HE RICE INSTITUTE

A UNIVERSITY OF

LIBERAL AND TECHNICAL LEARNING

FOUNDED BY
WILLIAM MARSH RICE
AND DEDICATED BY HIM TO
THE ADVANCEMENT OF LETTERS
SCIENCE AND ART

EDGAR ODELL LOVETT
PRESIDENT

THE BOARD OF TRUSTEES

JAMES ADDISON BAKER : CHAIRMAN
JAMES EVERETT McASHAN : VICE-CHAIRMAN
BENJAMIN BOTTS RICE : SECRETARY-TREASURER
WILLIAM MARSH RICE, JR.
CESAR MAURICE LOMBARDI
EDGAR ODELL LOVETT
JOHN THADDEUS SCOTT

CALENDAR

	1914	
SEPTEMBER	23-26	*Examinations and Registration*
SEPTEMBER	28	*Lectures and Recitations of the Third Session Begin*
NOVEMBER	26	*Thanksgiving Day*
DECEMBER	23	*Autumn Term Ends*
	1915	
JANUARY	4	*Winter Term Begins*
FEBRUARY	22	*Washington's Birthday*
MARCH	2	*Texas Independence Day*
MARCH	20	*Winter Term Ends*
MARCH	22	*Spring Term Begins*
APRIL	21	*San Jacinto Day*
JUNE	9	*Spring Term Ends*

THE RICE INSTITUTE

THE NAME

The new institution bears the name of the founder, the late William Marsh Rice. It aspires to university standing of the highest grade. Dedicated to the advancement of literature, science and art, the educational programme of liberal and technical learning now being developed may justify the designation "Institute" as representing the functions of a teaching university and, at least in some of its departments, those of the more recent research institutions established in this country and abroad.

BRIEF HISTORICAL SKETCH

The Rice Institute was incorporated in 1891 as the William M. Rice Institute for the Advancement of Literature, Science and Art, under a liberal charter granting a self-perpetuating board of seven life trustees great freedom in the subsequent organization of a non-political and non-sectarian educational institution in the city of Houston, Texas. At present this board of trustees consists of the following members: James Addison Baker, Chairman; James Everett McAshan, Vice-Chairman; Benjamin Botts Rice,

Secretary-Treasurer; William Marsh Rice, Jr., Cesar Maurice Lombardi, Edgar Odell Lovett, and John Thaddeus Scott. At the expressed wish of the founder the elaboration of his plans was postponed until after his death, which occurred in 1900 under such circumstances as to involve his estate in long years of litigation. When the trustees came into possession of the full resources of the foundation, which now amount to more than ten million dollars, they invited Dr. Edgar Odell Lovett, Professor in Princeton University, to assist them in formulating and executing the educational programme of the Institute. The President thereupon undertook a year's journey of study which extended from England to Japan; on the completion of this preliminary investigation, a most suitable site of three hundred acres was secured, and to Messrs. Cram, Goodhue and Ferguson, of Boston, was committed the task of designing a general architectural plan consistent with the programme which had been adopted for the Institute.

In 1911, on the seventy-fifth anniversary of Texas Independence, the corner-stone of the Administration Building was laid by the trustees. This building, the Mechanical Laboratory of the Engineering Quadrangle, the Power House, and the first two wings of the Residential Hall for Men have in the meantime been completed. The third wing of this Hall will be ready for occu-

pancy in the coming autumn, while the construction of the Physics Laboratory and Lecture Amphitheatre is about to be completed from plans prepared by Messrs. Cram and Ferguson under the direction of Dr. H. A. Wilson, F. R. S., Professor of Physics in the Institute. The initial building schedule includes also special laboratories for instruction and investigation in chemistry and biology, and in the applications of these sciences to the arts of industry and commerce. In the preparation of preliminary studies for its general building plans the Institute enjoyed the co-operation of an advisory committee consisting of Professor Ames, director of the physical laboratory of the Johns Hopkins University; Professor Conklin, director of the biological laboratory of Princeton University; Professor Richards, chairman of the department of chemistry, Harvard University; and Professor Stratton, director of the National Bureau of Standards.

The actual work of instruction of the first academic year began on the 23rd day of September, 1912, the anniversary of the death of the founder. In the presence of the trustees of the Institute, members of the initial teaching staff, and representative citizens of the community, the first class of students was received in the faculty chamber of the Administration Building with appropriate ceremonies on September the 26th. The scholastic work of the first academic

year was limited to a single class of Freshmen of a standard of preparation as high as the best public and private high schools are capable of producing.

