NOTES.

AT the meeting of the London Mathematical Society held on April 13 the following papers were read: By Mr. P. W. WOOD, "On irreducible Jacobians of degree six"; by Mr. A. E. WESTERN, "On Fermat's numbers and the converse of Fermat's theorem"; by Professor A. E. H. LOVE, "On the strains that accompany bending"; by Dr. W. H. YOUNG, "On limiting sets of points in linear continua."

AT the meeting of the National academy at Washington, D. C., April 18–20, Professor M. I. PUPIN, of Columbia University, was elected to membership. No mathematical papers were presented at the meeting.

AT a recent meeting of the Institute of France, it was voted to make the following appropriations from the Debrousse legacy: 5000 francs for computing and compiling the lunar tables, 5000 francs to support the *Journal des savants*, and 3000 francs for preparing a catalogue of the works of Leibniz.

BEGINNING with the current volume 76, the *Proceedings* of the Royal Society of London are issued in two series, Series A containing the mathematical and physical papers, and Series B the biological papers. At the same time the size of the page has been increased to royal octavo, and the journal is printed in larger type.

AMONG the forthcoming books announced by Ginn and Company we notice the Theory of functions of real variables by Professor JAMES PIERPONT. The work consists of two volumes, the first of which is now in press; it will probably appear about August 1. The first volume is devoted to the foundations of the differential and integral calculus, and treats of the more important topics with great rigor and generality. The theory of irrational numbers introduced by Cantor and Dedekind is developed at considerable length, and the more elementary properties of point aggregates are freely used.

MR. M. M. DAWSON, consulting actuary of New York City, recently gave a series of lectures at the University of of Michigan in connection with the courses in insurance mathematics on the following subjects: pension funds, service pensions, mutual employees' insurance, fraternal insurance, and the history of the mathematics of insurance.

THE various American universities offer advanced courses in mathematics for the year 1905–1906 as follow:

BRYN MAWR COLLEGE. — By Professor CHARLOTTE A. SCOTT: Algebraic invariants, with applications, two hours; Modern analytic geometry, two hours. — By Mr. J. E. WRIGHT: Linear ordinary differential equations, two hours; Higher analysis, two hours. — By Dr. ISABEL MADDISON: Analytic geometry of space, one hour. The journal club will meet fortnightly.

UNIVERSITY OF CALIFORNIA. — By Professor I. STRINGHAM: Quaternions, three hours; Logic of mathematics, three hours; Seminar, two hours. — By Professor G. C. EDWARDS: Differential equations, three hours. — By Professor M. W. HASKELL: Analytic geometry, three hours; Algebraic forms and geometric transformations, three hours. — By Professor E. J. WILCZYNSKI: Projective differential geometry, three hours. — By Professor C. A. NOBLE: Calculus of variations (first half year) three hours; Theory of differential equations (second half year), three hours. — By Professor A. W. WHITNEY: Analytic geometry of three dimensions (second half year), three hours; Calculus of finite differences, two hours; Theory of probabilities, three hours. — By Professor D. N. LEHMER: Theory of equations, three hours. — By Dr. T. M. PUTNAM: Synthetic geometry, three hours; Theory of numbers, three hours. — By Dr. J. H. MCDONALD: Theory of functions of a real variable, three hours. — By Dr. B. L. NEWKIRK: Theory of complex functions, three hours.

UNIVERSITY OF CHICAGO, Summer quarter (June 17 to September 1, 1905). — By Professor O. BOLZA: Theory of functions of a complex variable; Selected chapters in the theory of functions. — By Professor H. MASCHKE: Advanced calculus; Differential geometry. — By Professor J. W. A. YOUNG: Critical review of secondary mathematics, for teachers. — By Professor L. E. DICKSON: Theory of numbers. Each course is five hours per week.

COLUMBIA UNIVERSITY. — By Professor T. S. FISKE: Advanced calculus, introduction to the theory of functions of a real variable, three hours; Theory of functions of a complex variable, three hours. — By Professor F. N. COLE: Theory of groups, three hours; Theory of plane curves, three hours. —

By Professor D. E. SMITH: History of mathematics, two hours. — By Professor JAMES MACLAY: Applications of the calculus to the theory of surfaces and curves in space, three hours. — By Professor C. J. KEYSER: Modern theories in geometry, three hours. — By Professor H. B. MITCHELL: Introduction to the calculus of quaternions, three hours. — By Dr. G. H. LING: Infinite series and products.—By Dr. EDWARD KASNER: Differential equations and continuous groups.

