THE SCIENCES

STATE UNIVERSITY OF IOWA · IOWA CITY

INTRODUCTION

Science, said Dr. Albert Einstein, is the effort to put together all we can learn about the things we see and feel in the world around us. "It is a way of explaining the universe in which we live," says Dr. James B. Conant.

This effort to understand our universe is nothing new in human history, but we in the twentieth century have managed to learn more, to increase our knowledge at a very rapid rate, and to find more practical uses for what we know. Nevertheless, as we have done all this, we have uncovered still more questions that we cannot yet answer.

So despite its great extensions, the horizon of science still shows no limit; it is nowhere reaching exhaustion. Scientists think of today's work as only a basis for what they will try to do tomorrow. If you are pondering a career, this is something to put in evidence. And consider, too, that even science as we know it today has extended its influence to but a small fraction of the earth's populations.

As is the case in most fields of human knowledge today, science for any individual means gradually learning more and more about less and less. That is to say, a science career requires specialization. But science is no mystery cult; there are no magicians, no supermen, in the laboratories. "The whole of science is nothing more than a refinement of everyday thinking," said Dr. Einstein.

If you look into the starry heavens with wonder and reverence, you have the curiosity of a scientist. If you have planted garden seeds and seen why some of your plants grew faster than others, you have experimented as a scientist. If you have come to a decision by trying to think through all its alternatives, you have probably thought the way a scientist hopes he thinks. If you are a stamp collector, you have perhaps found the pleasure in classifying your stamps that a scientist finds in organizing his facts and ideas.

The traits of honesty, industry, and diligence—the habits of accurate, impartial observation and humble curiosity . . . these are important for success in science, as they are in many professions. A scientist is often his own boss, frequently works alone at his special job. Initiative, imagination, and self-sufficiency are often important. Ingenuity is commonly the difference between success in one month instead of three.

Today more careers than ever before are waiting for young people in science. Since the Korean War and our new national defense effort, the shortage of scientists has been a very serious national concern. No one can suppose that our national and industrial progress will continue unless we continue to know more and more about science—and its applications to human activities—as the years go by.

No honest college adviser will *guarantee* any student a job when he graduates. But a science student can be as sure as anyone; never have his opportunities been so great.

This applies just as much to women as to men. Most of science draws no line between the sexes, and there is no field in which there are not many opportunities open to both.

A career in science may have begun with a Christmas chemistry set or a summer's collection of grasshoppers. This interest in science is developed through high school and college as the formal educational foundation in science is being laid. With the growth of scientific knowledge, the fields become more specialized. In many areas the biggest opportunities now are for those who have studied beyond the four years of college and who have earned master's or doctor's degrees.

This sounds like a long pull and a hard job, and it is. But no one need commit himself to graduate work when he starts in college. The decision will come easily and naturally, in due time. And remember, too, that once you become a graduate student you are already a professional scientist; from there on you can expect to earn while you learn. At SUI, for instance, most graduate students in science are appointed to part-time teaching or research jobs.

After your college work you can expect as a scientist the freedom—and responsibilities—of a truly professional life. Depending on your field and your interests, you may be able to choose between high school or college teaching, scientific work in an industry, or research in a university, industrial, or government lab-

oratory. You can expect a good income when you graduate. You can expect to advance rapidly, and your work will be governed not by a time clock but by your own desire to progress into the more challenging scientific problems.

You will grow as your science grows, through the scientific meetings you will attend and the interests you will share with colleagues throughout the country. Your college degree will not mark the end of your education. As the years go by, you will find that your profession continues to be a profound and exciting intellectual experience. "Science," says Dr. Rene Dubos of the Rockefeller Institute, "can enrich life with new esthetic and emotional experience, with broader understanding, with stimulating and rewarding mental experience. It provides emotional and intellectual values that increase the flavor and dignity of human existence."

The sciences are an important part of the work of the State University of Iowa. These are the basic science departments at SUI:

Bacteriology—life and processes of microscopic plants and animals
Botany—life and processes of plants
Chemistry—composition of all substances
Geography—study of the earth's substances
Geology—history and life of the earth
Mathematics—"queen and servant of science"
Physics—behavior and structure of matter and
Astronomy—the earth in our universe
Psychology—study of human behavior
Zoology—life and processes of animals

Both undergraduate and graduate students find in these departments a wide variety of both general and specialized studies; detailed descriptions of these many departments are given in following pages of this booklet.

