The Doctor of Philosophy Degree

A Policy Statement

Council of Graduate Schools

The Doctor *of* Philosophy Degree:

A Policy Statement

COUNCIL OF GRADUATE SCHOOLS

2005 CGS TASK FORCE ON
THE DOCTOR OF PHILOSOPHY DEGREE

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FOREWORD

The Doctor of Philosophy (Ph.D.) degree is awarded by faculty stewards of the discipline to those who have demonstrated the highest level of mastery of the intellectual principles of their chosen field. Through research and scholarship, recipients of the Ph.D. have demonstrated their ability to apply these principles to create original contributions that expand the boundaries of knowledge in the field. Ph.D. education is a process involving a high degree of departmental, program, school, and university autonomy, while striving to maintain the highest national standards. The Council of Graduate Schools (CGS) plays a unique role in maintaining high standards by articulating them in publications such as this one.

Graduate deans, who are usually charged with maintaining the quality of the graduate programs at their institutions, can use this policy statement as a quality assurance tool at their home institution; faculty committees charged with oversight of graduate programs and policies can use it as a guide for policy development; and oversight organizations such as state governing boards and accrediting agencies can use it as a template for evaluating programs and policies and as a basis for assessing program outcomes.

This booklet represents a considerable revision and expansion of earlier CGS publications on this topic. It appears at a time of renewed interest in the standards, principles, and processes of Ph.D. education, prompted by several concerns. Among them is the need to broaden participation in Ph.D. programs, particularly among minorities and women, and to ensure that our graduate schools are producing a sufficient number of people prepared for careers in research and teaching to meet national needs.

Because Ph.D. education is so centered on the concept of independent scholarship, programs leading to this degree tend to be less rigid in structure than many other kinds of doctoral programs. There is great variation, particularly among disciplines, in approaches to training and in definition of what constitutes acceptable contributions to research. The original authors of this booklet and those involved in subsequent revisions, while recognizing and appreciating this diversity, have attempted to provide a broad overview of the subject that will be useful to anyone interested in Ph.D. education.

Debra W. Stewart
President
Council of Graduate Schools

PREFACE

The Doctor of Philosophy (Ph.D.) degree is awarded by universities in many parts of the world as the mark of highest achievement in preparation for active careers of scholarship and research. This booklet characterizes the typical academic and institutional contexts of Ph.D. programs in the United States and Canada. It also identifies those standards of quality and procedures that are most likely to lead to successful Ph.D. degree programs. It combines and updates two earlier publications of the Council of Graduate Schools: *The Doctor of Philosophy Degree* (1977, 1990) and *Requirements for the Ph.D.* (1979). The first of these was itself a revision of two earlier statements, *The Doctor of Philosophy Degree* (1964) and *New Doctor of Philosophy Degree Programs* (1965).

Part II outlines several aspects of the Ph.D. program, most especially the academic context, faculty responsibilities, administrative organization, and facilities, and includes a summary of factors to be considered in establishing a new Ph.D. program. Part III describes in some detail the requirements that are commonly set for the Ph.D. degree by universities and by their academic departments.

The booklet is designed to meet the needs of a number of different readers. Its primary purpose is to provide guidance to university faculty and academic administrative officers in reviewing current Ph.D. programs and in establishing new ones; for this purpose, Part I should be especially useful. In addition, the booklet is designed to give prospective and current Ph.D. students a reasonably clear picture of the purposes of the Ph.D., the tasks to be completed, the level of performance to be achieved, and the expected schedule for completion of the degree. For these students, Part III should be especially useful. It is hoped that the document will also acquaint interested members of the public with the concept of the Ph.D. degree and the achievements that are required to attain it.

PART I: THE NATURE AND PURPOSE OF THE DOCTORAL PROGRAM

The Doctor of Philosophy degree is the highest academic degree granted by North American universities. It is a research degree and is to be distinguished from other doctorates, such as the M.D., J.D., Ed.D., or N.D., which are designed for professional training or which focus on applied research related to professional practice rather than on basic research that expands the knowledge base of the field.

