in higher mathematics. *Second*—A full practical course in draughting in all its branches. *Third*—Three years in general and analytical chemistry. *Fourth*—A year in geology, general and economic. *Fifth*—The special training in mining engineering and metallurgy. *Sixth*—Course in mechanics, physics, history and modern languages.

This long course is intended to be not only technical, but educational, and to combine with the special studies the elements of mental drill proper to a college curriculum.

In this State, however, it is probable that the number of men who will begin early enough, and can afford the time to take this complete course, will be limited, and the University would fail to be of the full benefit it should to the mining industry of the State if it restricted its work to this class only.

There are many men now at work in this State who would be glad to have an opportunity for special instruction in the technical studies bearing upon their business, but who cannot go to college for four years, even if they had the necessary preliminary training. Now, to meet this demand, the mining department has arranged another and separate course, to which I wish the members of the Mining Society to give particular attention, as it is a new departure.

I have printed it in our summer announcement as "a short course in mining." The time taken is two years, of which the first is general and preparatory, while the second is devoted to somewhat elementary, but still practical instruction in various subjects directly useful to Ohio miners. The course is as follows, subject to such changes as experience may prove to be advisable:

### THE FIRST YEAR.

*(Each study occupies five hours a week.)*

FALL TERM—Algebra, Wells' University Algebra; Geometry, Wentworth's Geometry; Physical Geography, Geikie's Physical Geography.

WINTER TERM—Algebra, Wells' University Algebra; Geometry, Wentworth's Geometry; Physics, Gage's Physics.

SPRING TERM—United States History, Johnson's History of the United States; Trigonometry, Chauvenet's Trigonometry; Physics, Gage's Physics.

### THE SECOND YEAR.

FALL TERM—Drawing, Faunce's Mechanical Drawing, three hours a week; Free-hand Drawing, two hours; Chemistry, lectures and Norton's Chemistry, four hours; Mine Surveying, five hours.

WINTER TERM—Drawing, Church's Descriptive Geometry, three hours; Elementary Geology, five hours; Chemistry, lectures and Norton's Chemistry, two hours; Mining Operations and Machinery, five hours.

SPRING TERM—Mechanical Laboratory, three hours; Elementary Metallurgy, five hours; Lettering, two hours; Mine Operating, five hours.

The first year, as before stated, is simply preparatory, and students who have done the work it covers, can take at once the second and more useful year.

Now, the students to whom this course is offered are those particularly who have had experience in work, and are of somewhat mature age. All the preparation that is necessary for entering this course is an ordinary elementary education. And as many men have had this, who, having been "out of school" for years, are not prepared to pass examination in the subjects (arithmetic, grammar, geography, etc.) required of all students who enter the University. Students for this short course, who are of sufficient age and general intelligence, will be admitted without any examination whatever.

The engineering classes in this course are different from those of the long one. They will be made extremely practical, and especially devoted to Ohio mining.

The methods of surveying and mapping mines, measuring coal extracted, ventilating, draining, &c., &c., will be thoroughly discussed and practically illustrated.

It is hoped that young men who intend to make Ohio coal mining their business will carefully consider this course and prepare themselves for it practically by devoting what time they can spare to the study of mathematics, as any practice in algebra and geometry before entering will greatly aid the student in his work at the school.

A third class of students, for which provision is made, are those who wish to attend the University for a limited time and pursue special studies not arranged in any printed course.

All classes are open to such, provided only that they can show that they have acquired the necessary preliminary training to enable them to take the studies with advantage, and are of sufficient maturity to have a definite object in view.

The mining department can thus admit students to special work in analytical chemistry, metallurgy, mining, engineering, assaying, &c. The usual proceeding is for the student, after obtaining admission either by examination or certificate, to arrange a scheme of studies for such time as he may propose to attend the college; this will then be examined by the secretary of the school or department, and if the applicant is found qualified to do the work he will be admitted to the classes selected. He is, of course, then expected to pursue his special course regularly.

I have given now a statement for members of this Institute to consider the plan of work laid out by the University for its department of mines. I should be glad if the members would, in view of their recent efforts in its behalf, take upon themselves the

task of ascertaining the effect of its operation and extending the scope of its usefulness.

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## DISCUSSION OF PROF. LORD'S PAPER.

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Mr. Roy—Will there be any degree conferred upon the completion of the short course?

Prof. Lord—I will say in regard to that, a degree is given only on the completion of the long course. It would not be right to give the same degree as is now given, but anyone who continues and completes the work of the long course will be entitled to a degree. Now, during the first year of the short course it has been necessary to abbreviate the work in metallurgy, and the man who takes the long course will get that much more thoroughly, will be much more developed, as well as better equipped in higher mathematics.

Mr. Roy—I like the course very much and think it could hardly be improved. As we are all very much interested in it, each member should make himself a committee of one, to secure students.