SUI is proud to have started high school graduates from throughout Iowa—and many nearby states—to careers in all these fields. SUI is proud, too, of the scientific honors which have come to the University, its faculty, and its students. The major national science honoraries and professional societies have Iowa chapters, and there is a multiplicity of programs and seminars throughout the entire school year. Science students at the University begin their professional activities long before they graduate, including participation in various inter-departmental programs.

When you come to SUI you come to a center for many educational activities, and as a science student you will participate in most of them. There are concerts, lectures, plays, Big Ten sports events, dances, parties . . . so many that no one can go to everything. You are in all respects a member of a typical college community in a great university.

Those who are looking for "snap" courses don't expect them in the sciences. They are right; education in science is not easy. Laboratory periods for "learning by doing" take afternoon hours from the football practice field and the corner soda fountain. Studying and library work cannot be neglected. But if you have intelligence and interest, you can be successful in science and still find time for the fun and activities that abound on the SUI campus. You do not have to be a stoop-shouldered, bespectacled genius or a retiring bookworm. The scientists who burn the midnight oil in their laboratories—and some do, at SUI as elsewhere—work long hours because they enjoy it.

All SUI students begin their college work with a group of "core courses": literature, historical-cultural and various social sciences. Science students add to these, during their first two years, the beginning courses in their special fields. The core courses and later requirements in other humanities fields, help assure that SUI science graduates are equipped to enjoy and contribute to the democratic society which makes their professions possible.

The basic sciences at SUI are enriched, too, by contacts with the applied sciences. The professional schools —engineering, medicine, pharmacy, dentistry—help give perspective to the sciences on which they are based. At SUI there are unusual opportunities to prepare for a career which combines science with other areas: with education, for science teachers; with journalism, for science writers; with museum studies, for curators and naturalists; with home economics, for

nutritionists and home management experts; with law, for technical patent specialists.

As a science student, you will be asked, when you first come to SUI, in what department you want to work. This is not a final decision; it can be changed after you have had one or two semesters' experience in that field. Before you make your choice, and whenever you want thereafter, you will have the advice of your own special faculty counselor as well as that of faculty in the departments concerned.

After the first year or two, you will probably find a particular interest in a special field within your major department; then you will want to choose courses pointing especially to this area. You will also choose one or more related fields, outside your major department but still closely related to your interests, in which you will also take courses. After four years you will graduate with a B.S. (Bachelor of Science) or a B.A. (Bachelor of Arts) degree.

Graduate work, if you decide on it, follows much this same pattern, too—more courses in the particular field of interest in your major and in related fields, and individual research projects, the reports of which become theses for master's and doctor's degrees. In SUI science departments, one or two years of graduate work is needed for an M.S. (Master of Science) or M.A. (Master of Arts) degree, and two more for a Ph.D. (Doctor of Philosophy) degree.

If you have graduated from an accredited high school with a satisfactory scholastic record you can enter SUI and continue your science career. If you have taken all or most of the science and mathematics courses given at your high school you will have some advantages of a head start. Some of the basic subjects will have been so completely covered that you will be ready to go right on to more advanced work. Other subjects, though you may still have to take them at SUI, will be easier because you are already familiar with some of the material that is talked about. And, because of your experience, you will surely have a better background for choosing the field in which you are especially interested.

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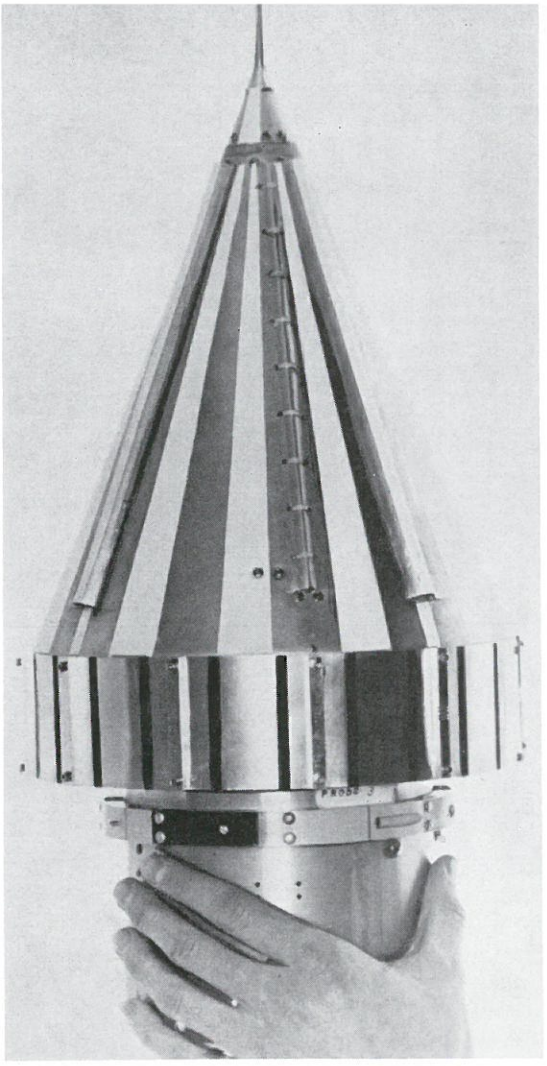