The Doctor of Philosophy program is designed to prepare a student to become a scholar: that is, to discover, integrate, and apply knowledge, as well as to communicate and disseminate it. Such skills may lead to careers in social, governmental, educational, biomedical, business, and industrial organizations, as well as in university and college teaching, research, and administration. The Ph.D. program emphasizes the development of the student's capacity to make significant original contributions to knowledge in a context of freedom of inquiry and expression. A well-prepared doctoral student will have developed the ability to understand and critically evaluate the literature of the field and to apply appropriate principles and procedures to the recognition, evaluation, interpretation, and understanding of issues and problems at the frontiers of knowledge. The student also will have an appropriate awareness of and commitment to the ethical practices appropriate to the field. All of this is accomplished in apprenticeship to and close association with faculty members who are experienced in research and teaching.

A central purpose of scholarship is the extension of knowledge. Students in a Ph.D. program become scholars by choosing an area in which to specialize and a professor with whom to work. Individualized programs of study may then be developed and committee members selected cooperatively as course work is completed and research undertaken. When all courses have been taken, all examinations passed, the research finished, the dissertation[1]

[1] The terms "dissertation" and "thesis" may be considered interchangeable for the purpose of this document, although it is common practice at many universities to distinguish between a thesis required for a master's degree and a dissertation required for a Ph.D. degree.

written and defended, and papers presented and/or publications submitted, the student should have acquired the knowledge and skills expected of a scholar who has made an original contribution to the field and has attained the expertise necessary to continue to do so.

The Doctor of Philosophy degree as awarded today by universities in the United States and Canada is based on traditions that go back to the founding of the universities of Western Europe, such as those in Padua, Bologna, Paris, Oxford, and Cambridge, and the flowering of philosophical work at such institutions. Programs leading to the Doctor of Philosophy degree have been modified as new knowledge and new technologies have arisen and as new social needs have been identified. They now encompass many disciplines in humanities; social sciences; physical, biological, and earth sciences; education; engineering; business; law; medicine and other health sciences; biomedical sciences; social work; and theology, among others.

Since 1990, many reports on the Doctor of Philosophy degree have appeared. (See Sidebar, Doctoral Education Change Initiatives and Resources.) Most of the reports include recommendations for changes in Ph.D. programs that are intended to make the doctoral education process more transparent to students and other stakeholders, and more responsive to the needs of those who employ Ph.D. graduates, while maintaining the core research requirement.

DOCTORAL EDUCATION CHANGE INITIATIVES AND RESOURCES

The Ph.D. Completion Project is a Council of Graduate Schools initiative that supports the creation of intervention strategies and pilot projects designed to increase completion rates and improve attrition patterns. www.phdcompletion.org *

Preparing Future Faculty (PFF) is a national program to transform the way aspiring faculty members are prepared for their careers. Launched as a partnership between the Council of Graduate Schools and the Association of American Colleges and Universities, PFF programs focus on the range of roles and responsibilities that are expected of faculty at the variety of institutions in which doctoral graduates find academic employment. The PFF National Office is maintained at CGS. www.preparing-faculty.org

Preparing Future Professionals (PFP) programs typically prepare graduate students for nonacademic positions. Like PFF programs, PFP programs allow students to explore opportunities in business, government, and nonprofit organizations where they might seek employment.

