

NEWS-LETTER

UNIVERSITY OF ILLINOIS

Department of Mining and Metallurgical Engineering Alumni

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ACCELERATED SCHEDULE NECESSARY?

The present conditions of partial mobilization have us all in a state of uncertainty concerning the future. This is especially felt by our students who are finding it difficult to follow the advice of "education as usual," however sound this advice may be. The situation is not too dissimilar to that at the start of the last war, when most students were unable to satisfactorily apply themselves to study in face of imminent induction in the services before completion of work for their degrees.

Recent policy has been to allow students who have been drafted to complete the current school year before being inducted, and to allow graduates 30 days to find a position in industry before being called. Underclassmen at the present have little hope of remaining in school to complete their course of study, and this condition certainly has an undesirable influence on student morale.

Congress is now debating a draft law under which up to 75,000 men will be deferred for college study. Our students are anxiously awaiting clarification of how this number is to be chosen. This number, in addition to the men rejected by draft boards, ROTC students, veterans, and students under draft age will comprise a male student body approximately equal to that of 1940-41 enrollment.

Colleges and universities are anticipating that by next fall, practically the entire male enrollment will come either directly from the armed services or through specific student deferments. In view of this possibility, a great deal of attention has been given the question of introducing an accelerated program at Illinois. The near unanimous opinion of the engineering faculty is to avoid a year-round accelerated schedule if at all possible. Most educators are in concurrence with the belief that such concentration is detrimental for both students and staff.

If the services request acceleration, however, and if most of the students are here by grace of the

services, it is doubtful that the University will have any choice but to adopt such a program.

Against this possibility, the various colleges of the University have been expressing themselves with regard to the two common methods of acceleration: the trimester system (three full semesters a year) and the quarter system, now used by some large schools such as Ohio State and Northwestern.

Some lively debate concerning the relative merits of the two plans has been aroused between the advocates of each. The quarter system appears more flexible and less concentrated but its adoption here would necessitate considerable review and adjustment of all curriculums. Many argue that this may be well worth while in many departments. Under the quarter system a student graduates in three years, while it takes only two and two-thirds years under the trimester plan.

The College of Engineering appears slightly in favor of the quarter system, providing acceleration is necessary. We would all like to think that these serious steps will not have to be taken, but nevertheless, we must be prepared for any eventuality.

State Analytical Lab To Move From Campus

In January, 1948, the department established an analytical laboratory for the State department of mines and minerals in the south end of the mining laboratory. The analytical laboratory had for its purpose the analyses of mine atmospheres for methane, oxygen, and carbon dioxide, and for the incombustible content of dusts found in coal mines. The samples of atmospheres and dusts are furnished to the laboratory by the State mine inspectors and samples are collected each month during their monthly inspections. The laboratory has employed from eight to 13 persons, depending upon the season of the year and the load of analytical work required.

Frederick Wins AIME Contest

Philip H. Frederick, who won the Chicago Section AIME student technical paper competition, has recently received word that his paper has also won the national award in the undergraduate division. As was reported in the last Newsletter, Phil's paper was entitled "Casting Stainless Steel Tensile Bars in Ceramic Molds."

In addition to the \$150 prize connected with the double award, Phil will also enjoy the wide recognition that accompanies this demonstration of his ability. Unfortunately, it may be some while before Phil is able to use this honor as a talking point in job-hunting, as he matriculated in the U. S. Air Force shortly after graduation.

While completing his basic training at Lackland, Texas, Phil applied for pilot training and was accepted. While waiting for class assignment, he was transferred to Wright-Patterson Field for work in the metallurgical department on high temperature alloys, and it now appears it is possible he may receive a direct commission and remain at Wright Field.

We are anxious to learn whether Phil's career in the Air Force will involve flying or metallurgy. For any alumni who may want to send any advice for Phil on getting along in the Air Force, his present address is: Pvt. P. H. Frederick, 3062 AMC Support Sqdn., Wright-Patterson Air Force Base, Dayton, Ohio.

The laboratory has afforded the means of continuous checking on the explosion hazards of coal mines and has proven its worth for the three years' time. With the expansion of the research program in physical metallurgy space is at such a premium the State has been requested to remove the laboratory from the campus. It now appears the analytical laboratory will be moved to the mine rescue station in Springfield sometime this spring, and the space released will be available for research purposes.

DEPARTMENT HOPES FOR MORE SPACE

Another victim of the mobilization effort has been the department's plans for expansion. For some time it has become apparent that our hopes for a new building would have to be shelved for an indefinite period. In spite of this setback to our expansion program, it was still hoped that our pressing need for additional space could be met by construction of a third floor to the present Metallurgy Laboratory and acquisition of one floor of the old power plant building north of the Mechanical Engineering Laboratory.

