

UNIVERSITY OF MINNESOTA
Graduate School

Minutes of the Executive Committee
Friday, December 6, 1963
12:00 Noon Board Room, Campus Club

Present: Professors A. Orville Dahl, W. E. Ibele, R. L. Jones, W. P. Martin, W. A. Russell, D. R. Torbert, J. G. Darley; Deans F. M. Boddy & John Haugland; Dean Bryce Crawford, Jr., presiding; Mrs. Shirley McDonald, secretary.

1. Reports on Proposed New Programs

- A. Proposed Ph.D. - Electrical Science - Professor Ibele gave a brief history on the origin and progress of this proposal. Sometime ago, an M.S. degree with a major in Electrical Science was established to enable students who, for example, do not have an undergraduate degree in Electrical Engineering, but do have an interest in and are adequately prepared to do graduate work in engineering physics in such areas as solid-state and plasma phenomena. Later a request for the Ph.D. in Electrical Science was made. An ad hoc committee was appointed to investigate the possibility that other engineering fields might also find a change in the degree designation useful. Since this committee found little interest, it was dissolved and the proposal was again referred to the Physical Sciences Group Committee.

There is some feeling by the P.S.G.C. that changing the title from Electrical Engineering to a major in Electrical Science would make little difference because the holder of the Ph.D. degree is thoroughly investigated as to his record, dissertation, etc. by a prospective employer. The committee asked Professor Ibele to get an opinion from the Physics Department since it would be most affected by the change. Professor Nier, chairman of the Physics Department, expressed views on several aspects of the proposal and Professor Ibele asked that a decision be deferred until the Physical Sciences Group Committee has had an opportunity to study the proposal further.

Dean Crawford stated that the E.C.P.D. is considering accreditation of graduate programs in the various engineering fields. He will contact Dr. Grintner, of that organization, to ask if there might be any opinion in regard to designated degrees.

- B. Proposed Ph.D. - Control Sciences - A committee from the faculties of the Departments of Aeronautical, Chemical, Electrical, and Mechanical Engineering and Mathematics in I.T. have recommended that a Ph.D. Degree in Control Sciences be authorized by the Graduate School. "During the past two decades the fields of automatic control, computer technology and information theory have evolved into a profound new intellectual activity of fundamental scientific interest having engineering applications of broad significance; a discipline possessing a unifying philosophical orientation and based on a voluminous technical literature."¹ Over the past several years individual graduate control courses have been designed in the

several departments. With the proposed program, a unified field of control science would be developed.

Professor Ibele stated that the Physical Sciences Group Committee is impressed with the breadth of interest in the several departments concerned and that it is useful to avoid duplication of staff and courses, as suggested in the proposal. The P.S.G.C. recommended that the program be approved, but with an amendment which has to do with admission to the program. The proposal stipulates that "Admission to the program must be approved by the Graduate School on recommendation of the faculty of the Center." The committee asked that "Admission to the program be approved by the Graduate School on recommendation of one of the relevant departments from which the Control Sciences Center faculty is comprised." It is felt that the student must be attached to one of the departments (as in Chemical Physics) in the event he is not able to do the work, or his interests shift. Thus a department would assume responsibility for the student.

The Executive Committee APPROVED the Ph.D. in Control Sciences with the amendment stated above.

There followed some discussion on how the student would be admitted and how the mechanics would be handled. It was decided that the student would be admitted to pursue a Ph.D. in either Electrical Engineering, Chemical Engineering, Mechanical Engineering, etc. (one of the departments) or in Control Sciences. The Graduate School will appoint a subcommittee (composed of faculty from the Control Sciences Center) which will be in communication regarding students programs as well as administer fellowship and assistantship programs for the Center. After the student programs have been endorsed by this subcommittee they will go to the Physical Sciences Group Committee for action.

- C. A Proposed Designated or Undesignated Master's Degree in Mineral Engineering and Metallurgical Engineering - Some confusion exists as to whether the major in Metallurgy (present M.S. degree-undesignated) should remain in force or whether the major as such should be disestablished. A proposal from the department indicates that the graduate programs in Metallurgy and Metallurgical Engineering should be combined into a single program entitled Metallurgical Engineering. Action on the proposal will be deferred until January so that the Physical Sciences Group Committee can clarify this point.

Dean Crawford mentioned that it might be well to study the whole question of the designated degree, and will meet soon with Professor Ibele and Professor Swalin.

- D. Proposed M.A. in American Legal Institutions - Professor Jones mentioned that Professor Carl Auerbach has been recently appointed to the Social Sciences Group Committee because of the increased use of law in various graduate programs.