The Responsive PhD project of the Woodrow Wilson National Fellowship Foundation explores a range of ways for the degree to be more responsive to social and academic change in areas such as interdisciplinary scholarship, the preparation for teaching careers, and inclusiveness efforts focused on enhancing diversity. www.woodrow.org/responsivephd/initiative.html

The Carnegie Initiative on the Doctorate of the Carnegie Foundation for the Advancement of Teaching studies changes in doctoral programs at selected departments in six fields of study and disseminates its findings in order to foster the production of "stewards of the discipline." www.carnegiefoundation.org/CID/index.htm

The Compact for Faculty Diversity is a collaboration of three regional higher education compacts and regional states to promote the preparation of minority students for faculty positions. www.aypf.org/rmaa/pdfs/Compact.pdf

Integrative Graduate Education and Research Traineeship (IGERT) This successful and innovative National Science Foundation training grant program represents the graduate community's responsiveness to new interdisciplinary opportunities for doctoral students. www.nsf.gov/home/crssprgm/igert/start.htm

Reenvisioning the Ph.D. was a University of Washington project that gathered information on promising practices in, conflicting views on, and shared concerns about Ph.D. education among students, faculty, employers, etc. A rich Web site continues to host results of the project and recommendations to improve the degree that issued from a major national conference: www.grad.washington.edu/envision/

The Forum on Faculty Roles and Rewards of the American Association for Higher Education compiles information on the changing roles of faculty, broadening definitions of scholarship, academic careers, and transitions. www.aahe.org/initiatives/facultyroles.htm

*All Web site URLs retrieved on January 11, 2005

PART II: THE ACADEMIC AND INSTITUTIONAL CONTEXTS OF THE DOCTORAL PROGRAM

GENERAL ORGANIZATION AND ADMINISTRATION

In most institutions, graduate doctoral programs rest on a broad base of undergraduate programs, and members of the faculty in a given discipline are frequently involved in both. The undergraduate curriculum is usually prescribed by the combined faculties of departments and of groups of departments (e.g., a College, School, or Faculty of Arts, Sciences, Education, etc.), with each faculty group determining appropriate courses and other degree requirements. Colleges and schools typically set undergraduate degree requirements for all students in that unit; departments typically specify those for majors in the field. By contrast, traditional graduate, particularly doctoral, programs are more generally tailored toward specialization in the discipline and to the individual student within that discipline. Nontraditional, interdisciplinary graduate programs that require cooperation among several disciplines, departments, schools, or colleges, while still focused on the individual student, require the collaborative integration of faculty effort and expertise across traditional disciplinary boundaries.

Typically, the administration of Ph.D. degree programs is carried out at three distinct administrative levels: the graduate division or school, the department or program, and the faculty or dissertation adviser. The graduate division, with the concurrence of the designated graduate faculty, establishes broad requirements and standards for the Ph.D. degree and the administrative format for the development of each individual program. These requirements and standards typically include satisfactory completion of course and seminar work; satisfactory performance on certain examinations such as compre-

hensive examinations, foreign language, and/or research tool competency examinations; a period of residence at the institution; production of original research; the completion of a dissertation; and a time limit for the completion of all degree requirements (see Part III for details). The graduate division may or may not set course requirements for the degree, but it usually establishes the protocol for program and dissertation advising and for the final university oral or other form of examination. A committee structure is often specified that requires a program advisory committee and a common or separate dissertation advisory committee for each student.

Although several different graduate education administrative structures exist, two models predominate, and most others are variations on these two. In the first model, the graduate division is responsible for all graduate programs offered and degrees awarded by the institution. In this model, all graduate committees and graduate students fall within the authority of the graduate dean, who makes the final determination that degree requirements have been met. In the second model, academic disciplines are represented by a Graduate School of Arts and Sciences, and the sphere of the graduate dean's authority may be limited to departments and programs in that college or area. In this structure, professional schools such as law, medicine, business, and education, are responsible for and have authority and autonomy over their own graduate programs. (For a fuller discussion of these models, see the CGS publication *Organization and Administration of Graduate Education,* revised 2004.)