In the early autumn of 1912 an academic festival in observance of the formal opening of the Institute was held under most favorable conditions of weather, most generous co-operation of the community and commonwealth, and the heartening encouragement of several hundred scholars and scientists who came to Houston to assist in the launching of the new university. Chief among these distinguished representatives of life and learning were the twelve foreign savants who had consented to participate in the inaugural programme by preparing series of lectures in the liberal humanities of philosophy, history, letters and art, and in the fundamental sciences of mathematics, physics, chemistry and biology. A complete account of the proceedings occupying the four days devoted to this celebration is now being prepared for publication in permanent form. In these volumes will be published in full the inaugural lectures of Professor Rafael Altamira y Crevea, of Madrid, Spain; Professor Emile Borel, of Paris, France; Senator Benedetto Croce, of Naples, Italy; Professor Hugo de Vries, of Amsterdam, Holland; Professor Sir Henry Jones, of Glasgow, Scotland; Privy Councillor Baron Dairoku Kikuchi, of

Tokyo, Japan; Professor John William Mackail, of London, England; Privy Councillor Professor Wilhelm Ostwald, of Gross-Bothen, Germany; the late Professor Henri Poincaré, of Paris, France; Professor Sir William Ramsay, of London, England; Professor Senator Vito Volterra, of Rome, Italy; Professor Carl Störmer, of Christiania, Norway. There will also appear the responses from American and foreign universities and scientific societies to the invitation of the Institute; the addresses of Governor Colquitt, Chief Justice Brown of Texas, Bishop Gailor of Tennessee, the inaugural ode of Dr. Henry van Dyke of Princeton and the dedication sermon by Dr. Charles F. Aked of San Francisco; together with the addresses delivered by the presidents or other official representatives of Amsterdam, Glasgow, London, Oviedo, Paris, Rome, Baylor, Chicago, Columbia, Lehigh, Princeton, Texas, Vanderbilt and Virginia universities; and a variety of other literary and artistic performances which are not easily classified in so brief a résumé.

THE STAFF OF THE INSTITUTE

For the staff of the Institute the best available instructors are being sought in the hope of assembling in Houston a group of scientists and scholars through whose productive work the new university may come into a place of importance among the estab-

lished institutions of the country. Of those selected for positions on the staff it is possible to announce at this time the following appointments, the names appearing in alphabetical order:

Philip Hechman Arbuckle, B. A. (Chicago), of Georgetown, Texas; Director of Athletics in Southwestern University; to be Instructor in Athletics.

Stockton Axson, Litt. D. (Pittsburgh), L. H. D. (Wesleyan), of Princeton, New Jersey; formerly of the University of Vermont and of Adelphi College; Professor of English Literature in Princeton University; to be Professor of English Literature.

Thomas Lindsey Blayney, M. A. (Centre College), Ph. D. (Heidelberg), of Danville, Kentucky; formerly Professor of European Literature and the History of European Art in Central University of Kentucky; to be Professor of German.

Percy John Daniell, M. A. (Cambridge) of Liverpool, England; Senior Wrangler and Rayleigh Prizeman of the University of Cambridge; Lecturer in Mathematics at the University of Liverpool; to be Assistant Professor of Applied Mathematics.

William Franklin Edwards, B. Sc. (Michigan), of Houston, Texas; formerly Instructor in the University of Michigan, and later President of

the University of Washington; to be Lecturer in Chemistry.

Griffith Conrad Evans, Ph. D. (Harvard), of Rome, Italy; Sheldon Fellow of Harvard University; to be Assistant Professor of Pure Mathematics.

Clyde Chew Glascock, Ph. D. (Johns Hopkins), of New Haven, Connecticut; formerly Fellow of the Johns Hopkins University; Assistant Professor of German in Yale University; to be Assistant Professor of German.

William Caspar Graustein, M. A. (Harvard), Ph. D. (Bonn), of Cambridge, Massachusetts; formerly Sheldon Fellow of Harvard University; Instructor in Mathematics at Harvard University; to be Instructor in Mathematics.

Albert Léon Guérard, B. A. (Paris), Agrégé de l'Université de France, of Palo Alto, California; formerly Junior Professor of French Literature and Examiner in History, State Normal School, Paris; later Instructor in the Romanic Languages at Williams College; Associate Professor of French in the Leland Stanford Junior University; to be Professor of French.

Claude William Heaps, B. Sc. (Northwestern), Ph. D. (Princeton), of Columbia, Missouri; formerly Class of 1860 Experimental Science Fellow of Princeton University; Instructor in Physics at the University of Missouri; to be Instructor in Physics.

Arthur Llewelyn Hughes, B. A., D. Sc. (Cambridge), of Cambridge, England; Research Scholar of Emmanuel College and MacKinnon Student of the Royal Society of London, engaged in scientific work at the Cavendish Laboratory of Cambridge University; to be Assistant Professor of Physics.

Julian Sorell Huxley, M. A. (Oxford), of Oxford, England; Newdigate Prizeman of the University of Oxford; Lecturer in Biology in Balliol College, and Inter-Collegiate Lecturer in Oxford University; to be Assistant Professor of Biology.

Francis Ellis Johnson, B. A., E. E. (Wisconsin), of Houston, Texas; recently with the British Columbia Electric Railway Company; to be Instructor in Electrical Engineering.

Edgar Odell Lovett, Ph. D. (Virginia and Leipsic), LL. D. (Drake and Tulane), of Houston, Texas; formerly Professor of Mathematics in Princeton University, and later Head of the Department of Astronomy in the same institution; President of the Institute; to be Professor of Mathematics.

John Thomas McCants, M. A. (Virginia and Yale), of Houston, Texas; formerly Scholar at the University of Virginia, and University Fellow at Yale University; Secretary to the President; to be Instructor in English.

Edwin Eustace Reinke, M. A. (Lehigh), Ph. D. (Princeton), of Princeton, New Jersey; Charlotte Elizabeth Procter Fellow of Princeton University; to be Instructor in Biology.

