NOTES.

THE concluding (June) number of the *Annals of Mathematics* contains the following papers: "Algebraic surfaces, their cycles and integrals, by S. LEFSCHETZ; "The potential of ring-shaped disks," by E. P. ADAMS; "Total differentiability. A correction," by E. J. TOWNSEND; "Existence theorem for the non-self-adjoint linear system of the second order," by H. J. ETTLINGER; "Motion in a resisting medium," by J. K. WHITTEMORE; "Continuous matrices, algebraic correspondences, and closure," by A. A. BENNETT; "Urn schemata as a basis for the development of correlation theory," by H. L. RIETZ; "On pseudo-resolvents of linear integral equations in general analysis," by T. H. HILDEBRANDT.

THE following advanced courses in mathematics are offered at the Italian universities during the academic year 1920–1921:

UNIVERSITY OF BOLOGNA.—By Professor P. BURGATTI: Principles of celestial mechanics; figures of equilibrium of rotating fluid masses; problems of cosmogony, three hours.—By Professor L. DONATI: Elementary and general relativity, three hours.—By Professor F. ENRIQUES: Elementary mathematics in the light of higher concepts. History of the ideas; criticism; problems, three hours.—By Professor S. PINCHERLE: Analytic functions; integral analytic functions; ordinary differential equations from Lie's standpoint, three hours.

UNIVERSITY OF CATANIA.—By Professor M. CIPOLLA: Theory of groups of finite order with applications, four hours.—By Professor G. SCORZA: Enumerative geometry; theory of invariants, five hours.—By Professor ——: Mathematical physics, three hours.

UNIVERSITY OF GENOA.—By Professor G. LORIA: Infinitesimal geometry of common space and of hyperspaces, three hours.—By Professor C. SEVERINI: Theory of analytic functions, four hours.—By Professor O. TEDONE: Elementary theories of electricity and magnetism, three hours.

UNIVERSITY OF MESSINA.—By Professor P. CALAPSO: Functions of a complex variable and elliptic functions, four

hours.—By Professor G. GIAMBELLI: Singularities of algebraic curves; introduction to the geometry on an algebraic curve, four hours.—By Professor O. LAZZARINO: Vector operations and functions; fields of force; principles of electrostatics and of the statics of elastic bodies, four hours.

UNIVERSITY OF NAPLES.—By Professor F. AMODEO: History of mathematics: the century of Galileo Galilei, three hours.—By Professor A. DEL RE: Analytic theory of heat, four and one-half hours.—By Professor R. MARCOLONGO: Electrodynamics; theory of Lorentz; optical applications, three hours.—By Professor D. MONTESANO: Geometry of straight lines and of conics in the ordinary spaces, six hours.—By Professor E. PASCAL: Abelian integrals and functions, three hours.

UNIVERSITY OF PADUA.—By Professor U. AMALDI: Contact transformations and canonical systems, four hours.—By Professor F. D'ARCAIS: Monogenic functions; gamma and elliptic functions, four hours.—By Professor P. GAZZANIGA: Theory of numbers, three hours.—By Professor G. RICCI: Methods of absolute differential calculus, with applications to the theory of elasticity, four hours.—By Professor F. SEVERI: Calculus of probabilities, four hours.—By Professor A. TONOLO: Partial differential equations of the first order, three hours.

UNIVERSITY OF PALERMO.—By Professor G. BAGNERA: Complex variables and integral analytic functions; elliptic functions, three hours.—By Professor M. DE FRANCHIS: A study of the real parts of algebraic entities, three hours.—By Professor M. GEBBIA: Vector fields, electro- and magnetostatics, four and one-half hours.—By Professor A. SIGNORINI: Theory of relativity, three hours.—By Professor V. STRAZZERI: Riemann surfaces; algebraic curves; abelian integrals, three hours.