The M.A. in American Legal Institutions is intended only for the foreign graduate student in law who wants a better understanding of

American legal institutions and practices. The Social Sciences Group Committee recommended approval of the program, but wished to point out to the Executive Committee a slight departure from the normal Plan B credit requirement. The proposal suggests a 15-18 credit minimum outside of the major and a 27-30 credit minimum in the major. After some discussion, the Executive Committee agreed that the formal ruling on the credit minimum for the Plan B program should be retained.

The Executive Committee APPROVED the Master of Arts Degree in American Legal Institutions with the provision that the standard Plan B credit requirements (minimum 21-27 credits in the major and a minimum of 18 credits in related fields) be retained.

At the time the minor in Law was established, certain members of the Law faculty were appointed to the Graduate Faculty for the purposes of teaching courses and serving on examining committees. Dean Haugland will look into the Graduate Faculty status of the members listed, now, for the purpose of advising Master's candidates.

- E. Proposed Changes in the M.B.A., M.S., and Ph.D. Degrees in Business Administration - Action on the proposed changes has been deferred to give the Social Sciences Group Committee an opportunity to study the proposals.
- F. Proposed Ph.D. - Industrial Relations - An ad hoc committee, chaired by Dean Paul Grambsch, was appointed to study the proposal. This committee concluded that Industrial Relations is valid as a basic field; faculty representation from the other areas is good, etc. The Executive Committee had some questions on the specific Ph.D. requirements and the Graduate School will clarify these details.

The Executive Committee approved, in principle, the major in Industrial Relations on the basis of the letter from Dean Grambsch reporting the opinion of his committee.

2. The CIC Traveling Scholar Program

Dean Crawford asked the Executive Committee to urge the Graduate Group Committees to report on the CIC program at their departmental faculty meetings. A brochure describing the program is attached to these minutes. In all probability, many of the faculty are not aware of the program and how it works as far as the University of Minnesota is concerned.

The Minnesota student who wishes to participate in the program is required by the Graduate School merely to submit, in advance, a brief description of his proposed research or study plan on the Graduate School general petition form. The proposal will be reviewed by the appropriate group committee and if it is judged a sound program, the student and his adviser will be encouraged to proceed with the preliminary steps at the host institution.

Questions on the CIC program and procedures can be directed to Dean John Haugland, extension 2966

3. The Proposed Change in the Ph.D. Minor Requirement

The Graduate School staff, in working out a statement for bulletin purposes, has designated this alternative to the normal minor as the Supporting Program of Study. Copies of the statement were circulated to the Graduate Group Committee members recently. Since this distribution, another paragraph has been inserted: "Obviously, a student electing to use the supporting program will not be expected to take written preliminary examinations in the fields included in his supporting program, nor would he be expected to have competency in each of the fields in his program comparable to that of a person with a normal minor in the fields concerned. The preliminary oral examining committee need not necessarily include a faculty representative from all of the fields included in a student's supporting program."

Dean Crawford received a report from Professor Russell of the Education Group Committee, in which it was suggested that any full member of the Graduate Faculty, either from the major or the supporting program, might serve in addition to the major adviser in counseling the student and might approve the supporting program.

The only objection expressed with the supporting program seemed to be with the role of the "Graduate Counselor." Some committee members believe that the "Graduate Counselor" as originally described, might tend to freeze certain kinds of supporting programs, or that they might inhibit some of the normal relationships between the major adviser and student. Dean Crawford polled the Executive Committee, and all of those who represent areas where the supporting program could be used, agreed that the alternative suggested by Professor Russell's committee would be a more satisfactory arrangement.

The Executive Committee APPROVED the Supporting Program as an alternative to the normal minor for the Ph.D. with the stipulation that a full member of the Graduate Faculty from the major or related field area, in addition to the major adviser endorse the supporting program. Dean Boddy pointed out that this second person would be responsible to the group committee and the student for coherence and usefulness of the supporting program.

Dean Crawford stated that a letter containing a statement describing the Supporting Program of Study will be mailed to the Graduate Faculty in January.

4. Use of the Grade Point Average

Discussion of this topic deferred until January.

5. Scheduling Group Committee Meetings

Professor Russell mentioned that some of the delay in the Graduate School clerical procedures, notices to students, committees, etc. might be eliminated if group committee meetings were scheduled on a regular basis. Announcements of the scheduled meetings could be published in the Minnesota Daily so that graduate students wanting action on programs would be aware of the deadlines for submission of such papers. This also might help reduce the increasing volume of material receiving interim action.