William Ward Watkin, B. Sc. (Pennsylvania), M. A. I. A., of Houston, Texas; formerly Scholar in Architecture in the University of Pennsylvania; local representative of Messrs. Cram and Ferguson, the supervising architects of the Institute; to be Instructor in Architecture.

Harold Albert Wilson, F. R. S., D. Sc. (London), of Montreal, Canada; Fellow of Trinity College, Cambridge University; formerly Professor in King's College, London; Research Professor in McGill University; to be Professor of Physics.

SCHOLARSHIPS AND FELLOWSHIPS

While seeking to develop its students in character, in culture and in citizenship, the Rice Institute will reserve for scholarship its highest rewards and in particular for evidences of creative capacity in productive scholarship. To encourage this devotion to learning a series of undergraduate scholarships and graduate fellowships will be devised to be awarded preferably to those students who have been in residence at the Institute for at least one year. Moreover, the varied opportunities for self-help in a growing institution in a large city should aid in enabling any young man

of determination to earn his education in a thoroughly democratic college community. There may thus be realized the founder's desire that the advantages which his philanthropy would make possible should be brought within the reach of the promising student of slender means.

Furthermore, the Institute would interpret in a very large way its dedication to the advancement of letters, science and art. It would not only look to the employment of these disciplines in the development of the life of the individual and in that of the race, but it would also play its part in the progress and enlargement of human knowledge by the contributions of its own resident professors and scholars. Accordingly there should always be associated with the staff of the Institute a group of advanced students in training for careers both as teachers and researchers: with this end in view graduate fellowships will be awarded from time to time to degree-bearing students of the Institute or other educational foundations of similar standing.

To fellowships for 1914-15 the following appointments have already been made:

Charles Epperson, B. A., B. Sc., M. A. (Missouri), Fellow in Mathematics at the University of Missouri; to be Fellow in Mathematics.

Eric Ross Lyon, B. A. (Oklahoma Christian University), special student at the Rice Institute; to be Fellow in Physics.

Joseph Leslie Riley, M. A. (Georgetown), Instructor in Physics at the University of Oklahoma; to be Fellow in Mathematics.

Will McLain Winton, M. Sc. (Vanderbilt), formerly Instructor in Biology at the Agricultural and Mechanical College of Texas; Professor of Biology at Texas Christian University; to be Fellow in Biology.

COURSES OF INSTRUCTION DEGREES

Although it is the policy of the new institution to develop its university programme rather more seriously from the science end, there are also being provided facilities for elementary and advanced courses in the so-called humanities, thereby enabling the Institute to offer both the advantages of a liberal general education and those of special and professional training. Extensive general courses in the various domains of scientific knowledge will be available, but in the main the programme consists of subjects carefully co-ordinated and calling for considerable concentration of study. These programmes have been so arranged as to offer a variety of courses in arts, in science, in letters, and in their applications to the several fields of engineering, domestic arts, and other regions of applied science, leading after four years of undergraduate work to the degree of Bachelor of Arts. Degrees will also be offered in architecture and in chemical, civil, electrical,

and mechanical engineering. Furthermore, for the degrees of Master of Arts, Doctor of Philosophy, and Doctor of Engineering, every facility will be afforded properly qualified graduate students to undertake lines of study and research under the direction of the Institute's resident and visiting professors.

The academic programmes of study leading to the degree of Bachelor of Arts after four years of study are of a common type for the first two years, but for the third and fourth years are differentiated into two forms: first, general courses leading to the degree of bachelor of arts, either with some grade of distinction or without special mention, and second, honours courses leading to the degree with first, second or third class honours. These two types will be referred to in the sequel as general courses and honours courses respectively.

The general course leading to the degree of B. A. has been arranged to give thorough training to those students who are seeking university instruction in literary and scientific subjects either as a part of a liberal education or as preliminary to entering upon a business or professional career. The general course therefore involves the study of several subjects up to a high university standard but does not include a highly detailed specialized study of any one subject such as is necessary before research work or university

teaching can be profitably undertaken. Students wishing to specialize with a view to research work and university teaching may either take an honours course and then proceed by graduate study to the degrees of M. A. and Ph. D., or they may first take a general B. A. course and after completing it proceed by graduate study to the higher degrees.

The attention of students intending to enter the profession of engineering or architecture is called to the great advantages in first taking a general or honours academic course before beginning special study in engineering or architecture. At present the Institute is not offering courses leading to degrees in law and medicine, but students looking forward to such careers will find in the earlier years of the B. A. course all the requirements for admission to many medical and law schools, provided suitable subjects are chosen. However, in view of the fact that several of the leading professional schools are now requiring bachelor degrees for admission, all such students are urged to proceed to this degree before entering upon specialized study preparatory to the practice of their profession.

As has already been intimated the course for the degree of B. A. extends over four years. During the first two years a considerable part of the work is prescribed, while during the last two years each student is allowed within certain re-

strictions, to select the subjects he studies. In the majority of the courses the formal instruction offered consists of three lectures a week together with laboratory work in certain subjects. Examinations are held from time to time and at the end of each term. In determining the standing of a student in each class both his work during the term and the record of his examinations are taken into account. Copies of certain general conditions regulating the standing of students in the classes of the Institute will be handed to candidates for matriculation at the time of their registration.

Of subjects included in the B. A. courses the following are now available.

