

THE INSTITUTE FOR ADVANCED STUDY
(Founded by Louis Bamberger and Mrs. Felix Fuld)

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THE INSTITUTE FOR ADVANCED STUDY
20 Nassau Street
Princeton, New Jersey
February, 1936

*Extract from the letter addressed by
the Founders to their Trustees, dated
Newark, New Jersey, June 6, 1930*

“It is fundamental in our purpose, and our express desire, that in the appointments to the staff and faculty, as well as in the admission of workers and students, no account shall be taken, directly or indirectly, of race, religion, or sex. We feel strongly that the spirit characteristic of America at its noblest, above all, the pursuit of higher learning, cannot admit of any conditions as to personnel other than those designed to promote the objects for which this institution is established, and particularly with no regard whatever to accidents of race, creed, or sex.”

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LIFE TRUSTEES

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MRS. FELIX FULD
South Orange, New Jersey

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1936

ALEXIS CARREL
New York, New York
JULIUS FRIEDENWALD
Baltimore, Maryland
LEWIS H. WEED
Baltimore, Maryland

1937

JOHN R. HARDIN
Newark, New Jersey
SAMUEL D. LEIDESDORF
New York, New York
WALTER W. STEWART
New York, New York

1938

EDGAR S. BAMBERGER
West Orange, New Jersey
ALANSON B. HOUGHTON
Washington, District of Columbia
HERBERT H. MAASS
New York, New York

1939

FRANK AYDELOTTE
Swarthmore, Pennsylvania
FLORENCE R. SABIN
New York, New York
OSWALD VEBLEN
Princeton, New Jersey

1940

ABRAHAM FLEXNER
Princeton, New Jersey
PERCY S. STRAUS
New York, New York

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Secretary: FRANK AYDELOTTE
Assistant Secretary: ESTHER S. BAILEY

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THE DIRECTOR OF THE INSTITUTE

COMMITTEE ON NOMINATIONS

MR. LEIDESDORF, *Chairman*
MR. AYDELOTTE
MR. STEWART

STAFF OF THE INSTITUTE

Director: ABRAHAM FLEXNER

SCHOOL OF MATHEMATICS

Professors

JAMES WADDELL ALEXANDER
ALBERT EINSTEIN
MARSTON MORSE
OSWALD VEBLEN
JOHN VON NEUMANN
HERMANN WEYL

Visiting Professor (1935-1936)

WOLFGANG PAULI

Associate

WALTHER MAYER

Assistants

LEONARD M. BLUMENTHAL
JAMES W. GIVENS, JR.
ROBERT S. MARTIN
ARTHUR E. PITCHER
ABRAHAM H. TAUB
LEO ZIPPIN

SCHOOL OF ECONOMICS AND POLITICS

Professors

*EDWARD MEAD EARLE
DAVID MITRANY
WINFIELD W. RIEFLER

SCHOOL OF HUMANISTIC STUDIES

Professors

ERNST HERZFELD
E. A. LOWE
BENJAMIN D. MERITT
ERWIN PANOFSKY

* On leave of absence

CALENDAR

1936-1937

October 1: First term opens
December 14: First term closes
January 14: Second term opens
May 1: Second term closes

MEMBERS, 1935-1936

REINHOLD BAER, Ph.D., University of Göttingen, 1925
 *ACHILLE BASSI, Dr. Math., University of Pisa, 1929
 Libero docente, University of Turin
 PAUL I. BERNAYS, Ph.D., University of Göttingen, 1912
 **WILLARD E. BLEICK, Ph.D., Johns Hopkins University, 1933
 LOUIS P. BOUCKAERT, Dr. Math. and Phys., Louvain University, 1934
 C.R.B. Educational Foundation Fellow
 GREGORY BREIT, Ph.D., Johns Hopkins University, 1921
 Professor, University of Wisconsin
 LEONARD CARLITZ, Ph.D., University of Pennsylvania, 1930
 Assistant Professor, Duke University
 JOHN F. CARLSON, Ph.D., University of California, 1932
 EDUARD CECH, Ph.D., Charles University, Prague, 1920
 Professor, Masaryk University, Brno
 EDWARD W. CHITTENDEN, Ph.D., University of Chicago, 1912
 Professor, University of Iowa
 JAMES A. CLARKSON, Ph.D., Brown University, 1934
 National Research Council Fellow
 ALFRED H. CLIFFORD, Ph.D., California Institute of Technology, 1933
 GEORGE COMENETZ, Ph.D., Columbia University, 1934
 EDWARD H. CUTLER, Ph.D., Harvard University, 1930
 Instructor, Lehigh University
 **ARNOLD DRESDEN, Ph.D., University of Chicago, 1909
 Professor, Swarthmore College
 PHILIP FRANKLIN, Ph.D., Princeton University, 1921
 Associate Professor, Massachusetts Institute of Technology
 BENNINGTON P. GILL, Ph.D., Columbia University, 1930
 Associate Professor, College of the City of New York
 **KURT GÖDEL, Ph.D., University of Vienna, 1930
 Venia legendi, University of Vienna