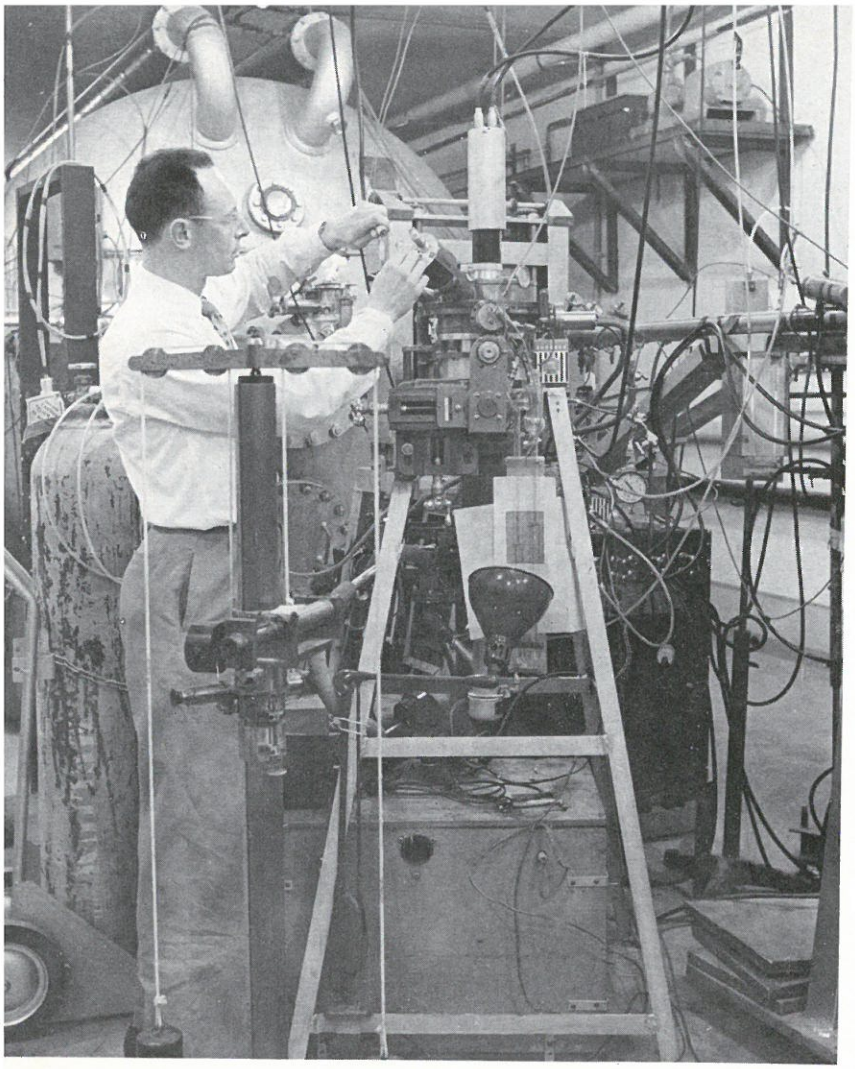
In the challenging Age of Space, . . .

PHYSICS AND ASTRONOMY

Physicists and astronomers study the structure and the dynamics of matter and energy—from particles within atoms to stars within galaxies. That the same physical laws apply to both atoms and stars is remarkable. That human beings have been able to develop their resources to the point of understanding some of these laws is even more remarkable.