Group A.	Group B.
1. English	1. Pure Mathematics.
2. French	2. Applied Mathematics.
3. German	3. Physics
4. Spanish	4. Chemistry
5. Economics	5. Biology
6 Education	6. Chemical Engineering
7. History	7. Civil Engineering
8. Philosophy	8. Electrical Engineering
9. Architecture	9. Mechanical Engineering

Instruction in advanced Latin is also offered.

Candidates for the degree of Bachelor of Arts of the Rice Institute will be required to select

studies from the preceding groups according to the yearly programmes exhibited below:

First Year.

(1) Pure mathematics.
(2) English.
(3) A modern language.
(4) A science.
(5) One other subject.

Second Year.

(1) Pure mathematics or a science.
(2) English.
(3) A modern language.*
(4-5) Two other subjects.

* Students who enter with credit in two modern languages may substitute another subject for (3) in the second year.

At the beginning of the third year students may elect to take either a general course or an honours course.

Third Year General B. A. Course.

Four subjects, of which two must have been taken in the second year and one in both first and second. At least one subject from each of the groups A and B must be taken. Students will receive advice in the selection of their subjects.

Fourth Year General B. A. Course.

Four subjects, two of which must have been taken in the third year and one in both second and third or in first and third. At least one subject from each of the groups A and B must be taken.

To students who have completed the general course the B. A. degree will be awarded either with some grade of distinction or without special mention.

The third and fourth year honours courses are intended for students who wish to specialize in particular branches of knowledge with a view to research work or teaching or later professional studies.

In view of these special objects the requirements in such courses will be more severe than in the general courses in the same subjects. For this reason it is recommended that students exercise due caution and seek advice before electing to take an honours course. Only those students who have shown in their first and second years that they are especially well qualified will be permitted to take an honours course. A student proposing to take an honours course must satisfy the department concerned that he is qualified to proceed with the study of that subject. He will be required to take the lectures and practical work provided for honours students in that sub-

ject during each of the two years and in addition certain courses in allied subjects.

Honours courses in mathematics and physics were given during the academic year 1913-14. In 1914-15 honours courses will be available as follows:

(1) Pure and applied mathematics.
(2) Theoretical and experimental physics.

In addition to these the following honours courses will be offered in 1915-16:

(3) Modern languages and literatures.
(4) Biology.
(5) Chemistry.

The following programme of honours courses in physics may be taken as typical of such courses:

Third year, five subjects: (1) mathematics, (2) physics 300, (3) physics 400, (4) physics 410, (5) one other subject.

Fourth year, four subjects: (1) mathematics, (2) physics 410, (3) physics 420, (4) physics 500.

The degree of B. A. with first, second or third class honours will be awarded, at the end of the fourth year, to students who have completed an honours course. Candidates for honours who fail may be excused such part of a general course as may be equivalent to the work they have done.

Candidates for honours who are not making satisfactory progress may be required to discontinue their honours course and may be excused such part of a general course as may be equivalent to the work they have done.

A student who has completed a general or an honours course for the Bachelor of Arts degree may obtain the Master of Arts degree after the successful completion of one year of graduate work. A candidate for the degree of Master of Arts must select a principal subject and will be required to take such courses in that subject and allied subjects as may be determined for each individual case. He may also undertake research work under the direction of the department of his principal subject and must submit a thesis embodying the results of this work.

A student who has completed a general course for the Bachelor of Arts degree may obtain the degree of Doctor of Philosophy after not less than three years graduate study and research work. A student who has obtained the Bachelor of Arts degree with first or second class honours may obtain the Doctor of Philosophy degree after not less than two years graduate study and research work. Candidates for the degree of Doctor of Philosophy must submit a thesis and pass a public examination.

For the academic year 1914-15 graduate

courses will be given in biology, pure and applied mathematics, and theoretical and experimental physics.

SUBJECTS OF INSTRUCTION FOR 1914-15

Among the undergraduate courses offered in the scholastic year 1914-15 it is possible to announce those described below. The numbers designating the courses have the following signification: courses whose numbers begin with 1 are open to all students of the Institute, courses whose numbers commence with 2 are available for sophomores and juniors, those beginning with 3 are open to none but juniors, those beginning with 4 are senior courses. In this connection it should be remarked that seniors will be admitted to the Institute for the first time in 1915-16. Courses whose numbers end in 0 extend throughout the year, those ending in 1, 2, 3, are first, second, and third term courses, respectively. Unless otherwise indicated all courses consist of at least three exercises a week.

English 100. A course in rhetoric, with the use of a text-book, and constant practical exercise in writing. Selected English authors will be read, primarily with the purpose of giving the students some sense of literary values and standards of literary style. It is a course in appreciation and expression.

English 200. A systematic study of the his-

tory of English literature from its beginnings, by the use of text-books and by lectures. In addition to the formal study of the history, there will be a rapid reading of some of the works of various authors who represent various epochs, but the chief emphasis will be put on Shakespeare, who will be studied historically and critically, as the foremost representative of the theatrical stage in the time of Elizabeth and James, and as the supreme dramatic poet of the English-speaking race. There will be a survey of Shakespeare's work in general, and an intensive study of the great tragedies. There will be numerous written themes in connection with the course.