UNIVERSITY OF PAVIA.—By Professor L. BERZOLARI: Abelian integrals, three hours.—By Professor U. CISOTTI: Relativity; Einstein's mechanics, three hours.—By Professor F. GERBALDI: Functions of a complex variable and elliptic functions, three hours.—By Professor F. SIBIRANI: Plane and twisted curves; principles of the theory of surfaces and con-

gruences of rays, three hours.—By Professor G. VIVANTI: Theory of functions of a real variable; Lebesgue integrals, three hours.

UNIVERSITY OF PISA.—By Professor G. ARMELLINI: Celestial mechanics, three hours.—By Professor E. BERTINI: Projective geometry of hyperspaces, three hours.—By Professor L. BIANCHI: Functions of a complex variable; algebraic numbers and analytical arithmetic, three hours.—By Professor G. A. MAGGI: Analytical dynamics; equilibrium and vibration of elastic bodies; elastic theory of light, four and one-half hours.

UNIVERSITY OF ROME.—By Professor G. BISCONCINI: Geometric applications of the calculus, three hours.—By Professor E. BOMPIANI: Continuous groups of transformations, three hours.—By Professor F. CANTELLI: Mathematical statistics, three hours; Actuarial mathematics, three hours.—By Professor G. CASTELNUOVO: Complex variables and algebraic functions, three hours.—By Professor U. CRUDELI: Introduction to advanced theories of electricity and magnetism, three hours.—By Professor T. LEVI-CIVITA: Absolute differential calculus with applications, three hours.—By Professor A. PERNA: Complements of mathematical analysis, three hours.—By Professor L. SILLA: Differential equations of dynamics, three hours.—By Professor V. VOLTERRA: General relativity, three hours; Differential equations of mathematical physics, three hours.

UNIVERSITY OF TURIN.—By Professor T. BOGGIO: Hydrodynamics, three hours.—By Professor G. FUBINI: Differential geometry and continuous groups, with special reference to the groups of motions and of conformal and projective transformations.—By Professor C. SEGRE: Geometry of differential equations, three hours.—By Professor C. SOMIGLIANA: Theory of oscillations and electromagnetic optics, three hours.—By Professor G. TOGLIATTI: Projective differential geometry, three hours.

The following courses are announced in American universities for the academic year 1920–1921, in addition to those listed in previous numbers of the BULLETIN.

UNIVERSITY OF ILLINOIS.—By Professor E. J. TOWNSEND: Complex variables, three hours; Differential equations, three hours.—By Professor G. A. MILLER: Theory of groups (introductory course), three hours; Theory of equations, three hours (first term).—By Professor J. B. SHAW: Vector methods, three hours.—By Professor A. B. COBLE; Algebraic and abelian functions, three hours.—By Professor R. D. CARMICHAEL: Linear difference equations, three hours.—By Professor A. EMCH: Geometric transformations, three hours (first term); Geometry in a complex field, three hours (second term).—By Professor A. R. CRATHORNE: Theory of statistics, three hours.—By Professor G. E. WAHLIN: Theory of numbers, three hours.—By Professor H. BLUMBERG: Theory of aggregates, three hours (second term).—By Professor E. B. LYTLE: History of mathematics, two hours (second term).

YALE UNIVERSITY.—By Professor E. W. BROWN: Differential equations, three hours (second term); Advanced mechanics, three hours.—By Professor J. PIERPONT: Theory of functions of real variables, two hours; Theory of functions of a complex variable, three hours.—By Professor W. R. LONGLEY: Theory of differential equations, two hours.—By Professor E. J. MILES: Advanced calculus, three hours (first term); Differential geometry, two hours.—By Professor J. I. TRACEY: Modern and differential geometry, three hours; Analytic geometry, two hours.—By Professor J. K. WHITTEMORE: Advanced differential geometry, two hours.—By Dr. W. L. CRUM: Mechanics, three hours.—By Mr. J. S. MIKESH: History of mathematics, two hours.—By Dr. J. M. STETSON: Higher algebra, two hours.