The department of physics offers a two years' cycle of courses in mechanics and mathematical physics as follows: By Professor M. I. PUPIN: Theory of the potential function, two hours; Partial differential equations of physics, two hours; Special problems, hydrokinetics, two hours. — By Professor A. P. WILLS; Mechanics, theory of elasticity, two hours; Electricity and magnetism, electromagnetic theory of light, two hours; thermodynamics, two hours, first half-year.

CORNELL UNIVERSITY. — By Professor L. A. WAIT: Differential calculus, two hours; Analytic geometry three hours. — By Professor G. W. JONES: Algebra, three hours. — By Professor J. MCMAHON: Theory of potential and spherical harmonics, three hours; Mechanics, two hours. — By Professor J. I. HUTCHINSON: Projective geometry, three hours; Infinite series and products, two hours. — By Professor V. SNYDER: Differential equations, two hours; Algebraic twisted curves, two hours. — By Dr. W. B. FITE: Definite integrals, two hours; Theory of functions, three hours. — By Dr. C. N. HASKINS: Theory of invariants, three hours; Calculus of variations, two hours; Differential equations, II, two hours. The Oliver mathematical club will meet fortnightly.

UNIVERSITY OF ILLINOIS. — By Professor S. W. SHATTUCK: Differential equations and calculus of variations, three hours.— By Professor A. N. TALBOT: Analytic mechanics, four hours. By Professor E. J. TOWNSEND: Theory of functions of a real variable, three hours; Solid analytic geometry (second semester), three hours; Seminar, three hours. — By Professor A. G. HALL: Potential function and spherical harmonics, three hours; Determinants, two hours. — By Professor H. L. RIETZ: Theory of invariants and higher plane curves, three hours. — By Professor J. STEBBINS: Least squares (first semester), two hours. — By Dr. H. L. COAR: Modern geometry and algebraic surfaces, three hours. — By Mr. E. L. MILNE: Mathematical theory of statistics (second semester), four hours.

INDIANA UNIVERSITY. — By Professor R. J. ALEY: Algebraic invariants (fall and winter terms), three hours; Theory of numbers (spring term), three hours; Ordinary differential equations (fall term), five hours. — By Professor S. C. DAVISSON: Modern geometry (fall and winter), two hours; Theory of surfaces (winter and spring), three hours. — By Professor D. A. ROTHROCK: Partial differential equations (fall aud winter), three hours; Theory of functions (winter and spring), three hours. — By Professor U. S. HANNA: Groups of substitutions and Galois's theory (fall and winter), two hours.

STATE UNIVERSITY OF IOWA. — By Professor L. G. WELD: The general theory of functions, two hours; Least squares (first semester), two hours; Elliptic integrals and functions (second semester), two hours; Fourier's series and spherical harmonics, two hours. — By Professor J. V. WESTFALL: Advanced calculus, three hours; Differential equations from the standpoint of the theory of functions, two hours. — By Dr. E. L. DODD: Vector analysis (first semester), two hours; Non-euclidean geometry (second semester), two hours. The mathematical seminar meets one evening each week.

UNIVERSITY OF MICHIGAN. — By Professor W. W. BEMAN: Solid analytic geometry, two hours; Higher plane curves (second semester), two hours; Differential equations (first semester), three hours; Linear differential equations (second semester), two hours; Quaternions (second semester), two hours; Seminar, two hours. — By Professor A. ZIWET: Projective geometry, three hours; Harmonic analysis, two hours; Advanced mechanics (second semester), three hours; Theory of potential (first semester), three hours. — By Professor J. L. MARKLEY: Theory of functions, three hours; Advanced theory of functions, two hours. — By Professor J. W. GLOVER; Higher algebra, three hours; Theory of annuities and insurance, two hours. — By Dr. A. B. PIERCE; Differential geometry, three hours. — By Mr. E. B. ESCOTT: Theory of numbers, two hours.

UNIVERSITY OF MISSOURI. — By Professor E. R. HEDRICK: Theory of functions, three hours; Advanced calculus, three hours; Higher analysis, three hours. — By Professor L. M. DEFOE: Analytic mechanics, three hours; Fourier's series and potential function, three hours. — By Professor G. A. BLISS: Differential geometry, three hours; Theory of groups,

three hours. — By Dr. L. D. AMES : Infinite series and products, three hours ; Galois's theory of substitutions, three hours. — By Mr. L. INGOLD : Theory of equations and determinants, three hours ; Elements of projective geometry, three hours ; Elements of differential equations, three hours.