Individual programs for doctoral students in their pre-dissertation years are developed cooperatively with a program adviser or mentor who is a member of the graduate faculty. Specific methods for choosing a dissertation adviser and a dissertation topic vary markedly among disciplines and among institutions. Ideally, a committee of graduate faculty works with the adviser in directing the student until degree requirements have been completed. Committee members are selected by either the program or the student (usually with guidance from the adviser/mentor), depending on the institution, for their special expertise in the areas of the student's research. At some universities, the department or program recommends graduate advisory committee members to the graduate dean, who officially appoints the committee. The graduate dean may also be responsible for naming one or more members of the committee, and in many instances these appointed members serve to represent the broader interests of the graduate college and university in the integrity and quality of the Ph.D. degree program. In some institutions, individuals with special competence who are not members of the graduate or university faculty may serve on dissertation committees, always under the auspices of the graduate advisory committee and the graduate dean. Under

some circumstances (such as a change in the research project) there may be changes in adviser and/or committee membership; such changes are always regarded as serious, especially after official appointment, and are made with due regard for the integrity of both the student's individual program and the institution's Ph.D. program.

The graduate dean shares responsibility with faculty for the quality of the graduate programs. (The degree to which this role is delegated to the faculty of individual schools and colleges varies among institutions.) Together, the graduate dean and the school or college conduct reviews of graduate programs, determine the viability of each degree program, and advise the administration on investments in particular areas of knowledge and lines of research and teaching that have the prospect of the greatest return to the institution. The faculty may delegate this responsibility to an executive committee or graduate council, either elected or appointed, that meets regularly with the graduate dean to advise and assist in a variety of ways with the management and operation of the graduate school or division. The executive committee or graduate council may have oversight of setting policies and procedures in areas such as graduate faculty membership; quality of the curriculum; requirements for graduate degrees; admission of students; funding for graduate students (fellowships and research and teaching assistantships); awards; rights and responsibilities of graduate students; graduate advisory committee membership; or any other issue or area of concern to them and to the graduate dean.

Graduate departments should set forth explicit guidelines and procedures for completing degree requirements so that the students and faculty know and understand their opportunities, duties, and responsibilities. These guidelines include objectives of the doctoral program; departmental requirements beyond those of the graduate division; course and seminar offerings; general timelines for comprehensive and other examinations and the date by which the exam date(s) are set; the mechanism by which material for comprehensive and other exams is chosen and the date by which that information is made available; research specialties offered; and the faculty responsible for each. In addition, departments, in cooperation with the graduate school, provide information on sources of funding for graduate students and graduate research, both within and from outside the university. Many departments and programs provide access to this information via their Internet Web site.

In most well-established doctoral universities, and in the best of circumstances, different Ph.D. programs complement each other and thus provide stimulation and intellectual strength to the entire academic enterprise. For example, a doctoral program in French language and literature can be significantly strengthened by the presence of strong doctoral programs in

other languages, English, history, linguistics, anthropology, and philosophy. Similarly, a doctoral program in physics can gain strength from the intellectual overlap of active doctoral programs in mathematics, chemistry, computer science, electrical engineering, and molecular biology. Many of the emerging areas of research and discovery are at the interface between traditional departments and disciplines, resulting in interdisciplinary research teams and graduate programs. Interdisciplinary programs, while important to the overall vibrancy of the graduate program offerings, provide a special challenge to the university and the graduate school in terms of the sustainability of the programs, rewards for faculty effort, and responsibility for enrolled students, particularly when the program crosses school or college boundaries. The graduate dean, with the aid of the executive committee or graduate council, has a special responsibility to ensure that all proper assurances are provided before an interdisciplinary program is approved and to provide oversight of the program once established. When an interdisciplinary program crosses boundaries between traditional fields, a joint-degree program with common courses that count toward both degrees (e.g., M.D./Ph.D.) may be an alternative to a separate graduate program.

In addition to Ph.D. programs with interdisciplinary "majors," disciplinary Ph.D. programs frequently include work in one or more related or "minor" fields in order to provide breadth as well as depth of training. In such cases, the student's graduate advisory committee may include a professor from each of the minor fields as well as the student's major professor and one or more other professors from the major department or field.