THE class of sciences of the Belgian academy announces the following subjects for prize memoirs for 1921: (1) a contribution to the study of the properties of analytic functions that do not take certain values in a given domain; (2) a contribution to the study of birational transformation in a space of more than two dimensions.

THE adjudicators of the Hopkins prize of the Cambridge philosophical society have made the following awards: for the period 1903–06, to Dr. W. BURNSIDE, of Pembroke College,

for investigations in mathematical science; for the period 1906–09, to Professor G. H. BRYAN, of Peterhouse, for investigations in mathematical physics, including aerodynamic stability; and for the period 1909–12, to Mr. T. R. WILSON, of Sidney Sussex College, for investigations in physics, including the paths of radio-active particles.

PROFESSOR H. HAPPEL, of the University of Tübingen, has been appointed to a professorship at the Breslau technical school.

AT the University of Münster, Professor R. COURANT, of the University of Göttingen, has been appointed professor of mathematics. Associate professor H. KONEN has been promoted to a full professorship of theoretical physics.

AT the University of Kiel, Dr. O. TOEPLITZ has been promoted to a full professorship of mathematics, and Dr. E. MADELUNG to a full professorship of theoretical physics. Professor H. JUNG has resigned, to accept an appointment as professor of mathematics at the University of Halle.

THE Braunschweig technical school has conferred the honorary degree of doctor of engineering on Professor H. LORENZ, of the Danzig technical school.

AT the University of Rostock, associate professor R. WEBER, of the department of applied mathematics and physics, has been promoted to an honorary professorship; Dr. O. HAUPT, of the Karlsruhe technical school, has been appointed at a professorship; Professor O. STAUDE has received the honorary degree of doctor of engineering from the technical school of Darmstadt.

ASSOCIATE professor R. WEITZENBÖCK, of the German technical school at Prague, has been promoted to a full professorship of mathematics.

THE following persons have recently been admitted as privat-docents in German technical schools and universities: Dr. A. BARUCH, in mathematics, in the department of mines at the Berlin technical school; Dr. J. DEUXES, in mathematics, at the University of Göttingen; Dr. A. LANDE, in theoretical physics, at the University of Frankfurt a. M.

DR. A. CHATELET has been appointed professor of mathematics at the University of Lille.

DR. BOULIGAND has been appointed maître de conférences in mathematics at the University of Rennes.

AT Cambridge University, Mr. J. E. LITTLEWOOD, of Trinity College, has been appointed Cayley lecturer in mathematics, and Mr. J. H. GRACE, of Peterhouse, has been reappointed University lecturer in mathematics.

PROFESSOR L. E. DICKSON, of the University of Chicago, has been elected correspondent of the Paris academy of sciences, in the section of geometry, as successor to Professor E. COSSERAT, elected non-resident member.

AT the University of Texas, assistant professor R. L. MOORE, of the University of Pennsylvania, has been appointed associate professor of pure mathematics. Associate professor JESSIE M. JACOBS, of Rockland College, has been appointed instructor in pure mathematics and assistant professor J. N. MICHIE, of the Texas agricultural and mechanical college, has been appointed adjunct professor of applied mathematics.

YALE University has conferred the honorary degree of master of arts on Professor H. E. HAWKES, dean of Columbia College.

DR. DANIEL BUCHANAN, professor of astronomy and mathematics at Queen's University, Kingston, Ontario, has been appointed professor of mathematics and head of the department at the University of British Columbia. At Queen's University, assistant professor C. F. GUMMER has been promoted to an associate professorship, and Dr. NORMAN MILLER to an assistant professorship of mathematics; Mr. A. WOODS has resigned, to accept a lecturership at Western University, London, Ontario.

PROFESSOR S. LEFSCHETZ, of the University of Kansas, has been granted leave of absence for the year 1920–1921. He will spend the first term at the University of Paris, and the second at Padua and Bologna.