UNIVERSITY OF NEBRASKA. — By Professor E. W. DAVIS : Theory of surfaces, two hours ; Pure mathematics, two hours. — By Professor CANDY : Differential equations, three hours ; Mathematical pedagogy, three hours. — By Professor C. ENGBERG : Theory of probabilities (second semester), three hours ; Algebra of quantics, three hours, or Higher plane curves, two hours ; Biometry, I, two hours. — By Miss I. SINCLAIR : Geometry of position, three hours, or Calculus of variations, two hours.

UNIVERSITY OF PENNSYLVANIA. — By Professor E. S. CRAWLEY : Higher plane curves, three hours ; Solid analytic geometry, two hours. — By Professor G. E. FISHER : Advanced calculus, two hours ; Invariants and covariants (first half year), three hours ; Linear differential equations (second half year), three hours. — By Professor I. J. SCHWATT : Theory of functions of a real variable, three hours ; Infinite series and products, three hours. — By Professor G. H. HALLETT : Theory of groups, three hours ; Calculus of variations (first half year), two hours ; Lie's theory of continuous groups (second half year), two hours. — By Dr. B. S. EASTON : Algebra (in German), two hours ; Theory of higher equations, two hours ; Elementary divisors and group characters, two hours. — By Dr. F. H. SAFFORD : Curvilinear coördinates and orthogonal transformations with applications to the theory of potential, three hours.

Summer session (July 5 to August 12, 1905). Each course will be given five hours per week. — By Professor E. S. CRAWLEY : Theory of numbers. — By Professor G. E. FISHER : Invariants and covariants. — By Professor I. J. SCHWATT : Definite integrals. — By Professor G. H. HALLETT : Theory of abstract groups. — By Dr. F. H. SAFFORD : Differential equations.

SYRACUSE UNIVERSITY. — By Professor W. H. METZLER : Analytic geometry (first semester), three hours ; Modern geometry (second semester), three hours ; Newtonian potential

and spherical harmonics, three hours; General theory of functions, three hours; Determinants, three hours; Elliptic integrals and elliptic functions, three hours. — By Professor E. D. ROE: Theory of invariants and covariants, three hours; Theory of substitutions, three hours; Advanced calculus (first semester), three hours; Differential equations (second semester), three hours; Analytic mechanics, three hours; Theory of equations, two hours; Analytic trigonometry (first semester), one hour; Determinants (second semester), one hour. — By Professor W. G. BULLARD: Projective geometry (first semester), three hours; Higher plane curves (second semester), three hours; Twisted curves and general theory of surfaces, three hours.

UNIVERSITY OF WISCONSIN. — By Professor C. A. VAN VELZER: Differential equations, three hours; Analytic geometry, three hours. — By Professor C. S. SLICHTER: Theoretic mechanics, three hours; Theory of probabilities (second semester), two hours; Hydrodynamics, two hours. — By Professor E. B. SKINNER: Geometry of three dimensions, two hours; Advanced calculus, two hours; Twisted curves and surfaces (first semester), three hours; Quaternions (second semester), three hours: Seminar in groups, two hours. — By ————————: Projective geometry, two hours.

DURING the present summer semester the various foreign universities offer the following courses in mathematics:

UNIVERSITY OF COPENHAGEN (February to June). — By Professor T. N. THIELE: Numerical calculation, four hours. — By Professor H. G. ZEUTHEN: Calculus, six hours; Homogeneous coordinates, one hour; exercises in the history of mathematics, one hour. — By Professor J. PETERSEN: General theory of groups, four hours. — By Professor N. NIELSON: Theory of gamma functions, four hours. — By Dr. C. JUEL: Algebraic and graphic curves, two hours. — By Dr. P. HEEGAARD: Hydrodynamics, two hours.

UNIVERSITY OF CZERNOWITZ. — By Professor D. v. STERNECK: Differential and integral calculus, II, two hours; Theory of functions, three hours; Seminar, two hours.

UNIVERSITY OF GENEVA. — By Professor C. CAILLER: Differential and integral calculus, three hours; Rational mechanics, II, two hours; Seminar, two hours. — By Professor

H. FEHR; Descriptive and projective geometry, two hours; Theory of algebraic equations, two hours; Seminar, two hours. — By Dr. R. DE SAUSSURE: Geometry of motion, two hours. — By Dr. D. MIRIMANOFF: Theory of potential, two hours.

UNIVERSITY OF GRAZ. — By Professor J. FRISCHAUF: Higher analysis with applications to geometry, five hours. — By Professor K. V. v. DANTSCHER: Elements of the theory of functions, and differential calculus, five hours; Seminar, two hours. — By Professor J. STREISSLER: Descriptive geometry, IV, three hours.