English 300. Restoration and Eighteenth Century English Literature from Dryden through Burns. A study of literary history, showing how changes in the ideals and forms of literature reflect the changes in national life, in politics, society, and philosophy. The course will show how the "Classical" school originated, developed, and prevailed, and how, in turn, it was superseded by the "Romantic" and "Naturalistic" schools. The instruction will be given by lecture, and the reading will be from the dramatists, essayists, novelists, and poets of the period from 1660 to 1800.

The following course may be offered in 1914-15 as a substitute for English 300 above:

English 310. Nineteenth Century English Literature. A study of as many as possible of the representative British and American authors of the century. No text-book will be used, but there will be very extensive reading of the works of the authors themselves and of the most important books of criticism and biography of the authors. The method of instruction will be by lecture. The main historical-literary currents of the century will be explained, and by far the greater stress will be laid on the philosophy and art of the individual authors.

French 100. Elementary French. A general introductory course, in which the method adopted is based on extensive and rapid reading, without sacrificing the study of syntax and the practice of conversation.

French 200. Second Year French. Syntax, composition, conversation based on rapid reading, and general survey of French literature.

French 210. History of French Civilization. A general survey of political, social and cultural conditions in France from the Roman conquest to the present day. Lectures in English. Assigned readings, essays, reports and debates. For this subject a good working library has been installed.

French 300. Third Year French. Advanced syntax, lectures, discussions and readings on Classical French Literature (XVI-XVII-XVIIIth centuries).

French 400. Fourth Year French. Composition (themes and essays); literary translation; lectures, discussions and readings on XIXth century literature.

German 100. Elementary German. Grammar, reading, conversation and composition. Collateral reading in history. Open to Freshmen and advanced students beginning German.

German 200. Second Year German. Historical, descriptive and narrative prose. Elements of the history of German civilization. Lectures and collateral reading. Open to advanced students who are continuing German or to Freshmen who have presented intermediate German for entrance.

German 300. Third Year German. The literature and civilization of the eighteenth and nineteenth centuries in Germany. Written reports in German, lectures, and collateral reading. Advanced course open to students who have had the equivalent of the two preceding courses.

German 310. Third Year German. Alternate course. The Middle High German Epic. Introduction to the literature of chivalry. Advanced course for students who desire to specialize in German.

Spanish 300. Elementary Spanish. Grammar, composition and reading from modern Spanish authors. Stress is laid on accurate pronunciation, Castilian being the standard, on the

essentials of grammar and on careful translation into idiomatic English of simple Spanish prose.

Spanish 310. Advanced Spanish. General survey of Spanish literature and in particular the literature of the Golden Age with extensive readings from Cervantes, Calderón, and Lope de Vega.

Mathematics 100. Trignometry, Analytic Geometry, Introduction to Calculus, constituting the Freshman course in mathematics which is required of all students in the Institute.

Mathematics 200. Differential and Integral Calculus. This course, including derivatives, integrals, differentials with their applications to geometry and mechanics, infinite series, Taylor's theorem, partial derivatives, is the foundation of theoretical physics and advanced mathematics, and the ideas introduced are of great importance in many branches of modern thought.

Mathematics 210. Differential and Integral Calculus. This course covers the ground of course 200 in mathematics, and in addition the subject of integration of functions of several variables. It will be more complete than the preceding course, and is intended for students who have greater facility in mathematical reasoning. It is a sufficient introduction to courses 300 and 310 in mathematics, and is open to students who

obtain high grades in mathematics 100 or otherwise satisfy the instructor of their fitness to take the course.

Mathematics 220. Modern Geometry and Algebra. Introduction to modern methods in geometry and algebra, including abridged notation and the theory of transformation and invariants.

Mathematics 300. Advanced Calculus and Differential Equations. Differentiation and integration of functions of several variables; surface and volume integrals, introduction to the theory of differential equations. This course or mathematics 310 should be taken by students whose major interest lies in physics or engineering; it is open to those who pass successfully in courses 200 or 210 in mathematics.

Mathematics 310. Theory of Functions of a Real Variable. Surface and volume integrals; introduction to the theory of differential equations and integral equations, with applications of the theory of sets of points; the Lebesgue integral; trigonometric series. Open to those who satisfy the instructor of their fitness to take the course.

Mathematics 320. Theory of Functions of a Complex Variable. This course is given in alternate years with course 310 to those students who satisfy the instructor that they are prepared to take the course. It has the same requirements for admission, but is not to be given in 1914-15.

Applied Mathematics 200. Theoretical Mechanics. Mathematical theory of the fundamental principles with applications to machines and structures.

Applied Mathematics 300. Mechanics of Elastic Bodies and Fluids. The bending and vibrations of elastic bodies, the motion of fluids and waves considered by means of harmonic functions. Open to those who satisfy the instructor that they are prepared to take the course.

Applied Mathematics 310. Mechanics of Rigid Bodies and General Analytical Dynamics. In this course the method of generalized co-ordinates, Lagrange's equations, and Hamilton's Principle will be applied to the problems of rotating rigid bodies, celestial bodies and to general theoretical physics. This course is given in alternate years with course 300 in applied mathematics to those students who satisfy the instructor of their fitness to take the course.

Physics 100. A course of three lectures a week on heat, light, sound and experimental dynamics. The lectures are fully illustrated by experiments.

Physics 200. A course of three fully illustrated lectures on electricity and magnetism and three hours of practical work per week. In the practical class experiments on mechanics, heat, light, sound, electricity and magnetism will be carried out by the students.