Work is in progress now converting the space of the boiler room to three floors of laboratory space. The addition of one of these floors plus a third floor on our building would give the department about 16,000 square feet of new space, and, while not permitting all the work of the department to be carried out under one roof, at least would satisfy our immediate need for space.

Prof. Walker made an excellent case of the department's need before the building and space committee of the college, and secured their approval for both a third floor on our laboratory, and the third floor of the power plant. It was proposed to house the department's research group in the physics of metals in the reconstructed power plant—to be called the Physical Science Building.

Crews Is Trustee for Honorary

Last January, Donald L. Crews, Met. '42, was nominated as a trustee of Alpha Sigma Mu, national metallurgical honorary fraternity. Don has accepted the recognition and responsibility of this appointment, and it is anticipated that in this position he will do a fine job in furthering the interests of the society.

Don is now Asst. Prof. of Metallurgical Engineering at the University of Cincinnati, devoting most of his work to instruction in foundry practice. He is his University's representative to the University Advisory Committee of the Foundry Education Foundation.

It would be hazardous to assume that all of the metallurgy alumni are aware of the existence and function of Alpha Sigma Mu. As a matter of fact, the guiding light of the founding of the society was

Metallurgy Seminars on Many Topics Given

Seminars in physical metallurgy have been continued with many highly informative talks presented recently by departmental staff members and by distinguished men in various fields who come to discuss their particular interests with us.

Talks last winter were made by Dr. Roy Shuttleworth of the Physics Department on the history of thermal etching of metals, along with his own recent observations on the subject; and by Dr. Frederick Seitz who described the aims and progress of the program of research in the physics of solids at the University. Stanley Channon, research assistant in metallurgy, described the work carried out for his Ph.D. thesis on recrystallization

After enjoying 24 hours' happy contemplation of how we could so adequately use the allocated space, a group with a higher priority and greater space requirements than ours came along, and our space was lost.

We still retain, however, the possibility of adding a third floor to the Met. Lab., which will add 8000 square feet to our present facilities, and at least ease our present cramped quarters. Definite decisions cannot be made until it is determined if construction materials are available, but we hope that construction on the third floor will be well along by September, 1951.

and grain growth in cold rolled cartridge brass.

The current semester's program of talks was initiated by Dr. Charles Wert, who discussed the effect of nuclear radiation on metals. Dr. Wert first explained the operation and control of a radioactive pile, and described the possible mechanisms by which the radiation could affect the structure of a metal specimen placed in a nuclear reactor. Data which has been published on the subject was reviewed and analyzed.

Roland P. Carreker described work he has carried out on the relation of some variables in the plastic deformation of metals. His tests were carried out on platinum wires under a wide range of experimental conditions: temperatures from 1550 to 780K, stresses from 900 to 40,000 psi., and strain rates from 10^{-3} to 10^{-6} min.⁻¹. From this large collection of data, a number of simple empirical relations were obtained for deformation under the experimental conditions of constant stress.

In the next talk, Dr. Clarence Zener of the Univ. of Chicago explained his new theory of ferromagnetism. This theory correlates very well with observed data, and does not necessitate any of the unjustified assumptions of older theories.

Prof. John Marx described methods for determining orientation of single crystals, and for measuring orientation differences between two adjoining grains by x-rays. His talk reviewed the application of x-rays to crystallography, and the various projection methods of plotting the data.

The most recent of the seminar series was presented by Dr. C. S. Smith, Director of the Institute for the Study of Metals, Univ. of Chicago, on the formation of the microstructure of metals. Dr. Smith described his familiar interesting and useful analogy between the growth of a soap bubble froth and the growth of grains in a metal. The application of growth data based on space filling and surface tension factors was seen to predict metallic structures with a high degree of accuracy. Dr. Smith's excellent presentation of this interesting subject made his lecture a high point in the series of colloquia talks.

Prof. Walker, when on the faculty of the Dept. of Metallurgical Engr. at Michigan College of Mining and Technology at Houghton, Michigan, in 1932.

The aims of the society are to recognize and encourage high scholarship in metallurgy. Alpha Sigma Mu, signifying the Arts and Sciences of Metals, prides itself on the absence of any mysterious handshakes and rituals, and accomplishes its purpose without introducing some of the personal animosities which unfortunately sometimes arise in similar organizations.

At the present time, there are chapters active at Illinois, Houghton, and Virginia Polytechnic Institute. It is hoped that chapters may soon be organized at the Univ. of Alabama, Purdue, Wayne Univ., and the Univ. of Detroit.

A NEW PROGRAM OF RESEARCH AND STUDY

In order to meet the increased application of the science of physics to metallurgy, a series of supplementary courses in metallurgy have been proposed by the department. The aim of these courses is to acquaint the student with new ideas in the physics of metals. In the article below, Dr. Wert has discussed these proposals.