Broadly speaking, physics divides into the work of the theorist and of the experimentalist. The former interprets, organizes, and suggests new experiments, using such tools as logic, mathematics, intuition, and knowledge of the experiments. The latter observes, tests, and analyzes data from the many instruments and techniques which ask questions of Nature. Theoretical and experimental cooperation create new knowledge, often leading to useful and momentous applications.

Perhaps the best measure of the impact of physics and astronomy in our times is that the mid-twentieth century is most notably the Age of the Atom and the Age of Space. World War II was dubbed "the physicists war." After radar



using highly complex equipment . . .

and nuclear fission came transistors, radio astronomy, satellites, and a host of other major applications.

In some of these developments—notably with radiation detection and particle identification from satellites and deep space probes—the State University of Iowa Department of Physics and Astronomy has played major roles. Logically and conveniently these related fields share the same department at the University, the only state institution in Iowa which grants degrees in astronomy.

Physics and related studies currently advance so rapidly that a freshman this year may graduate into a career field which does not now exist. So the physics major has the more reason to ground himself in the fundamentals of his field—the better to prepare himself for new developments.

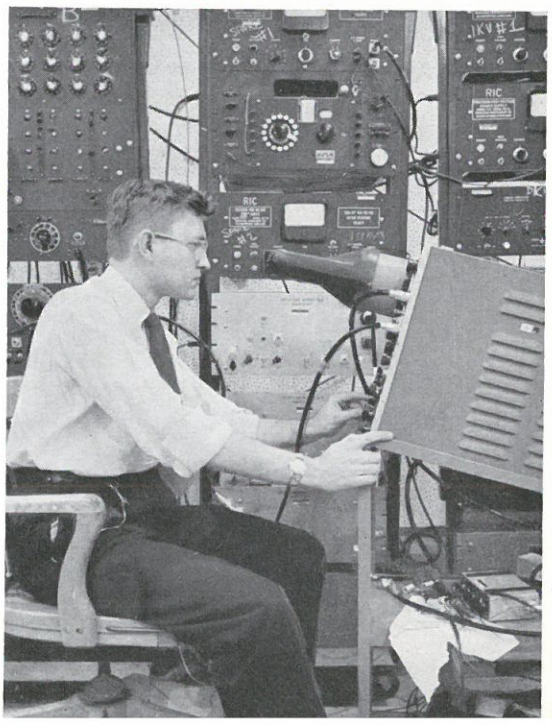
As he advances in his program at SUI the physics major may work with a Cockroft-Walton accelerator of 400 kev, or with a four mev Van de Graaff. He may operate shock, radiation, or environmental test chambers or other electronic apparatus connected with the preparation and reception of space instruments. Astronomy majors use a 5-inch telescope atop the Physics Building and a 12-inch one out in the country away from the interference of artificial light.

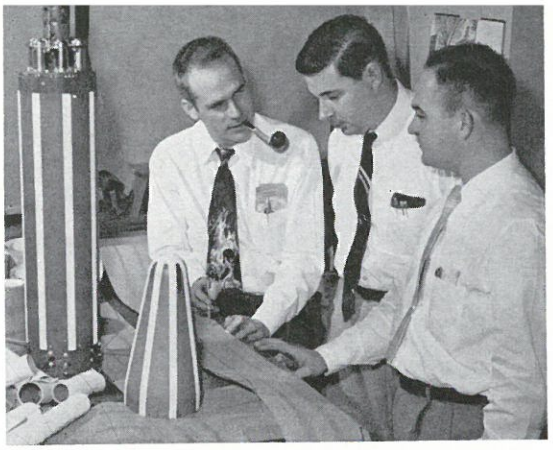
When you study at SUI for a bachelor's degree in physics, you take a general introductory course in physics, a course in atomic and nuclear physics, and courses in analytical mechanics and electricity and magnetism. The requirements, beyond these, are flexible enough so that you can build whatever foundation your future plans suggest. Physics students take at least one course in chemistry and several semesters of mathematics—and, of course, the usual "core course" requirements in other liberal arts departments.

With a bachelor's degree in physics you should be able to teach high school physics and mathematics, or to work in a government or industrial laboratory in such fields as precision measurement, electronics, mechanics, or nuclear physics.