FACULTY RESPONSIBILITIES FOR GRADUATE STUDY

The quality of the graduate faculty is the single most important factor in the establishment and maintenance of an excellent program leading to the Ph.D. degree. Doctoral education requires several faculty members in each field in which doctoral programs are offered. Although the ratio of doctoral students to faculty varies among programs and institutions, a doctoral program must include sufficient faculty to expose students to the benefit of several points of view. In addition, there must be sufficient faculty to create appropriate graduate advisory committees and to supervise, evaluate, and examine students in the program.

Each member of the graduate faculty must be a creative and productive scholar, that is, an accomplished researcher and an excellent teacher and mentor; graduate teaching is an extension of faculty research. Usually graduate faculty members have earned a doctoral degree relevant to the field, main-

tain an active engagement in teaching and research, and publish the results of their research regularly through professionally recognized channels. Faculty members eligible to participate in a Ph.D. program must be able to serve as classroom teachers, as major advisers or mentors, and as members of dissertation committees. A significant part of a graduate faculty member's responsibilities is associated with the effort required to direct doctoral students through the four to five (or more) years of full-time study necessary to complete the degree. The number of doctoral students a professor can successfully direct at any one time depends upon the field of study, the individual faculty member's other responsibilities, and the quality of the students accepted into the program.

Since it is not possible to offer a doctoral degree program without sufficient faculty in the field or discipline, the extent to which a program can offer training in subspecialty areas will depend on the expertise and number of the faculty. The strength of a doctoral program is enhanced by the range and diversity of academic interests of the program faculty. For instance, in French language and literature programs, faculty research interests might include the periods of French literature, narrative theory, culture studies, or linguistics; in physics, fields represented might include atomic physics, nuclear physics, solid state physics, or low temperature physics.

Faculty are also members of a department, and the most important ingredient for a successful departmental doctoral program is a strong collective faculty commitment to graduate study and to the responsibility for graduate students that this entails. Although the training of Ph.D. students may compete for attention and resources with other departmental responsibilities, no doctoral program will prosper unless the departmental environment is supportive of its aims and needs. Likewise, the ultimate success of doctoral programs at a given institution depends upon the support of the deans of the schools and colleges and that of the provost or chancellor and president of the institution.

Faculty are responsible for promoting the central values of scholarship–truth, honesty, freedom of inquiry, intellectual autonomy–in themselves and in their students. This involves explicit attention to the ethics of the field, the responsible conduct of research, publication and dissemination of research results, excellence in teaching, and the development of a community of scholars.

RECRUITMENT AND RETENTION OF DOCTORAL STUDENTS

Among the major responsibilities of the faculty are selection of students for admission and retention of students who enroll in the program through careful advising and mentoring. Potential students are made aware of doctoral

programs through their advisers in undergraduate programs, through university and graduate program Internet Web sites, and through various publications, such as *Peterson's Graduate and Professional Programs Series*, and posters and other information prepared by graduate departments. Internet Web sites and program brochures typically provide a profile of each program, a list of current graduate faculty, brief descriptions of research conducted by students and faculty in the program, and the requirements for the doctoral degree.

Among the major responsibilities of the university administration, the school deans, and the faculty is devoting time and attention to the recruitment of women and members of historically underrepresented minorities and ethnic groups. Doctoral programs should seek fair representation of demographic groups and enrichment by their presence. But even recruitment is not enough; the successful graduation of these students must also be a major responsibility. High-quality curricula, challenging research projects, teaching experience and other professional development opportunities, and financial support are necessary to train and graduate a more diverse group of future faculty, professionals, scientists, and national leaders than has been historically represented in U.S. Ph.D. programs. For detailed discussions, see the three-volume 2003 *Inclusiveness Series* of CGS publications: *Achieving an Inclusive Graduate Community*; *Recruiting for Success*; and *Ensuring Success*. For a discussion of factors that contribute to successful doctoral degree completion, see the CGS publication, *Ph.D. Completion and Attrition : Policy, Numbers, Leadership, and Next Steps* (2004).