UNIVERSITY OF INNSBRUCK. — By Professor O. STOLZ: Theory of real numbers as introduction to the differential calculus, four hours; Theory of functions of a complex variable, one hour; Seminar, two hours. — By Professor K. ZINDLER: Differential equations, three hours; Theory of surfaces, four hours. — By Professor MENGER: Projective geometry, two hours.

GERMAN UNIVERSITY OF PRAGUE. — By Professor G. PICK: Differential and integral calculus, II, four hours; Concept of number and limit, one hour; Seminar, two hours. — By Professor J. GMEINER: Analytic geometry of space, five hours.

UNIVERSITY OF VIENNA. — By Professor G. v. ESCHERICH: Theory of functions, five hours; Theory of probabilities, three hours; Proseminar, one hour; Seminar, one hour. — By Professor F. MERTENS: Algebra, II, five hours: Theory of statistics, three hours; Seminar, two hours; Proseminar, one hour. —By Professor W. WIRTINGER: Differential and integral calculus, five hours; with exercises, two hours; Seminar, two hours; Proseminar, one hour. — By Professor G. KOHN: Synthetic geometry, II, four hours; with exercises, one hour; Non-euclidean geometry, three hours. — By Dr. A. TAUBER: Mathematics of insurance, II, six hours.—By Dr. E. BLASCHKE: Mathematics of statistics, II, three hours.— By Dr. K. CARDA: Linear continuous groups, two hours. — By Dr. J. PLEMELJ: Hypergeometric differential equations, two hours. — By Dr. W. GRÜNWALD: Line geometry, II, two hours.

PROFESSOR F. LINDEMANN, of the University of Munich, has been decorated with the order of St. Michael, of the third class.

PROFESSOR ERNEST LEBON has been elected a corresponding member of the academy of sciences of Lisbon.

PROFESSOR M. DISTELI, of the University of Strassburg, has been appointed professor of descriptive geometry at the technical school at Dresden.

PROFESSOR F. SCHILLING, of the new technical school of Danzig, has declined the call to the technical school at Charlottenburg.

AT the University of Bern, Dr. PEXIDER has been appointed docent in the theory of numbers.

DURING December, 1905, a course of fifteen lectures will be delivered at Columbia University by Professor V. F. BJERKNES, of the University of Stockholm, on "Fields of force," including the discussion of the hydrodynamic analogues of the electrostatic and electromagnetic fields.

A similar course will be delivered in March and April, 1906, by Professor H. A. LORENTZ, of the University of Leyden, on "Extensions of Maxwell's electromagnetic theory of light, and the dynamics of the electron."

These courses are open, without charge, to all teachers and advanced students of physics who may desire to attend. Exact dates and other details may be obtained hereafter on application to the secretary of Columbia University.

DURING Professor E. B. VAN VLECK'S absence in Europe the mathematical department at Wesleyan University will be in charge of Professor J. M. VAN VLECK. Dr. B. C. EUER and Mr. L. A. HOWLAND have been appointed instructors in mathematics.

PROFESSOR J. H. TANNER has been granted leave of absence from Cornell University for next year. Mr. W. H. CARRUTH and Mr. E. C. COLPITTS have been appointed assistants in mathematics.

AT the Massachusetts Institute of Technology, associate professor D. P. BARTLETT has been promoted to a full professorship of mathematics.

Dr. J. V. WESTFALL, instructor in mathematics at the University of Iowa, has been promoted to an assistant professorship at the same institution.

AT the University of Indiana, Dr. S. C. DAVISSON and Dr. D. A. ROTHROCK have been promoted from associate to junior professorships of mathematics.

DR. T. W. WRIGHT, professor of applied mathematics at Union College, has resigned on account of ill health.

PROFESSOR LEBEN WARREN, for twenty-seven years professor of mathematics at Colby College, Watertown, Maine, died April 21, at the age of 69 years.

DR. CORNEILLE L. LANDRÉ, actuary of the Netherlands general society, died February 10, at the age of sixty-seven. Dr. Landré was a frequent contributor to actuarial and mathematical journals, and was perhaps one of the most eminent of the world's actuaries. His well known work, Mathematisch-technische Kapitel zur Lebensversicherung, easily ranks among the foremost treatises on insurance mathematics.

Catalogues of second-hand mathematical works: Thury, Baumgartner & Co., 4 Rue Diday, Geneva, catalogue No. 53, 148 mathematical titles; Gustav Fock, 7 Schlossgasse, Leipzig, catalogue No. 267, 1862 titles; W. Junk, 22 Rathenowerstrasse, Berlin, catalogue No. 28, 740 titles in mathematics; Theordor Ackermann, 10 Promenadenplatz, Munich, catalogue No. 539, 735 titles.