* Absent first term
 ** Absent second term

LAWRENCE M. GRAVES, Ph.D., University of Chicago, 1924
 Associate Professor, University of Chicago
 *WILLIAM J. HENDERSON, Ph.D., University of Cambridge, 1935
 *JOSEPH O. HIRSCHFELDER, Ph.D., Princeton University, 1936
 BANESH HOFFMANN, Ph.D., Princeton University, 1932
 SPOFFORD H. KIMBALL, Ph.D., Harvard University, 1932
 WINSTON E. KOCK, Ph.D., University of Berlin, 1934
 NORMAN LEVINSON, D.Sc., Massachusetts Institute of Technology, 1935
 National Research Council Fellow
 WILLIAM T. MARTIN, Ph.D., University of Illinois, 1934
 National Research Council Fellow
 FRANCIS J. MURRAY, Ph.D., Columbia University, 1935
 National Research Council Fellow
 SUMNER B. MYERS, Ph.D., Harvard University, 1932
 National Research Council Fellow
 DANIEL PEDOE, B.A., Magdalene College, Cambridge, 1933
 Cambridge University Fellow
 MAURICE H. L. PRYCE, B.A., Trinity College, Cambridge, 1933
 Commonwealth Fund Fellow
 WILLIAM C. RANDELS, Ph.D., Brown University, 1934
 **LOUIS N. RIDENOUR, JR., B.S., University of Chicago, 1932
 MORRIS E. ROSE, Ph.D., University of Michigan, 1935
 NATHAN ROSEN, Sc.D., Massachusetts Institute of Technology, 1932
 OTTO F. G. SCHILLING, Ph.D., University of Marburg, 1934
 ROMAN SMOLUCHOWSKI, Dr. Math. and Phys., University of Groningen, 1935
 RICHARD F. S. STARR, B.S., Cornell University, 1924
 MARTIN H. STOBBE, Ph.D., University of Göttingen, 1930
 ERIC D. TAGG, B.A., Clare College, Cambridge, 1933
 Commonwealth Fund Fellow
 *STANISLAW M. ULAM, Dr. Sci., Polytechnic Institute, Lwów, 1933
 GASTON VAN DER LIJN, Dr. Sci. Phys. and Math., University of Brussels, 1931
 C.R.B. Educational Foundation Fellow

*KURT WEITZMANN, Dr. Phil., University of Berlin, 1929
*DONALD N. WILBER, M.F.A. in Architecture, Princeton University, 1933
LEE R. WILCOX, Ph.D., University of Chicago, 1935
SHAUN WYLIE, B.A., University of Oxford, 1934
Commonwealth Fund Fellow

I

HISTORY AND ORGANIZATION

AMERICAN universities now offer abundant facilities for study in the liberal arts and sciences leading to the Ph.D. degree. Some universities have made excellent arrangements also for work beyond the Ph.D. degree, especially in recent years since the organization of advanced fellowships such as the fellowships offered by the National Research Council, the Rockefeller Foundation, and the Commonwealth Fund. But, with the exception of medicine and a few other branches, the country has not hitherto possessed an institution whose sole purpose it is to provide young men and women of unusual gifts and promise with opportunities to continue their independent training beyond the Ph.D. degree without pressure of numbers or routine. To provide such opportunities Mr. Louis Bamberger and his sister, Mrs. Felix Fuld, established in 1930 the Institute for Advanced Study with an initial gift of \$5,000,000. In April, 1934, an anonymous gift of \$1,000,000 was made to facilitate the organization of a school of economics and politics, and in 1935 a school of humanistic studies was added.

In order that the ideals of the Founders might be realized, the organization and administration of the Institute have been kept simple and unostentatious, and the several schools are in their internal conduct as nearly autonomous as possible, though movement from school to school takes place spontaneously.