The Executive Committee approved this idea and the Graduate School staff will work out tentative schedules on the basis of two meetings per quarter. Some staggering of meetings between the various group committees will be attempted in order to avoid the periodic onslaught of group committee business in the Graduate School Offices. After the tentative schedules have been made, the Graduate School will clear them with the chairmen of the group committees.

6. Graduate Faculty Appointments and Graduate School Procedures

The Graduate School staff has been studying its present procedures in respect to Graduate Faculty appointments. Dean Crawford asked the Executive Committee to comment on the feasibility of combining certain classifications. It was decided during the course of this meeting that combining A-1 and the A-2 categories or the A-3 and B categories would not be reasonable since the separate categories are very useful as they are; however consideration might be given to combining the A-2 and A-3 categories. Dean Crawford asked the Executive Committee to explore this possibility with their group committees.

In this connection, the dean asked the Executive Committee about nominations to the Graduate Faculty, or recommendation for change in Graduate Faculty status in which the group committees may not concur. Should the group committee chairmen check back with the nominators to explain the action, or should this be left to the Graduate School? It was concluded that in cases where the group committees do not indicate that the nominator has been contacted, the Graduate School will do so.

The date for the next Executive Committee meeting was set for Tuesday, January 14 at 11:30 A.M.

Respectfully submitted,

Shirley McDonald,
Secretary

December 11, 1963

Office of the Dean

March 29, 1963

discuss with WBL

(V)
Dean Bryce Crawford
Graduate School
321 Johnston Hall

Dear Bryce:

You will remember our discussion at lunch a few weeks ago concerning a masters degree for foreign law students.

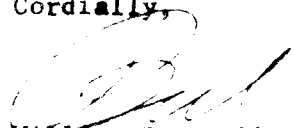
I enclose a proposed statement of the requirements for the degree Master of Arts in American Legal Institutions. We have tried to fit this to the Plan B requirements and I hope we have succeeded. I send it to you informally for your suggestions and comments.

We have not tried to spell out the various fields of law in which the student would concentrate, for these should be molded to the student's needs. We envisage that most of the courses outside the field of concentration would be taken outside the Law School, but we do not want to specify the whole area of the law as a single field of concentration, for we might better meet the needs of a particular student by having him take somewhat less than 18 credits outside the Law School. Therefore, we drafted this so as to leave the flexibility we can get by designating a field of concentration narrower than the total Law School curriculum.

I invite your comments and suggestions, and also your advice as to what formalities are required to have this program established.

If you think it advisable Carl Auerbach and I could plan to have lunch with you or Frank Boddy to talk about this.

Cordially,


William B. Lockhart
Dean

WBL/zn

Requirements for the Degree of Master of Arts
in American Legal Institutions

(V)
Plan B with Concentration in a Field of Law

The program of work leading to this degree is designed to familiarize the foreign student who has studied law in his own country with American legal institutions. Only foreign graduate law students, therefore, may be awarded this degree.

The program of work will be selected to suit the particular needs of each foreign student. Normally, at least 3 quarters of graduate study are required with concentration in a field of law. Courses accounting for at least 27-30 quarter credits must be taken in the Law School. Courses accounting for ~~at least~~ 15-18 quarter credits may be taken in other departments of the University. Within the limits indicated, the number of quarter credits to be taken in the Law School and the courses to be taken outside the Law School will be agreed upon by the student and the appropriate Law School Committee. The courses to be taken outside the Law School will be selected to enable the foreign student to put his studies in the Law School in their proper social, economic, political and cultural framework.

Note Stipulation re credits in Eq Comm minutes

UNIVERSITY OF MINNESOTA
Graduate School
Minneapolis 55455

Office of the Dean

November 18, 1963

TO: Graduate School Group Committees

FROM: Bryce Crawford, Jr.

SUBJECT: Change in Ph.D. Minor Requirements -- A Supporting Program
of Study

The Executive Committee has recommended that the proposed change in minor requirements which would initiate a more flexible minor for the Ph.D. degree be put into effect soon. The following is a tentative definitive formulation which describes the new program.

Supporting Program of Study

In place of the traditional minor as defined in the Graduate School Bulletin, a student may, with the approval of his major adviser and the appropriate group committee, include a supporting program of study in his overall doctoral program. This supporting program must include not less than one-sixth of the total work in the doctoral program (in terms of course work, approximately 18 to 24 credits), and must be completed before admission to the preliminary examinations. ← *Inuit*

It should be noted that the supporting program is an alternate to, not a replacement of, the minor. The traditional minor will continue to be available at the option either of the student or of his adviser.