Physics 300. A course of three lectures and three hours practical work per week on elementary properties of matter, thermodynamics, theory of vibrations and physical optics. The theory of the experiments to be done in the laboratory will be discussed in the lectures.

Physics 400. A course of three lectures and three hours practical work chiefly on electricity and magnetism.

Physics 410. Physics Colloquim. One meeting a week at which researches in physics will be discussed. Honours course.

Physics 420. This course consists of about nine hours a week practical work on exact measurements in all branches of physics. Honours course.

Physics 500, 510. A course consisting of three lectures a week extending over two years on various modern developments in physics, including theory of heat conduction, advanced thermodynamics, electromagnetic theory of light, discharge of electricity through gases, Roentgen rays, electrical properties of flames and hot bodies, photo-electricity, theory of radiation, electron theory of properties of insulators and conductors, and constitution of matter. Honours and graduate course.

Chemistry 100. Elementary Theoretical Chemistry. A general course with lectures, recitations, and laboratory work.

Chemistry 200. Analytical Chemistry, Quantitative and Qualitative Analysis. Laboratory work with lectures and recitations.

Chemistry 300. Chemistry of the Carbon Compounds and the Elements of Electrochemistry.

Chemistry 310. Advanced Analytical Chemitsry with special reference to Industrial Chemistry.

Chemistry 320. A course on the metallurgy of iron and steel.

Biology 100. General Biology. This course will include a general study of the origin and constitution of living matter; the differences between animals and plants; the fundamentals of morphology and physiology as illustrated by selected animal types; the development of the individual and of the race; together with a brief introduction to such biological ideas as are of general interest. The course is planned to meet the needs not only of those who intend to continue the study of biology, but also of those who wish to specialize in other branches, but yet are desirous of getting some general knowledge of the subject. It is a prescribed subject for those who wish to enter a medical college later, and it is thought that it will prove valuable to those intending to study theology, philosophy, psychology, economics, or agriculture.

Biology 200. Cellular Biology. This course will be more specialized in character. It is intended primarily for those students who wish to continue biological work. In it will be considered the structure and reproduction of cells; the physical basis of reproduction and the cytological mechanism of heredity; experimental embryology and regeneration. In the laboratory students will have an opportunity of studying living and prepared specimens illustrating the course, and to become acquainted with some of the methods of modern biological experiment and technique.

Biology 300. Principles of Morphological Zoology.

Biology 400. Evolution and Heredity.

Economics 200. Elements of Economics. An introduction to the fundamental theories of economics and to their applications, with especial reference to the problems of money, banking, transportation, international trade, and monopoly.

Economics 300. Financial History of the United States. An account of the history of American public finance including the currency, banking institutions and administration, the principles of taxation, the government revenue system, the tariff, and the national debt.

Education 101. A course in the psychology of education, offered during the first term of the academic year.

Education 102. A course in the principles of education, for which Education 101 is a prerequisite.

Education 103. A course in the practice of education, which concludes a year's work offered to meet the requirements for a first grade State teacher's certificate.

In 1915 further courses will be available in the history and philosophy of education. These courses will be supplemented from year to year in order that Bachelors of Arts of the Institute who so desire may come into a permanent State certificate on graduation from the Institute.

History 100. European History. A general survey of the intellectual, social and political development of Europe from the fourth to the nineteenth century. Lectures and required reading.

History 200. Constitutional Government in Europe and America. The origins and operation of constitutional government, the formulation of public policy and the conduct of public business, with especial reference to the political institutions of England and the United States. Lectures and required reading.

Philosophy 200. Logic. A course in deductive and inductive logic together with training in clear, consistent thinking and efficient argumen-

tation. This course is especially recommended to Juniors in 1914-15.

Philosophy 300. Historical Introduction to Philosophy. In this course the student will be introduced by means of lectures and assigned readings to the problems, development and significance of philosophic thought. A survey will be made of the essential features and main currents of the history of philosophy, ancient and modern.

Philosophy 311, 312. A course dealing with the origin and development of moral ideals, the essentials of ethical theories, and the problem of morality, individual and social, at the present time.

Philosophy 313. A course on the philosophic currents in modern literature, tracing in particular the influence of romanticism, idealism, realism, materialism, naturalism, and symbolism.

COURSES IN ENGINEERING

Courses will be offered in chemical, civil, electrical and mechanical engineering. A complete course in any one of these branches will extend over five years. A student who has successfully completed the first four years of a course will be awarded the degree of B. A., and after successfully completing the remaining year of his course he will be awarded an engineering degree. The work of the first three

years will be the same for all students, but in the last two years each student will be required to select one of the special branches mentioned above.

The work of the first two years will consist chiefly of courses in pure and applied mathematics, physics, chemistry, and other subjects, an adequate knowledge of which is absolutely necessary before the more technical courses can be pursued with advantage. During the first two years, however, a considerable amount of time will be devoted to engineering drawing and the elements of surveying.

Technical work will begin in the third year with courses of a general character in mechanical engineering, civil engineering and electrical engineering, all three to be taken by all engineering students, including those in chemical engineering. These courses will form an introduction to the technical side of each branch and should enable students intelligently to select a particular branch at the beginning of their fourth year.

