

Bulletin Of

Texas Technological College

Lubbock, Texas

VOL. XVII

OCTOBER, 1941

No. 10



Professional Preparation For Work

In The Petroleum Industry

By

Leroy T. Patton

Professor and Head of the Department of Geology
and Petroleum Engineering
Texas Technological College

Issued monthly by The Texas Technological College, Lubbock, Texas, Entered
as second-class matter, December 24, 1924, at the Postoffice,
at Lubbock, Texas, under the Act of
August 24, 1912.

PROFESSIONAL PREPARATION FOR WORK IN THE PETROLEUM INDUSTRY

The great development of the petroleum industry in the present day economy, its great development in the Southwest, and the opportunities offered by the industry to young men entering it induce many young men to seek training for entrance into this most important industry, with the result that many students enter the colleges and universities, especially of the Southwest, with the intention of securing education which will fit them for places in this industry. Many such persons, however, do not have adequate information concerning the different types of work, the proper preparation for each type, the nature of the different curriculums offered by the educational institutions, and the relation of these curriculums to the different types of work in the industry. It is believed that an informal discussion of these questions will be of help to students entering college for the purpose of securing training for entering the petroleum industry. It is for this purpose only that this paper is written. The writer will be glad to discuss further with any students who so desire any of the questions in connection with their proposed college work, and to answer any questions which may come up, either by correspondence, or by personal interviews.

In order to relate the discussion definitely to the work of the industry, the different departments of the usual organization of the major companies will be taken up, and the curriculums in preparation for the work of the departments discussed.

Geological Departments.—The first application of science in the petroleum industry was in the application of the principles of geology to the problem of finding oil, and it is to the use of geological principles that the industry owes its rise from the status of precarious gambling ventures to one of the world's leading industries. All major companies, therefore, maintain large geological departments, and these departments are among the most important in the organization, for upon their advice depends many of the vital decisions of the company. Not only the major companies but many of the smaller independent companies now maintain geological departments, and those that do not, use the services of consulting geologists.

Since geology was originally used in the search for new fields, and since it was in this search that it made its most spectacular success, many persons have the impression that this is its only use. This is far from being true. Geology being the science of the earth cannot be divorced from any activity of the industry, and is vitally related to many of them. In the fields already discovered and undergoing development, for instance, the geological departments are engaged, among other activities, in extensive subsurface work in which they identify horizons from the study of well cuttings, making use of microfossils, petrographic characters of the rocks, and other methods. The production departments depend upon advice from the geological departments concerning depths at which casings are to be set, horizons at which wells are to be brought in, and many other similar problems.

In the work of exploration for new fields the geological departments are engaged in a multitude of different activities, different parts of the world calling for different types of study. This branch of the work still is of utmost importance to the industry, since new fields must constantly be discovered as the old ones are exhausted.

Work in the geological departments calls for thorough training in all branches of geological science since different and varied problems are constantly arising in each new field and the exploratory geologist must be prepared to cope with them.

Professional Training for Work in Geological Departments of Oil Companies.—Texas Technological College offers two curriculums for professional

training for those who wish to enter the geological departments of oil companies. The first of these is given under the Division of Arts and Sciences.

This curriculum gives thorough training in all branches of geological science ordinarily dealing with the problems of the petroleum industry and constitutes a sound preparation for professional work in the geological departments of the oil companies. It also includes sound fundamental training in the other sciences and fundamental training in one foreign language. An outline of this curriculum is given below.

CURRICULUM FOR THE DEGREE OF BACHELOR OF SCIENCE GEOLOGY MAJOR

Freshman Year

	Semester Hours	
	Sem. I	Sem. II
Two courses in sciences to be chosen from the following	6	6
Biology 131-2. Natural History of Plants and Animals		
Botany 131-2. General Botany		
Zoology 131-2. General Zoology		
(Only one to be selected from first three.)		
Chemistry 131-2. General Chemistry		
Geology 131-2. General Geology		
Physics 131-2. Elements of College Physics		
English 131-2. Freshman Composition	3	3
A foreign language	3	3
Mathematics 130. Algebra	3	
Mathematics 131. Trigonometry		3
Orient. 111. Orientation	1	
Orient. 112. Orientation (elective)		1
Physical Training or Band 111-2	1	1
	17	17

Sophomore Year

Geol. 231. Mineralogy	3	
Geol. 235. Elementary Structural Geology	3	2
Science—courses in the two science departments not represented in the freshman year	6	6
Eng. 231-2. Introduction to Literature	3	3
The foreign language begun in the freshman year	3	3
Physical Training or Band 211-2	1	1
	16	16