ASSISTANT professor E. G. BILL, of Dartmouth College, has been promoted to a full professorship of mathematics.

DR. J. W. CAMPBELL, of the State University of Iowa, has been appointed assistant professor of mathematics at the University of Alberta.

MISS GERTRUDE SMITH, of Vassar College, has been promoted to an assistant professorship of mathematics.

DR. J. R. KLINE, of the University of Illinois, has been appointed assistant professor of mathematics at the University of Pennsylvania.

DR. L. R. FORD, of Harvard University, has been appointed assistant professor of mathematics at Rice Institute.

AT Elmira College, Miss MARY SUFFA, of Beloit College, has been appointed head of the department of mathematics, and Miss FRANCIS W. WRIGHT, of Brown University, has been appointed instructor.

ASSISTANT professor A. C. MADDOX, of the Oklahoma Agricultural and Mechanical College, has been appointed professor of mathematics at the Louisiana State Normal School at Natchitoches.

MR. F. H. MURRAY and DR. J. L. WALSH have been appointed Sheldon Fellows by Harvard University, and expect to spend the coming year studying in Paris.

PROFESSOR IDA BARNEY, of Meredith College, has been appointed assistant professor of mathematics at Smith College.

ASSISTANT professor LOUISA M. WEBSTER, of Hunter College, has been promoted to an associate professorship of mathematics.

DR. C. A. LAISANT died May 5, 1920, at the age of seventy-nine years. He was founder of the *Intermédiare des Mathé-*

maticiens, one of the founders of *l'Enseignement Mathématique*, and an editor of the *Nouvelles Annales de Mathématiques*.

Miss Mary A. Colpitts, instructor in mathematics at the University of Wisconsin, died July 11, 1920.

NEW PUBLICATIONS.

I. HIGHER MATHEMATICS.

Ahrens (W.). Mathematiker-Anekdoten. 2te, stark veränderte Auflage. (Mathematisch-physikalische Bibliothek, Nr. 18.) Leipzig, Teubner, 1920. 42 pp. M. 1.40

Barthel (E.). Polargeometrie. Berlin, Leonhard Simion Nachfolger, 1919. M. 4.50

Chini (M.). Esercizi di calcolo infinitesimale. 3a edizione. Livorno, Giusti, 1920. 8vo. 10 + 300 pp. L. 8.50

Encyklopädie der mathematischen Wissenschaften. Band II 3, Heft 3: L. Lichtenstein, Neuere Entwicklung der Potentialtheorie. Konforme Abbildung. Leipzig, Teubner, 1919. M. 7.60

Fricke (R.). See Perry (J.).

Lichtenstein (L.). See Encyklopädie.

Luckey (P.). Einführung in die Nomographie. 2ter Teil: Die Zeichnung als Rechenmaschine. Leipzig, Teubner, 1920. M. 1.40

Meissner (O.). Wahrscheinlichkeitsrechnung. 1tes Bändchen: Grundlehren. 2tes Bändchen: Anwendungen. Leipzig, Teubner, 1919. M. 1.00 + 1.00

Muir (T.). The theory of determinants in the historical order of development. Volume 3: The period 1861 to 1880. London, Macmillan, 1920. 26 + 503 pp. 35s.

Pasch (M.). Mathematik und Logik. 4 Abhandlungen. Leipzig, 1919. M. 2.00

Perry (J.). Höhere Mathematik für Ingenieure. Autorisierte deutsche Bearbeitung von R. Fricke und F. Süchting. 3te Auflage. Leipzig, Teubner, 1919. M. 20.00

Piaggio (H. T. H.). An elementary treatise on differential equations and their applications. London, Bell, 1920. 12s.

Pincherle (S.). Lezioni di calcolo infinitesimale dettate nella R. Università di Bologna e redatte per uso degli studenti. 2a edizione riveduta. Bologna, Zanichelli, 1920. 8vo. 8 + 785 pp. L. 40.00

Riemann (B.). See Weber (H.).