In the third year instruction will also be begun in shopwork. The classes in shopwork are intended to give familiarity with workshop methods. The object of these classes is not primarily to train students to become skilled mechanics, but to provide such knowledge of shop methods as is desirable for those who may be expected as engineers to employ mechanics and to superintend

engineering shops. It is intended in the engineering courses to pay special attention to the theoretical side, because experience has shown that theoretical knowledge is difficult to obtain after leaving the university, and without it a rapid rise in the profession of engineering is almost impossible. On the other hand, it is not intended to disregard practical instruction, for this reason the last three years will include besides shopwork a variety of practical work in engineering testing laboratories. It is recommended that students obtain employment in engineering work during the summer vacations, for it should be remembered that no amount of university work can take the place of practical experience in engineering establishments and in the field. The courses in engineering are not intended to take the place of learning by practical experience, but are designed to supply a knowledge of the fundamental principles and scientific methods on which the practice of engineering is based and without which it is difficult, if not impossible, to succeed in the practice of the profession.

Students who can afford the time are recommended to devote three or four years to preliminary work instead of two, taking the B. A. at the end of four years and an engineering degree at the end of six or seven years. Students proposing to do this are advised to take a course devoted largely to mathematics, physics, and

chemistry, or an honours course in either mathematics, physics, or chemistry. The subjects taken during the years of preparatory work must include those of the first two years in the general engineering course, which may be substituted for options in the academic B. A. course. The honours course in physics is strongly recommended for those who wish to become either electrical or mechanical engineers.

The following are the schedules for the five-year course leading to the B. A. degree in four years and an engineering degree in five years:

First Year.

(1) Mathematics.
(2) Physics.
(3) English.
(4) French or German.
(5) Engineering Drawing.*

* NOTE.—Engineering Drawing includes (a) Freehand drawing, (b) Mechanical drawing, (c) Descriptive geometry, (d) Graphic statics, (e) Mapping.

Second Year.

(1) Mathematics.
(2) Mechanics.
(3) Physics.
(4) Chemistry.
(5) Engineering Drawing and Surveying.

Third Year.

(1) Mathematics.
(2) Mechanical Engineering.
(3) Civil Engineering.
(4) Electrical Engineering.
(5) Shopwork.

Fourth and Fifth Years.

Each student must select a course in one of the following special branches:

(a) Mechanical Engineering.
(b) Electrical Engineering.
(c) Civil Engineering.
(d) Chemical Engineering.

Each of these courses will include both lectures and laboratory work. More specific details will be announced later.

COURSES IN ARCHITECTURE

To students of architecture the Institute offers a full course extending over five years, leading to the degree of B. A. at the end of the fourth year and to an architectural degree at the end of the fifth year. It is the purpose of the course in architecture to lead men during their residence to a comprehensive understanding of the art of building; to acquaint them with the history of architecture from early civilization to the present age; and to develop within them an under-

standing and appreciation of those conceptions of beauty and utility which are fundamental to the cultivation of ability in the art of design.

In arranging the courses which follow it will be observed that there are included certain indispensable elements of a liberal education and also such engineering and technical subjects as are becoming more and more necessary to the general education of a practicing architect. Of the more strictly architectural subjects, design is given by far the largest place. As a matter of fact the courses in history and design and those in free-hand drawing, in water colour, in drawing from life, and in historic ornament have all a double object; to create in the student an appreciation of architectural dignity and refinement and to increase constantly his ability to express conceptions of architectural forms. Accordingly the training of the student must not be limited to the training in draftsmanship alone, but all courses should conspire to the cultivation of creative and constructive ability in expression and design. With a view to keeping the student in touch with the progress of his profession and with the daily routine and detail of its practice, it is strongly recommended that he spend his summer vacations in the office of some practicing architect.

The following are the schedules for the five-year course leading to the B. A. degree in four years and a degree in architecture in five years:

First Year.

(1) Pure Mathematics.
(2) English.
(3) A modern language (French recommended).
(4) A science (Physics or Chemistry recommended).
(5) Architectural subjects: architectural drawing, elements of architecture, freehand drawing, shades, shadows and perspective.

Second Year.

(1) Pure Mathematics.
(2) English.
(3) A modern language.*
(4) A science.
(5) Architectural subjects: design, antique drawing, water colour, history of architecture.

* Students who enter with credits in two modern languages may substitute another subject.

Third Year.

(1) English.
(2) History or Economics.
(3) Architectural subjects: design, antique drawing, water colour drawing, history of architecture, pen and ink rendering, mechanics.

Fourth Year.

Architectural subjects: design, construction, water colour drawing, pen and ink rendering, drawing from life, history of architecture, historic ornament, special lectures.

Fifth Year.

Architectural subjects: design, construction, water colour drawing, drawing from life, history of architecture, architectural practice, special lectures.

LIBRARY

Quarters for the Library of the Institute have been provided on the second floor of the Administration Building. In its initial equipment the policy is being followed of providing such books as are necessary to supplement the courses of instruction and to support the independent investigations of the staff and advanced students. In this manner a high degree of efficiency becomes possible at the very beginning of the Library's existence. Moreover, for works of general and more popular interest the shelves of the Carnegie Library of Houston are accessible to all members of the Institute.