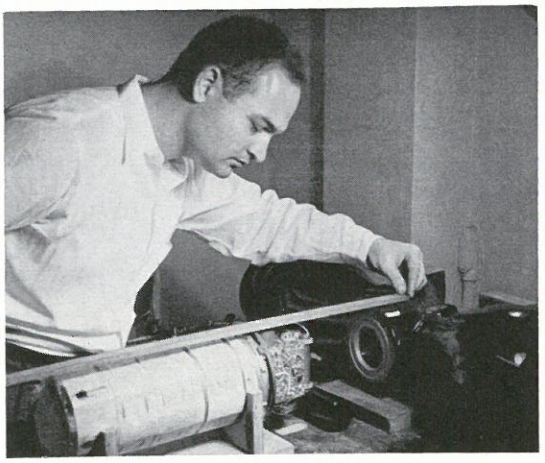
As in most sciences, however, better opportunities await those with more years of college work. At SUI there are three graduate degrees in physics:

and exacting techniques, . . .

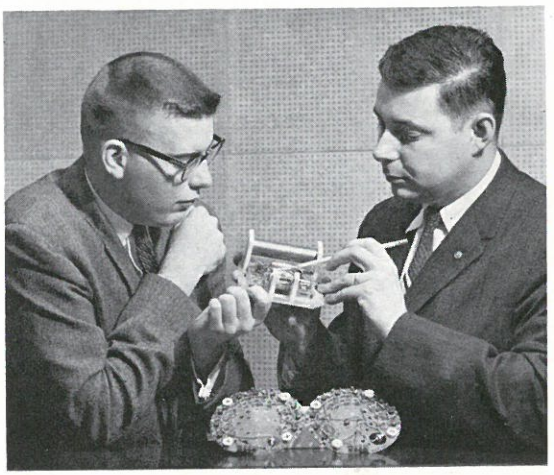




physicists explore the mysteries . . .



of our planet and, . . .



with astronomy, are reaching . . .

M.A.—a general program in three semesters of graduate work, for those who want broader training, especially for high school and junior college teaching.

M.S.—a specialized program of graduate work for those who plan to take Ph.D. degrees or who seek industrial or government research jobs.

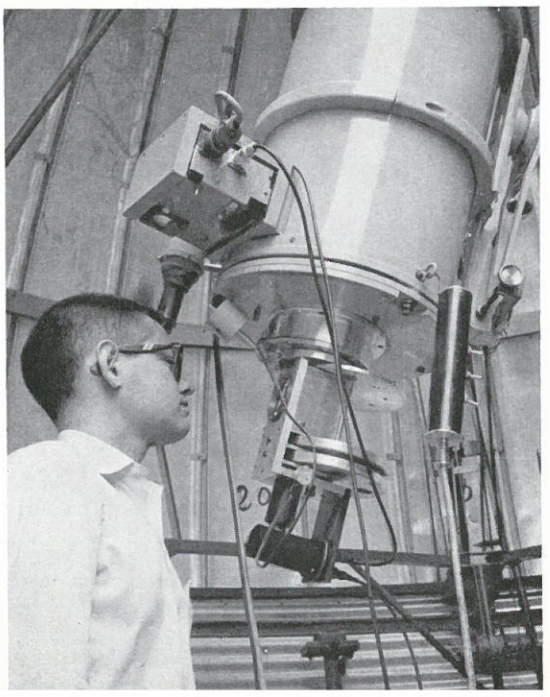
Ph.D.—the professional program, requiring two or three years of advanced study and original research after receiving the M.S. degree. A doctor's degree opens the full range of satisfying and rewarding careers in physics.

If you hope for a career in physics, begin by getting as much preliminary training in science and mathematics as your abilities and circumstances allow. When you are ready for advanced work, you can expect to work as a physicist and so earn many of your graduate expenses.

Students intending to concentrate in astronomy should also endeavor to get as much prior preparation in mathematics and science as is practicable. In addition to the undergraduate major, the department at SUI offers a program of advanced study leading to the Master of Science degree in astronomy.

Graduates with specialized training in astronomy are qualified for many positions in observatories or with the government, as well as for a variety of industrial jobs that require their scientific ability. In this era of space exploration, such opportunities are multiplying. Those going into teaching often give courses in mathematics or physics along with astronomy.

into the universe beyond.



FOR MORE INFORMATION

If, after reading this booklet, you still have questions about any phase of study in the various science departments at the State University of Iowa, please address a card or letter with your questions to the Dean of Admissions, State University of Iowa, Iowa City. Requests for application for admission, housing forms, or general information about SUI also may be addressed to the Dean of Admissions.

The enormous amount of data used in modern scientific investigation is processed with spectacular speed by electronic computers.