The internal affairs of the several schools are managed by their respective faculties. Coöperation with the corresponding authorities of Princeton University and with the director has proved to be easy and informal. The Board of Trustees is composed of laymen, scholars, and scientists. It is hoped that in this way perfect accord may be established between the administrative officers and the scholars who really constitute an institution of learning. The scale of salaries and retiring allowances is such that the teaching staff is freed from all financial concern and feels under the strongest obligation to refrain from activities that bring a financial return without really being of high scientific or scholarly character—in other words, that the members of the staff may live up to the standard that has been created in the full-time departments of certain medical schools organized within recent years. In order to avoid difficulties and evils that have developed in institutions where both full-time and part-time arrangements are employed, the Institute is pledged to its Founders to adhere strictly to the full-time basis. In practice, higher education in America has proved beyond question that, though under unusual circumstances something worth while may be accomplished by part-time workers, the two cannot be harmoniously combined and that wherever the effort is made part-time arrangements tend to encroach upon the full-time principle. Administration and organization are therefore greatly simplified, nice problems of adjustment are eliminated, and undivided attention to its fundamental purpose is secured by simple adherence to the

principle of full-time work, and this is equally applicable to those who come as members for a year or more and to those who have continuing appointments.

The Institute for Advanced Study is located at Princeton, New Jersey. Work began in the field of mathematics on October 2, 1933. The authorities of Princeton University have been most helpful and cooperative. They offered the Institute space in the new mathematics building, Fine Hall, opened in 1931. The School of Humanistic Studies and the School of Economics and Politics have been comfortably accommodated in temporary quarters. While a site of approximately two hundred acres contiguous to the campus of Princeton University has been acquired, the Trustees of the Institute have no intention of building until the institution has developed beyond its present size and scope. For the time being the director and members of the various staffs and the trustees are in position to concentrate attention solely upon bringing together workers in the various fields in which the Institute is thus far interested.

While the Institute and Princeton University are organically and administratively entirely distinct, the faculties and students of the two institutions cooperate in any direction that promises more favorable results than either institution could obtain alone, the students availing themselves of the courses, seminars, and opportunities for conference and direction of work in both institutions without payment of an additional fee. Advanced workers, such as National Research Council Fellows and Commonwealth Fund

Fellows, who have come to Princeton to study with a member of one group, often find it in their interest to confer or work with one or more members of the other group, and are therefore accredited to both institutions.

The initial group forming the School of Economics and Politics assembled in Princeton in the autumn of 1935, and the School of Humanistic Studies was organized in the academic year 1935-1936.

II PURPOSE

INASMUCH as only those students have been admitted who have already obtained the Ph.D. degree or who have given evidence of ability in independent research at least equal to that expected for the degree of Doctor of Philosophy, the number of students is relatively small and is expected to remain small. The workers or members are for the most part persons who received their doctor's degree some years ago, have engaged in university and college teaching, and have while carrying on their routine published papers indicative of promise. The staff aids students in deciding the general methods and purposes of their work and, as occasion offers, in the details.

Among the members during the present year are a number of advanced scholars on leave of absence from universities. They have acted in close coöperation with the regular staff of the Institute to the mutual advantage of both groups. While the persons who are thus advanced may profit by seminars or lecture courses which bring them in touch with the latest advances in the various branches of their science, equally important is the opportunity for informal and frequent contact with other investigators with whom they exchange ideas regarding the problems or fields in which they are interested. The workers may seek the professors whether on the staff of the Institute or on the faculty of Princeton University whose interests coincide with their own. They make

their own individual arrangements from time to time. No two persons during the year 1935-1936 have pursued the same course of action. The group contains members, several of whom conduct seminars or meet in conference on various subjects.

It is difficult to overestimate the importance of a year spent in free research and study to those who for a number of years previously have been carrying the burden of routine college and university teaching and have had to carry on their original work in such bits of time as could be snatched from their daily studies. Naturally, mature persons of this kind receive preference in the matter of admission.

III

SCHOOL OF MATHEMATICS

Messrs: ALEXANDER, EINSTEIN, MORSE, PAULI, VEBLER, VON NEUMANN, WEYL, MAYER, BLUMENTHAL, GIVENS, MARTIN, PITCHER, TAUB, and ZIPPIN.

IN the School of Mathematics work is carried on by individual contact with students, by seminars, by courses of lectures, and by other methods, each professor being free to follow the methods he prefers and to vary them from year to year. It will be noticed that the staff consists only of professors and their assistants and one associate, in this respect differing from the faculty of a university which has varied teaching responsibilities.

During the year 1935-1936 a course of lectures on analysis situs was given jointly by Professor Lefschetz of Princeton University and Professor Alexander of the Institute. The course will be continued during the year 1936-1937.

Professor Einstein will continue his investigations in the relativistic theory of matter.