Summer

Geol. 363. Field Geology (Summer)	6	
---	---	--

Junior Year

Geol. 333. Petrology: Optical Mineralogy	3	
Geol. 334. Petrology: Descriptive		3
Geol. 335-6. General Palentology	3	3
Elective in science	3	3
Eco. 231-2. Principles of Economics	3	3
Govt. 339-10. American Government, National and State	3	3
	15	15

Senior Year

Geol. 411-2. Geology of Texas	1	1
Geol. 413-4. Seminar	1	1
Geol. 431-2. Advanced General Geology	3	3
Geol. 433. Structural Geology	3	
Geol. 434. Petroleum Geology		3
Geol. 435. Index Fossils	3	
Geol. 436. Micropaleontology		3
Electives	3	3
Electives in science	3	
	17	14

The second curriculum is given under the Division of Engineering, and leads to the degree of B. S. in Petroleum Engineering, Geology Option.

This curriculum contains the same training in geology as the first mentioned curriculum but differs from it in the substitution of courses in Engineering instead of courses in foreign language, and the electives of the former curriculum. A copy of this curriculum is given below.

CURRICULUM FOR THE DEGREE OF BACHELOR OF SCIENCE IN PETROLEUM ENGINEERING

Geology Option

Freshman Year

	Semester Hours	
	Sem. I	Sem. II
English 131-2. Freshman Composition	3	3
Chem. 131-2. General Chemistry	3	3
Math. 121-2. Algebra	2	2
Math. 131. Trigonometry	3	
Math. 132. Analytics		3
Engr. Dwg. 132-3. Engineering Drawing	3	3
Engr. Or. 111. Engineering Orientation	1	
M. S. 111-2, Military Science; P. E. 113-4, Physical Education; or Music 111-2, Band	1	1

Sophomore Year

	16	15
Phys. 235-6. Engineering Physics	3	3
Phys. 215-6. Physical Measurements	1	1
Engr. Dwg. 222. Descriptive Geometry		2
Math. 251. Calculus	5	
Math. 233. Calculus Applications		3
Chem. 220. Qualitative Analysis		2
C. E. 331. Applied Mechanics—Statics		3
Eng. 233. Technical Writing	3	
Geol. 131-2. General Geology	3	3
Geol. 231. Mineralogy	3	
M. S. 211-2, Military Science; P. E. 213-4, Physical Education; or Music 211-2, Band	1	1

Summer

Geol. 363. Field Geology	19	18
	6	

Junior Year

C. E. 332. Applied Mechanics—Kinematics and Kinetics	3	
C. E. 333. Applied Mechanics—Strength of Materials		3
Eco. 231-2. Principles of Economics	3	3
Petrology 333. Petrology: Optical Mineralogy	3	
Geol. 334. Petrology: Descriptive		3
Geol. 335-6. General Paleontology	3	3
C. E. 231-2. Plane Surveying	3	3
C. E. 310. Testing Laboratory		1

Senior Year

	15	16
Geol. 431-2. Advanced General Geology	3	3
Geol. 433. Structural Geology	3	
Geol. 434. Petroleum Geology		3
Geol. 435. Index Fossils	3	
Geol. 436. Micropaleontology		3
Geol. 411-2. Geology of Texas	1	1
Geol. 413-4. Seminar	1	1
Speech 337. Project Speaking		3
C. E. 334. Surveying	3	
Elective		3

	14	17
*Govt. 131-2. American Government, National and State	3	3

The choice between these two curricula depends upon the natural aptitude of the student. There are certain advantages in a broad training in the sciences and languages, and opportunities for electives, and there are certain advantages in engineering training combined with professional courses in geology.

Students planning to do graduate work after completion of their undergraduate courses should take the first named curriculum.

Students taking the first curriculum may, of course, choose subjects in mathematics and engineering as their electives. By proper choice of electives and some summer work it is possible to complete this curriculum and one of the curriculums in Petroleum Engineering with approximately a year's work after graduation in the first curriculum and thus obtain two degrees. Students who wish to pursue this plan should, however, consult with the Head of the Department concerning the same when first entering college, and should pursue a carefully planned program under the direction of the Department Head throughout their college course.

Geophysics Departments.—Within recent years there has grown up another important department in the major companies; namely, geophysics department. In certain areas such as the High Plains of Texas, and in the salt dome regions of Texas and Louisiana, it has not been possible to ascertain the subsurface conditions from the study of the surface conditions, and recourse has been made to certain physical methods in order to ascertain conditions of underground structure.