LABORATORY INSTALLATION

The equipment for work in physics, chemistry and biology was temporarily housed during the past session in the mechan-

ical building which constitutes the first wing of the Engineering Quadrangle. For chemistry there was set aside on the second floor space for a students' laboratory, a lecture room fitted for purposes of instruction, and two chemical supply rooms. The laboratory and lecture room are completely equipped with new and approved apparatus, much of which has been imported. For biology similar appointments in the way of laboratory research and lecture rooms were provided. For physics three rooms were fitted up as a lecture room, an elementary teaching laboratory, and a workshop and research laboratory respectively. The lecture room has seats for about ninety students, and is provided with a lecture table to which direct and alternate currents, gas, water and steam are applied. A Bausch and Lomb convertible balopticon is provided for projection of slides and experiments. A large amount of lecture apparatus has been purchased from various firms in the United States, England and Germany. The collection of lecture apparatus includes all the latest forms of demonstration apparatus for experiments on mechanics, sound, light, heat, electricity and magnetism. The workshop in which a machinist and a glassblower are now employed is fitted up for the repair and manufacture of scientific apparatus. Many pieces of apparatus for use by the students have already been made in this shop.

With the beginning of the coming academic year the new Physics Buildings will be ready for occupancy. They stand upon the north side of the academic court adjoining the Administration Building and are connected to it by a continuation of the original cloister. The Physics Laboratory proper is a two-story building 275x56 feet, connected with a large Lecture Amphitheatre, 121x72 feet. These laboratories will contain among other rooms three large lecture rooms fitted with special lecture tables completely equipped for all kinds of experimental demonstrations. There are also two class-rooms for 120 students each. For practical classes, four laboratories are provided with a total floor space of 10,000 square feet. The building also contains seven specially equipped research rooms, three dark rooms for optical work, battery, liquid air, and constant temperature rooms, and a workshop. All laboratories, lecture rooms, and research rooms are provided with individual service for the students of gas, water, steam, compressed air, vacuum, and both direct and alternating currents of electricity. The building is constructed of brick and marble, corresponding in design to the style as defined in the Administration Building, but of a simpler character, and expressing its purpose as a laboratory building. While these buildings are designed entirely for the use of the physics department, the west end

of the building will be used for the present by the department of electrical engineering. At the service of other departments also will be placed the lecture hall of the amphitheatre wing which has been specially equipped for public scientific lectures. It has seating capacity for more than four hundred auditors, and is arranged with seats properly elevated to command a 28-foot lecture table.

REQUIREMENTS FOR ADMISSION

Candidates for admission to the Institute who present satisfactory testimonials as to their character will be accepted either upon successful examination in the entrance subjects or by certificate of graduation from an accredited public or private high school. The standard requirements for matriculation are determined by the system of units given below. A unit represents a course of study pursued five hours a week for an academic year. Fourteen such units are required for entrance in full standing to the Freshman class of the Institute. A candidate offering twelve units may be accepted with conditions, but all deficiencies must be removed before the student will be recognized as a candidate for any degree.

From the following list every candidate will be required to present three units in English, two and one-half units in mathematics, two units in history, and three units in foreign languages. For

the present, in the case of mature candidates whose preparation has not been adequate, compliance with the requirements in foreign languages may be temporarily deferred, but every such candidate will be expected to remove all language conditions within two years.

LIST OF SUBJECTS WITH VALUES IN UNITS

Botany 1; Chemistry 1; English (Reading and Practice 2, Study and Practice 1); French (Elementary 2, Intermediate 1); German (Elementary 2, Intermediate 1); Greek (Grammar and Elementary Prose Composition 1, Xenophon 1, Homer—*Iliad,* Books I-III 1); History (Ancient 1, Mediaeval and Modern 1, English 1, American 1); Latin (Grammar, Elementary Prose Composition and Caesar 2, Cicero 1, Vergil 1); Mathematics (Algebra 1½, Plane Geometry 1, Solid Geometry ½, Trigonometry ½); Spanish (Elementary 2, Intermediate 1); Physics 1; Physical Geography ½; Physiology ½; Zoology 1. Substitutes for certain of these subjects may be considered in individual cases.

The terms of admission to the Institute are based on the recommendations of the Carnegie Foundation for the Advancement of Teaching as expressed in the Documents of the College Entrance Examination Board. Complete information with respect to further details of these re-

quirements will be forwarded by the Institute to any candidate upon receipt of a request addressed to the Office of the President.

EXPENSES

There will be no charge for tuition and no fees for registration or examination in the Institute. A small deposit will be required to cover possible breakage in the laboratories and losses from the libraries; the balance from this contingent fee is, of course, returnable at the close of the session.

ARRANGEMENTS FOR RESIDENCE

Rooms in the Residential Hall for Men completely furnished exclusive of linen, together with table board at the Institute Commons may be had at prices ranging from twenty to twenty-four dollars a month of four weeks. The rooms will be let in the order of applications received. Diagrams showing the floor plans will be sent on request to anyone who may be interested. Accommodations for the residence of young women on the university grounds will not be offered during the coming year. The Residential Hall for Men is of absolutely fireproof construction, heated by steam, lighted by electricity, cleaned by vacuum apparatus, and equipped with the most approved form of sanitary plumbing, providing adequate bathing facilities on every floor.


THE ACADEMIC SEAL OF THE RICE INSTITUTE
SCIENCE
LETTERS
ART