Advising and Mentoring

The responsibility for advising and mentoring is exercised in various ways from one institution to another. Faculty advising that provides doctoral students with continuous feedback, both formal and informal, is considered one of the most successful models of mentoring. Before students choose an area of research specialization, initial orientation and advice about course work and examinations may be provided by the person responsible for coordinating and monitoring graduate study within the program, e.g., the Director of Graduate Studies (DGS). Some doctoral programs appoint a committee of graduate faculty members, instead of or in addition to a single faculty adviser or DGS, to provide this guidance for each doctoral student. The adviser, DGS, or committee meets with each student to plan a program of course work, seminars, and research; monitor the progress made toward completion of the program of study; arrange for the administration of examinations; make recommendations about the student's continuation in the program; and recommend award of the Ph.D. degree.

The dissertation supervisory committee may include some, but often not all or any, members from the original graduate advisory committee. The principal dissertation adviser, in particular, is a mentor in a special position of influence and trust. Inasmuch as dissertation advisers have the greatest say as to whether the student has conducted adequate original research, whether the student has compiled the results of the research in a well-written dissertation, and whether to recommend the student for jobs after completion of the degree, they have a most serious responsibility to foster in the student intellectual autonomy, appreciation of the highest academic standards, and a realistic sense of appropriate career options.

At all stages, advising is a reciprocal responsibility. Faculty are expected to be diligent in providing counsel and guidance and to be available for consultation. They should demonstrate flexibility and critical thinking and a desire to challenge students constructively to become as good researchers and teachers as they are themselves—or better. Students are expected to actively seek out and to follow the guidance of advisers, demonstrate their willingness to be challenged, and work diligently to master research and teaching skills required for professional success.

An exit interview between the Director of Graduate Studies or the Graduate Dean and the student can provide valuable information about the student's doctoral experience, including the student's perception of the effectiveness of the program, adequacy of support, and degree of reciprocity in the advising relationship. Since exit interviews are more likely to be conducted at the program than at the institutional level, some universities conduct an exit survey of all doctoral graduates to gather additional information that students may not feel comfortable sharing with faculty in their department or information that pertains to the student's perception of institutional, rather than departmental or program, resources. Information provided by the exit survey can provide quantitative data on the graduate experience across the university and may lead to improved practices at both the institution and the program. As with any research involving human subjects, universities seeking to publish the results of exit surveys should seek approval from the appropriate Institutional Review Board (IRB) prior to initiating the survey.

Ideally, doctoral programs will provide continued advice and mentorship beyond graduation into at least the early stages of career development, most especially through tenure in the case of graduates who pursue academic careers.

Seminars, Colloquia, and Research Centers

Good advising alone is insufficient for a high-quality doctoral program that maximizes the chances of students completing the Ph.D. degree. Other as-

pects of retention include the building of an *esprit de corps* among graduate students and professors—the intellectual stimulation and passion for learning that lead to socialization into the academic climate of the discipline and to the development of a community of scholars.

The sense of common purpose can be encouraged by joint research projects or by seminars in which each student reports on the literature of the field or on his or her own research and where faculty are free to interact with other faculty and graduate students. Such environments may play a far more significant role in the training of graduate students than regular classes. In particular, seminars provide good opportunities for job preparation for budding scholars and teachers and can lead to important improvements or innovations in the student's research. Doctoral programs usually also sponsor colloquia or seminar series in which students hear and can interact with distinguished scholars from outside the university. Crucial to the effective function of the colloquia as professional development activities are opportunities for graduate students to discuss their own work with visiting scholars.

Many universities have research centers that extend the university's research in areas of inquiry that require mutual effort by faculty from various disciplines and departments. They offer faculty and students opportunities to do research in multidisciplinary or interdisciplinary configurations not easily achieved within the boundaries of traditional departments and programs. For example, a research center on organization theory may bring together faculty and graduate students from business, economics, political science, education, psychology, industrial engineering, and medical information sciences, as well as university administrators, to address one or more projects that extend beyond departments and even schools. While research centers may or may not offer degrees, they greatly enhance the academic inquiry and innovation associated with doctoral work.