For a great many years, the science of metallurgy has to a large degree been dependent on the science of chemistry for its fundamental principles. This was entirely just, since many of the problems of the past, as well as of the present have depended upon understanding constitution diagrams, phase changes, reactions between metals in the liquid and solid state, etc. Many of the best known metallurgical researchers of the past have had the disciplines of chemistry to guide their thinking and this science will continue to play an important role in the future.

Accompanying the gradual development of metallurgy, however, came a need for new tools and ideas not generally possessed at the time by chemists. At this time, some physicists entered the field, bringing with them new ideas about electrons and electronic structure of atoms. Their ideas have enabled us to understand the electronic structure of metals and insulators and, though many details remain, it is most likely that the fundamental ideas are sound, and will remain essentially unchanged.

Two years ago, Dr. Frederick Seitz joined the staff of the Physics Department, and now has a group of about twelve staff members and twelve graduate students working under his direction. Several courses have been set up in the Physics Department dealing with solids in general. The Department of Mining and Metallurgy has also taken steps to start a program of research and study in the fundamental properties of metals. Two new staff members were added last fall, and it is hoped that the number can be increased.

The program being initiated by this department has two aims. The first is to present to all undergraduate students some of the ideas of the physics of metals. The second aim—and the one to which most attention will be given—is to give to all graduate students as broad a training as possible in the application of the ideas of physics to the solution of problems in metallurgy. Some of these graduate students will, of course,

do thesis research in conventional metallurgical fields; some will do their thesis research in this new area of study.

The first course proposed, Physics of Metals (Met. E. 218), is intended to follow the familiar Introductory Physical Metallurgy (Met. E. 201), and is to be taken by students in their second semester of the junior year. In this new sequence, some of the material now taught in Met. E. 201 will be held over to the new course, and Met. E. 201 will be devoted more extensively to the study of phase diagrams and their relation to microstructure than it is now. The new undergraduate course will be rather general in nature but will tend to emphasize the mechanical rather than the electrical and magnetic properties of metals.

Besides serving as a course of formal instruction, this course should serve to introduce to the students that part of the staff doing teaching and research in this area in the graduate school. We hope in this way to awaken in some of the students an interest in doing graduate work in this field. Such a course as this will be a more systematic introduction to the field as compared to the colloquia talks on physics of metals, which because of their more advanced nature have proved somewhat frightening to undergraduates.

The first two semesters of advanced undergraduate and graduate courses, Mechanical Behavior of Metals (Met. E. 309) and Phase Changes in Metals (Met. E. 310) are designed principally for graduates, though exceptional undergraduates may enroll. Either course is an entity in itself and requires no elaborate background of mathematics or other science.

Met. E. 309 has the intriguing subtitle Elasticity, Plasticity, and Anelasticity. The first part of the course will be concerned with properties of crystals which depend on direction in the metal. Though emphasis will be placed on elasticity, other properties such as electrical conductivity and thermal expansion will be treated as well.

The second part of the course will consist mainly of an examination of the properties of dislocations. Not much emphasis will be placed at this time on the purely empirical facts about plastic properties of metals. The inter-relation of work hardening, annealing, effect of impurities, vacancies and dislocations will be considered. As the modern theories of crystal plasticity wax and wane, the content of this part of the course will vary. The final part of the course will deal with anelasticity and its effect on mechanical properties of metals.

Met. E. 310, Phase Changes in Metals, also will cover three areas, the first of these being diffusion. Besides attempting to learn something about the possible mechanisms of diffusion, the class will investigate experimental methods of studying diffusion. Upon completion of this study, a competent student should be able to choose and carry out interesting and significant experimental investigations in this field. The middle part of this course will be concerned with nucleation and phase changes in the solid state. This study will involve both the thermodynamics of change of phase, and attempts to make detailed models of how changes of phase occur. The work will lead quite naturally into age-hardening and other phase changes important in practice; the final part of the course will consist of a study of such systems.

The final year of work proposed in this field is Advanced Physics of Metals. After an introduction to the ideas of quantum mechanics and the modern picture of the atom, some time will be spent in showing how the periodic table is built up. Some effort will be expended in seeing just what properties are periodic in the table. The student will be urged to acquire a "feeling" for such things as density, conductivity, crystal structure, and melting point of a metal by noting its general position in the periodic table. It is hoped that this knowledge will cause a wondering of "why is it so?" A section on

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NEWS OF THE ALUMNI

Reider (Ray) Eriksen, Met. '41, spent six weeks of the past summer touring his native country, Norway. Ray took many color photographs of scenes from one end of the country to the other. Included in the group are pictures of Ray's home town, a fishing village nestled in one of the fjords of northern Norway. Ray apologized for not learning to play baseball better in his youth, but as he was able to show, all the playing fields would consist of barren rock pitched from 30 to 80 degrees from horizontal. Ray's pictures and commentary were enjoyed by Don Crews, '42, and Harry Czyzewski, '41, on a visit to Cleveland February 16. The Ray Eriksen travelog is recommended to all Illini. On your next trip to Cleveland, be sure to get in touch with him. Ray works in the Research Department of the National Malleable Steel Castings Co., Cleveland.