It should be emphasized that the supporting program must be a coherent pattern of studies, possibly embracing several disciplines, but clearly forming a purposeful part of the doctoral program with the same type of supporting relation to the major field as the traditional minor requirement. The student's major would, of course, represent the core and would hold the entire program together -- thus the Ph.D. program has to be considered as a whole. Since the role of the minor adviser will change, more responsibility will fall on the student and the major adviser in justifying a program as a coherent one.

It is important to note at this point that early submission of a Ph.D. program is a prime necessity. Group committee approval should be given before a student commits himself to work on a supporting program. This type of individually tailored program will necessitate careful planning by the student and skillful evaluation by faculty advisers, and is not something that can be structured by the student alone, or even in consultation with his major adviser only.

The formulation and approval of a Ph.D. program which includes a supporting program must, of necessity, be handled differently in different areas in accordance with the varying policies and procedures of group committees and departments. In some areas the Graduate School, on the recommendation of the group committee concerned, will appoint a number of "graduate counselors" who will be chosen to serve in the place of the traditional minor adviser to counsel students who wish to use the supporting program minor. A student's completed Ph.D. program should have the approval of both the major adviser and the graduate counselor.

In other areas the student, after consultation with, and the approval of, his major adviser may submit his Ph.D. program directly to the group committee for their review and action. The student, however, should avail himself of the advice of members of the group committee or other graduate faculty members on the formulation of a coherent program which includes the supporting program.

Under either procedure the final recommendation regarding approval of a proposed program which includes the supporting program would remain with the group committee, as is presently the case for the normal minor. And, as is presently the case with the normal minor, the stipulation would continue to be made that programs with the supporting program should be formulated, and the entire doctoral program submitted to the Graduate School as early as possible after the completion of one full academic year, normally the fourth quarter of a student's Graduate School registration.

Control Sciences

1. Need for a Graduate Program in Control Sciences

A committee chosen from the faculty of those departments in the Institute of Technology concerned with the Control Sciences authorized the granting of the M.S. degree in Control Sciences. During the past few decades the fields of automatic control, computer technology, and information theory have evolved into a well-defined and vital area of research of fundamental and practical interest having engineering applications of broad significance. A discipline possessing a scientific spirit and a bias toward analysis based on a soundness of technical criteria.

The purpose of the Institute's new research program leading to the Ph.D. in Control Sciences is to conduct an experiment to pursue a wide field of study to see that in Science and Engineering, as well as these candidates may develop into creative experts who are authoritative in the manifold aspects of control theory and information theory and computer technology and who have a command of the application of such knowledge and an appreciation of the limitations of their knowledge.

To meet the growing interest in the Control Sciences the departments of aeronautical, chemical, electrical, and mechanical engineering, and mathematics in I.T. have organized several graduate courses in the last few years. These individual control courses have been independently designed and have tended to be uncorrelated. As a consequence some of these courses have similar content and result in an unnecessary duplication of effort for the faculty and students. A further undesirable feature of the current offerings is that both faculty

and students often specialize in one narrow aspect of the subject without realizing the general scope of Control Science and the possible ramifications of its applications. Such a specialization fails to stimulate scholars having a mastery of the unified field of Control Science and even results in a serious lack of breadth in the course offerings or gaps in certain crucial areas.

2. Discussion of the Ph.D. in Control Sciences

The new Ph.D. program in Control Sciences will require all candidates to demonstrate proficiency in each of the four basic divisions:

- i) mathematical and physical control models,
- ii) stability and control of linear and nonlinear deterministic processes,
- iii) stochastic problems in control and information theory,
- iv) numerical and computer techniques and the implementation of control concepts in scientific and engineering problems.

This requirement can be fulfilled by completing a minimum of 9-200-level quarter credits in each of the four divisions and successfully passing a preliminary examination including these studies. In addition the candidate will be strongly encouraged to diversify his program by including advanced courses in at least three of the related departments of aeronautical, chemical, electrical, and mechanical engineering, and mathematics. In particular considerable mathematical proficiency is required, as indicated below in the detailed specifications of the Major Program. The instructional program for each candidate must be approved by an appropriate subcommittee of the Physical Sciences Graduate Group Committee.