ADMINISTRATIVE SERVICES AND PHYSICAL FACILITIES REQUIRED FOR DOCTORAL PROGRAMS

An institutional commitment to high-quality graduate work, as indicated by the degree to which support is provided for research facilities and instructional programs, must exist in order for the graduate faculty to effectively fulfill their responsibilities and for students to develop an adequate professional background for a successful career. Competitive salaries for faculty; suitable offices; secretarial and technical services; graduate fellowships, scholarships, and assistantships; teaching and library resources; contemporary or cutting-edge computer and other technology; and adequate

funds for supplies used in teaching and research are some examples of the support that must be provided by institutions seriously committed to graduate education.

Institutions that offer graduate programs leading to the Ph.D. degree are typically organized into schools, colleges, divisions, programs, or departments that include faculty with a wide range of scholarly and research interests. Although governing boards are legally responsible for the activities of the institution, they delegate operational responsibility to the chief administrative officer. In turn, responsibility for the nature and functioning of the academic programs is delegated to the faculty, who are in turn administratively responsible to department heads, deans, and the academic officers of the central administration. The strength of the institution's graduate education programs will depend to a large extent on the vigorous and enthusiastic support given by this group of administrators.

Successful graduate instruction and research require a variety of facilities and resources to support and encourage the academic enterprise. Among them are the following:

Teaching and Professional Development Resources

Graduate programs are greatly enhanced by centralized teaching services that complement the training of teaching assistants provided by departments. Such facilities provide generic information on classroom and/or laboratory instruction, pedagogical skills, ethical issues, and opportunities to mentor undergraduate students. Services such as videotaping, classroom visits, personalized practice teaching sessions, and critiques from both peers and professionals provide detailed feedback designed to improve teaching. In conjunction with faculty and student committees, teaching centers may find it useful to design teaching assistant evaluation forms for use in classes or sections taught by teaching assistants. The training and experience of the teaching assistant is further enhanced by a combination of advanced information about learning styles and pedagogical techniques and opportunities to participate in programs (e.g., Preparing Future Faculty programs) that offer preparatory training for the professorate. Access to these and other professional development programs is invaluable for providing doctoral students with necessary career skills. Additional information about the Preparing Future Faculty initiative can be found in the CGS publications *Preparing Future Faculty in the Sciences and Mathematics* (2002) and *Preparing Future Faculty in the Humanities and Social Sciences* (2003) and on the Web site of the PFF National Office at CGS: www.preparing-faculty.org.

Libraries

An adequate library and effective library services are indispensable resources for graduate programs. Institutions offering doctoral programs must ensure that libraries have the resources to maintain adequate collections and journal subscriptions, including Internet or online access to computerized databases, electronic repositories, and bibliographies in the disciplines and areas in which doctoral programs are offered. In addition to adequate and well-rounded collections, libraries should offer an array of additional services, including convenient study surroundings, such as carrels; easy access to the stacks; online access to catalogs, databases, and publications; interlibrary loan or exchange programs; facsimile transmission; photocopying provisions (within copyright guidelines); simple check-out and return arrangements; and provisions for long-term check-out for faculty and for Ph.D. students preparing their dissertations. Contemporary and digital libraries are not only repositories of knowledge but also active participants in developing audiovisual and other nonbook materials. Research librarians and bibliographers play a major role in assisting research and in instructing faculty and students about the changing nature of information systems. In many large doctoral institutions, there are also departmental and branch libraries that specialize in particular fields.

Computer Facilities

Computer and information technology is evolving at seemingly ever-increasing rates. Computers have become an integral part of most research. They are central to experiments in the physical and life sciences; to quantitative work in the social sciences; to research on logic in cognitive and information sciences; and they provide data banks essential to work in the humanities. The seemingly limitless capabilities of the computer and Internet as tools for research, data management, and data evaluation make them indispensable resources for nearly all graduate programs. Institutions with graduate programs should make a major and ongoing investment to ensure that faculty and students have access to computers, the services of an effective computer center, and the computing capabilities necessary for research. University computer policies must recognize their great utility and flexibility and the changing uses to which computers are being put in different fields.