Since these methods are merely for the ascertaining of underground geological conditions, it is obvious that geological knowledge is necessary for their interpretation, so that whatever the methods used the fundamental type of training for such work is training in geology. Combined with this training in geology there should be specialization in physics and electrical engineering. In the curriculum in Petroleum Engineering, Geophysics Option, outline of which is given below, such combination of studies has been worked out.

CURRICULUM FOR THE DEGREE OF BACHELOR OF SCIENCE IN PETROLEUM ENGINEERING

Geophysics Option

	Semester Hours	
	Sem. I	Sem. II
Eng. 131-2. Freshman Composition	3	3
Chem. 131-2. General Chemistry	3	3
Math. 121-2. Algebra	2	2
Math. 131. Trigonometry	3	
Math. 132. Analytics		3
Engr. Dwg. 132-3. Engineering Drawing	3	3
Engr. Or. 111. Engineering Orientation	1	
M. S. 111-2, Military Science; P. E. 113-4, Physical Education; or Music 111-2, Band	1	1
	16	15
Sophomore Year		
Phys. 235-6. Engineering Physics	3	3
Phys. 215-6. Physical Measurements	1	1
Math. 251. Calculus	5	
Math. 233. Calculus Application		3
Eng. 233. Technical Writing	3	
Geol. 131-2. General Geology	3	3
Geol. 231. Mineralogy		3
Engr. Dwg. 222. Descriptive Geometry	2	
E. E. 230. Principles of Electrical Engineering		3
M. S. 211-2, Military Science; P. E. 213-4, Physical Education; or Music 211-2, Band	1	1
	18	17

	Summer	Sem. I Sem. II	
		Semester Hours	
Geol. 363. Field Geology		6	
Junior Year			
E. E. 331-2. Principles of Electrical Engineering		3	3
E. E. 321-2. Electrical Engineering Laboratory		2	2
Geol. 333. Petrology: Optical Mineralogy		3	
Geol. 334. Petrology: Descriptive			3
Geol. 335-6. General Paleontology		3	3
Phys. 333-4. Electricity and Magnetism		3	3
Geol. 411-2. Geology of Texas		1	1
Senior Year			
E. E. 431-2. Alternating Current Machinery		15	15
E. E. 433. Transmission		3	3
E. E. 434. Communication			3
Geol. 431-2. Advanced General Geology		3	3
Geol. 433. Structural Geology		3	
Geol. 434. Petroleum Geology			3
Geol. 435. Index Fossils		3	
Geol. 436. Micropaleontology			3
Geol. 413-4. Seminar		1	1
Geol. 427-8. Theoretical Geophysics		2	2
		18	18
Govt. 131-2. American Government, National and State		3	3

Production Departments.—In the early history of the oil industry, and until very recent years, the work of drilling wells, and other operations connected with getting oil out of the ground was in the hands of the so-called practical men, men who had merely learned the routine of drilling and other operations by experience in the work. There has, however, grown up a demand for men with technical training who are able to cope with new problems as they arise, and the production departments of the major companies are now being recruited from the ranks of men who have received technical training.

The first development of training for this branch of work was solely in the direction of training in the technique of the methods of production. This, of course, is valuable training and necessary for this type of work. There has, however, been a reaction in the industry against such a narrow type of training, and demand has grown up for men with sound training in the fundamentals of geological science, who are able to understand varying geological conditions as these are encountered, and to intelligently use the information and advice supplied to them by the geological departments. The Production Option of the curriculum in Petroleum Engineering contains fundamental work in both technical training in production methods and fundamental training in geological science, a balance which meets the present day demands of the industry. The outline of this option is given below.

CURRICULUM FOR THE DEGREE OF BACHELOR OF SCIENCE IN PETROLEUM ENGINEERING

Production Option Freshman Year

	Semester Hours	
	Sem. I	Sem. II
Eng. 131-2 Freshman Composition	3	3
Chem. 131-2. General Chemistry	3	3
Math. 121-2. Algebra	2	2
Math. 131. Trigonometry	3	
Math. 132. Analytics		3
Engr. Dwg. 132-3. Engineering Drawing	3	3
Engr. Or. 111. Engineering Orientation	1	
M. S. 111-2, Military Science; P. E. 113-4, Physical Education; Music 111-2. Band	1	1
	16	15