Professor Morse will conduct a seminar in the general field of analysis in the large. The seminar will discuss the topological analysis of functions and the extensions of this analysis to functionals, in particular to the calculus of variations. Other possible topics are abstract metrics and the associated function space topologies.

In 1935-1936 Professor Veblen and Professor von

Neumann have been collaborating in a seminar in which the chief subjects studied have been generalizations of projective geometry and the theory of spinors. It is proposed to continue this seminar in 1936-1937 in the same field or one of its natural extensions. Professor von Neumann will also lecture on various topics in mathematical quantum theory.

During the year 1935-1936 Professor Weyl gave an elementary course in invariant theory and conducted a seminar in current literature where the participants were expected to report on their own research work and on important new mathematical papers. The latter seminar will be continued in 1936-1937; in addition, a course of lectures covering the higher parts of invariant theory and the theory of matrix algebras and factor sets is planned.

Through 1935-1936 Professor Pauli conducted a seminar on the theory of the positron and related topics.

Professor Mayer has lectured in 1935-1936 on calculus of variations, and he proposes to lecture in 1936-1937 on differential geometry.

Professor Max von Laue lectured in October, 1935, on thermodynamic equilibria and on the recent development of the theory of Röntgen-ray interferences.

During the year Professor Paul Bernays gave a course of lectures on logical calculus, Professor Gregory Breit gave a number of reports on nuclear physics, Professor Eduard Cech gave a series of lectures on pseudo-manifolds, in the spring term Dr. Reinhold Baer conducted a seminar on Abelian

groups, and Professor Lawrence M. Graves conducted a seminar on linear spaces.

Once a week the mathematical club, conducted by Princeton University and the School of Mathematics, meets. A paper is presented, followed by informal discussion and questioning. Daily at four thirty in the afternoon tea is served for both the University and the Institute groups, and professors and workers or members thus assemble at their pleasure.

Since 1911 Princeton University has published the *Annals of Mathematics* under the editorial direction of the Department of Mathematics. In 1933 an agreement was entered into in accordance with which Princeton University and the Institute for Advanced Study jointly publish the *Annals*. The editorial board consists of Professor S. Lefschetz of the University, Professor John von Neumann of the Institute, and ten associate editors from various institutions.

IV

SCHOOL OF ECONOMICS AND POLITICS

Messrs: EARLE, MITRANY, and RIEFLER

THE formation of the School of Economics and Politics of the Institute for Advanced Study was announced in January, 1935, and in October Professor Mitrany and Professor Riefler took up residence in Princeton. Professor Earle will join them in the autumn of 1936.

Professor Mitrany is working on a new approach to political studies.

Professor Riefler has been occupied primarily during the past year in establishing closer informal contacts with current work in economic research, particularly in the fields of money and banking, public finance, the quantitative measurement of economic activity, and social security. Among the objectives of the school will be the encouragement of coördination in the work of specialists in these areas of research through informal conferences on specific problems or findings as occasion warrants, the organization of specific pieces of research at Princeton or elsewhere, and the development by means of correspondence and exchange of memoranda of more continuous interchange of thought between scholars working on common problems in these fields.

V

SCHOOL OF HUMANISTIC STUDIES

Messrs: HERZFELD, LOWE, MERITT, and
PANOFSKY

THE School of Humanistic Studies was started in October, 1935. In the absence of Professor Meritt, who lectured at Oxford and subsequently spent some weeks in Athens, the task of beginning fell to Professor Panofsky. He succeeded without difficulty in establishing the same kind of coöperative relationship with the Princeton University Department of Art and Archaeology as had been previously established between the mathematicians of the University and the Institute. During the year 1935-1936 he conducted a seminar on the work of Michael Angelo with the participation of five advanced students; in 1936-1937 he hopes to complete his work on Dürer's *Melancholia* and to continue his investigations in the field of late mediaeval and Renaissance iconography and will again conduct a seminar.

During the year Doctor Weitzmann brought to Princeton approximately twenty-five hundred new photographs from Mount Athos, a mass of material which throws entirely new light on the development of Byzantine art and will be utilized by the Princeton group of art-historians and archaeologists.

The staff has been enlarged by the addition of Pro-

fessor Lowe and Professor Herzfeld. Inasmuch as Professors Lowe, Meritt, and Herzfeld are abroad prosecuting their researches as this bulletin goes to press, it is impossible at this time to make any announcement about their plans for the coming year.

VI

APPLICATIONS AND FEES

APPLICATIONS for admission should be addressed to the Institute for Advanced Study, Princeton, New Jersey.

The membership fee is \$100.00 per annum.

The Trustees have set aside a sum which can be used as stipends to persons of distinct ability and promise who require a limited amount of financial aid.