We enjoy reading letters like the one from Joe Di Voto, Met. '43, which passed across our desk recently, and contained a well appreciated compliment on the metallurgical training received here in his undergraduate years. Joe brought us up-to-date on his varied experience since graduation: with Howard Foundry, David Bradley Mfg. Works, Tucker, Armour Research Foundation, and Chrysler. Joe is now working as head of the metallurgical section for Stewart-Warner in Chicago.

Verle Utzinger, Met. '49, is one of our graduates that we see more often than most, since he's working only a short distance away in Decatur. On his latest visit, he had more news than usual to report: the birth of his first son on September 1.

The department was on the mailing list for the Wyvona and Joe Lane (Met. '43) Christmas Newsletter. It would not be revealing any confidences to pass along that after receiving his Ph.D. in metallurgy from M.I.T. last June, the Lanes took a well-deserved leisurely vacation in the south before returning to Washington where Joe is now working on high temperature alloys at the Naval Research Laboratories. Most of their spare time is apparently being spent on

the development of a piece of Maryland real estate in which the Lanes have invested.

The graduate students and staff were anxiously helping Bill Hoskins, Met. '50, wait out the month of December for the birth of his first child. To the relief of all, the internal revenue department was successfully cheated as William Theodore was born on Dec. 12. Bill is holding a half time assistantship, and working on his M.S.

Prof. Walker is just now back at his desk after undergoing abdominal surgery late last month. We were all glad to learn that his operation was highly successful, and though he is still somewhat weak, his recuperation was remarkably rapid. Johnny blames his whole trouble on his fulfilled resolution concerning alcoholic moderation. You may know that Prof. Walker's return to good health will result in renewed vigor in his directing of the growth of the department.

In the role of the successful graduate returning to visit the alma mater last month was Roland P. Carreker, Met. '45, on his way back to the General Electric Research Lab. at Schenectady from the AIME meeting in St. Louis. Roland was enthusiastic about the excellent work being done by the metallurgy group at G. E., and described some of his recent work to the graduate seminar. He also talked to the group of graduating seniors on the highly pertinent subject of job potentialities in industry and research.

We are always happy to hear from any of the alumni, and hope that the feeling isn't prevalent that it is necessary to take drastic measures to work up the impetus to write of your current doings. We're thinking now of the letter from Ed Kaminski, Met. '50, telling of the birth of 8 lb., 13 oz. daughter Kathleen Elizabeth on Jan. 25, 1951. Ed is working for Carnegie-Illinois Steel, and his home address is 3223 South Wallace, Chicago. It wasn't at all necessary to go to such lengths just to have an excuse to write.

George Caskey, an honor graduate in metallurgy last June, has

written concerning his progress in his first semester's work in the graduate school at Massachusetts Inst. of Tech. We were glad to read between his modest lines that he is doing quite well in his graduate courses. One observation he has to make on the work at M.I.T. is that less emphasis is placed on development of laboratory skills, and more work in theory and problems. An interesting note is that George feels his undergraduate work at Illinois has prepared him better than graduates of M.I.T. and other schools represented at Cambridge.

Glen Wensch, Met. '46, was at Los Vegas, Nev., as an observer at the recent atomic weapons tests in connection with his work at Los Alamos Scientific Laboratory. Glen took time away from his duties and the gaming tables to drop his friends here a short note.

Stan Channon, our second Ph.D. in metallurgy, just beat the Newsletter deadline when his wife presented him with a boy, John Lyall, on March 16. Stan has accepted a position with duPont, and will be leaving for Delaware soon.

A NEW PROGRAM (from page 3) "what holds a solid together" will follow this; here the origin of the various forces that hold atoms in an equilibrium position in a solid will be studied. The course will continue with a study of the electrical properties of solids based on the band theories of solids. Magnetic and other cooperative superlattice properties of solids will finish out the year.

In addition to the courses described above, there is ample thought and energy being given to the establishment of research in the physics of metals. Problems being undertaken at the present time deal to a large extent with plasticity; especially of the effect of impurity atoms on plastic properties. Some of the anelastic measurements being done in Zener's group at Chicago have been transplanted down here and will yield results in due time.

We hope that with the plans outlined here and with the plans of the rest of the department that a strong enough foundation has been laid so that with vigor on our part, larger and larger success will ultimately follow.