	Semester Hours	
	Sem. I	Sem. II
Sophomore Year		
Phys. 235-6. Engineering Physics	3	3
Phys. 215-6. Physical Measurement	1	1
Engr. Dwg. 222. Descriptive Geometry		2
Math. 251. Calculus	5	
Math. 233. Calculus Application		3
Chem. 220. Qualitative Analysis		2
C. E. 331. Applied Mechanics—Statics		3
Eng. 233. Technical Writing	3	
Geol. 131-2. General Geology	3	3
Geol. 231. Mineralogy	3	
M. S. 211-2, Military Science; P. E. 213-4, Physical Education; Music 211-2, Band	1	1
	19	18
Summer		
Geol. 363. Field Geology	6	
Junior Year		
C. E. 332. Applied Mechanics—Kinematics and Kinetics	3	
C. E. 333. Applied Mechanics—Strength of Materials		3
M. E. 334. Elementary Thermodynamics	3	
M. E. 335. Heat Engines		3
M. E. 317-8. Heat Engine Laboratory	1	1
Geol. 333-4. Petrology		
or		
Geol. 335-6. General Paleontology	3	3
C. E. 231-2. Plane Surveying	3	3
C. E. 231-2. Plane Surveying	3	3
C. E. 310. Testing Laboratory		1
Petr. Engr. 331. Drilling and Development	3	
Petr. Engr. 333. Production Engineering		3
Speech 337. Project Speaking	3	
	19	17
Senior Year		
Petry. Engr. 421. Oil Field Testing Methods	2	
Petr. Engr. 432. Advanced Production Engineering		3
Petr. Engr. 433. Special Problems in Petroleum Production		3
Petr. Engr. 434. Natural Gas Engineering		3
Petr. Engr. 411. Seminar	1	
C. E. 420. Hydraulics	2	
C. E. 410. Hydraulics Laboratory		1
Geol. 433. Structural Geology	3	
Geol. 434. Petroleum Geology		3
Geol. 431-2. Advanced General Geology	3	3
Geol. 411-2. Geology of Texas	1	1
Eco. 231-2. Principles of Economics	3	3
	18	17
Govt. 131-2. American Government, National and State	3	3

Scouting Departments.—All of the major companies maintain a staff either as a separate department, or as a part of some other department, whose business it is to obtain and compile information concerning the activities in different field. This does not mean, as the name seems to imply, the obtaining of information by surreptitious means. As a matter of fact scouting activities are generally methods of cooperation among the major companies. Oil scouts of many districts are organized into cooperative groups with arrangements for the pooling of information and exchange of data. Scouting is one of the most interesting of the activities of the industry since those engaged in it are kept at the forefront of the developments.

Oil scouts are generally trained geologists, since their business involves extensive reports on geological conditions encountered in the activities of different fields.

Private Consulting Work.—In addition to employment with the major companies there are opportunities for private consulting work in the various branches of the petroleum industry. At the present time the opportunities for such work are perhaps the greatest in geology since most of such work has to do with exploration for new fields. There are, however, limited opportunities for such work in other branches particularly with the smaller independent companies as clients. Like all private businesses such private consulting businesses are difficult to establish. They are generally established by men who have had experience with major companies and who have established contacts which give them a clientele for the beginning of their business. However, some very successful enterprises of this kind have been established by men without a previous period of experience with the major companies.

Organization of the Professional Courses in Preparation for Work in the Petroleum Industry in Texas Technological College.—The organization and administration of the professional courses discussed in the foregoing paragraphs, in Texas Technological College, is under one department, the Department of Geology and Petroleum Engineering. This is a plan in which this institution is a pioneer, and which is proving eminently satisfactory, since it brings all related activities together under one organization, prevents unnecessary duplication and waste of effort, and undesirable competition between departments dealing with the same general and closely related type of work. Because this organization is still unique among educational institutions, and because it involves departmental connections between two Divisions, it is sometimes somewhat confusing to persons not familiar with it. It has, however, proved to be the most logical and satisfactory organization for work, the subject matter of which, lies in the borderland between two Divisions.

Information

Requests for bulletins, the college catalogue, or other information concerning college courses may be addressed to the Registrar, Texas Technological College, Lubbock, Texas; or requests may be directed to the President or respective deans of the divisions of the College.

Inquiries concerning reservation of rooms in the College dormitories should be addressed to the Manager of Dormitories, Texas Technological College, Lubbock, Texas. Inquiries regarding room reservations with families in Lubbock should be addressed to the Chairman of the Student Housing Committee.

Additional publications available:

- Engineering Bulletin
- Bulletin on Graduate Study
- Summer Session Bulletin
- Bulletin on Correspondence Courses
- Bulletin on Educational Motion Pictures
- Bulletin on Textile Engineering
- Bulletin on College Schedule of Classes (available one week before classes begin)