This graduate program would meet the goal of training doctorates with a broad knowledge of the Control Sciences. Further, the program would serve to

coordinate the course offerings, and to provide the opportunity to eliminate course duplication, and to provide the opportunity of new courses as the need arises. Moreover, this program would represent fully the talented efforts of the scientific community in the University of Minnesota and in the surrounding region. There are now many students who qualify for, and who seek, the training which can be provided only by a graduate program in Control Sciences. The program can be of great service to the State of Minnesota in the strengthening of a basic scientific field currently of great importance to the Nation.

3. Control Sciences Center

The new Ph.D. program in Control Sciences would be directed by a faculty of the Control Sciences Center.

The faculty of the Center will consist of faculty members of the relevant departments of the University acting as a subcommittee of the Graduate Group Committee for the Physical Sciences.

4. Faculty of the Control Sciences Center

Initially it is proposed that the faculty consist of:

N. R. Amundson (Ch.E.)	L. Markus (ITM)
R. Aris (Ch.E.)	K. Ogata (M.E.)
R. P. Halverson (E.E.)	J. H. Park (E.E.)
F. B. Lee (E.E.)	P. R. Sethna (Aero. E.)
B. W. Lindgren (ITM and Statistics)	M. Stein (ITM and Computation Center)
W. S. Loud (Mathematics)	

5. Degree in Control Sciences

The program in Control Sciences leads to the Ph.D. degree. No M.S. degree or minor specialization is planned in the field of Control Sciences.

Responsibilities

Candidates for the Ph.D. program in Control Sciences will normally have completed an undergraduate degree in an appropriate field, such as aeronautical, chemical, civil, electrical, mechanical, engineering, mathematics, or physics. [Admission to the program may be approved by the Graduate School on recommendation of the Faculty of the Center] Any applicant whose scientific and engineering training is adequate to enter the program will be considered.

4. Approval of Program

The candidate's tentative program will be planned with the aid of an advisor selected from those listed on the faculty of the Center. This faculty will consider the program so transmitted to the Physical Sciences Group Committee with recommendations. Approval and appointment of a thesis committee will be handled as usual. The standard requirements on course credits, languages, examinations, and research thesis will apply.

8. Major Program

The course work in the major should normally be selected from those courses in science and engineering that are particularly relevant to the field of Control Sciences. As it is intended that this program should provide an opportunity for a broad training, it is desirable that at least 9 credits of 200-series courses be selected from each of 3 of the related departmental areas. In addition the candidate must prepare for a preliminary examination in each of the following four basic divisions:

- i) mathematical and physical control models (see EM 132-133B-134B; IF 174-175; Seminar in Control Process Models)
- ii) stability and control of linear and nonlinear deterministic processes (see EM 284-285-286; WF 296-297-298; ER 294-295-296)

- iii) stochastic problems in control and information theory (see EE 267-268-269; Math 284A-284B-284C)
- iv) numerical and computer techniques and the implementation of control concepts in scientific and engineering processes (see EE 194-195-196; ChE 171-172-173; ME 198-199; EE 190A-190B-190C; ITM 227-228-229; ITM 165A-165B-165C)

Normally a candidate can prepare for the preliminary examination by completing 9 credits of 200-series (or suitably advanced) courses in each of the four divisions. The balance of the normal requirements for the Ph.D. will be selected in consultation with an advisor.

9. Minor Program

There will be no official minor program. However, each candidate is required to attain a high level of mathematical proficiency, as demonstrated by a satisfactory completion of ITM 173-174-175 and either ITM 132-133B-134B or ITM 284-285-286 (or some approved substitute excluding advanced calculus and engineering mathematics).

10. Language Requirements

All candidates must satisfactorily meet the requirements of two foreign languages, usually selected from French, German, or Russian.

11. Sample Program Leading to Ph.D. in Control Sciences

The entering candidate is here assumed to have a substantial undergraduate engineering (electrical, mechanical, or chemical) training including advanced calculus or engineering mathematics, but without any special courses in control processes. Any deficiency in mathematics or foreign languages is to be filled outside the indicated program (for example, during summers).

First Year

ITM 173-174-175

ITM 132-133B-134B

EE 194-195-196

Seminar in Control Process Models

(Complex var., Integ. Transf., PDE)

(Prob. with Applications)

(or ChE 171-172-173) (control)

200-201-202

Second Year

ITM 284-285-286

ME 296-297-298 or EE 294-295-296

EE 190A-190B-190C

EE 267-268-269

(Nonlinear ODE and control)

(Adv. control theory)

(Computer Systems)

(Statistical Comm. Th.)

Third Year

Seminars, Research, Thesis.