Physical Facilities

A university with strong doctoral programs must have good classroom and seminar facilities, and, in appropriate fields, well-equipped teaching and research laboratories. It also must provide each doctoral student with adequate working facilities, such as desk space and library carrels, computer and Internet

access, e-mail accounts, mail boxes, laboratory facilities, or field accommodations. Graduate student lounges or "centers" are especially useful in providing opportunities for learning through informal meetings with other graduate students and with faculty.

Auxiliary Facilities

Graduate students and faculty frequently need access to highly specialized services and skills. Research equipment such as nuclear reactors, sophisticated spectroscopic facilities, and electron microscopes are essential in certain disciplines–and special collections may be equally important in other areas–to enable the faculty and graduate students to address significant research questions and make important contributions to knowledge. In some cases, such facilities may be available on campus. In others, reciprocal arrangements must be made with other universities, industries, or governmental laboratories. These arrangements provide access to specialized equipment and make it feasible for faculty and graduate students to conduct experiments that would not otherwise be possible. The inter-institutional arrangement enhances the doctoral program by affording graduate students the opportunity to take courses not offered by the home institution and to access specialized equipment and collections not available at the home university. Arrangements that provide access to government scientific facilities, such as nuclear reactors and accelerators, are especially useful, provided adequate funding for graduate student as well as faculty participation is available.

Some disciplines require a variety of shops with specialists who are able to fabricate new devices, modify and adapt existing equipment, and make necessary repairs. Instrument maintenance and repair technicians, skilled photographers, scientific illustrators, and other auxiliary resource personnel contribute significantly to the success of many research programs. An interested and competent nonteaching staff, such as maintenance personnel programmers, supporting services and agencies, and particularly clerical staff, is essential for the effective and successful conduct of graduate programs. Institutions committed to doctoral study provide these and other auxiliary facilities and services as needed by researchers in the various disciplines in which the institution offers Ph.D. degree programs, as well as in complementary disciplines.

All of the above facilities, services, and personnel must be not only available but also skillfully maintained, coordinated, and managed (or administered) if they are to support doctoral education and assist effectively in the development of new knowledge.

GUIDELINES FOR ESTABLISHING NEW PH.D. DEGREE PROGRAMS

The following is a brief outline of conditions and processes that need to be considered when a new Ph.D. program is being established. These will of course vary considerably from institution to institution. The decision to initiate a doctoral program is based on many factors and conditions. Those considered to be most important are:

1. There is clear evidence of the potential for a high-quality program that could not reasonably be subsumed or offered under a program already in existence in the university.
2. The graduate faculty who will participate are already productive in research relevant to the new program and are in full support of the new program.
3. There is clear evidence of both student interest to enroll in the new program and employment opportunities for prospective graduates.
4. Adequate financial resources and opportunities are available to attract high-quality graduate students.
5. The administration fully understands its responsibilities and is supportive of the program.
6. Library facilities are adequate for doctoral study in the new program area as well as in supporting areas.
7. Laboratories or comparable facilities are available and adequate for the new program.
8. Appropriate officers and procedures for administering and reviewing the program are already in place.

When the above conditions prevail, the following process will increase the likelihood that the institution can establish a sound program leading to the Doctor of Philosophy degree:

1. Form a faculty committee that will develop the proposal for the new doctoral program, which will include the following:
   a. The reasons for offering the new program.
   b. The need for the program in light of the university's other graduate programs.

c. The expected contribution of the program to existing university departments and the proposed liaison mechanism with those departments.

d. The need for the program in light of local, regional, and national conditions and the expected contribution of the program to society through mechanisms such as industry, business, or government.

e. The number of students expected to participate in the program.

f. The form and availability of student funding.

g. An existing plan for affirmative action or student diversification.

h. The effective and efficient administration of the program.

2. In consultation with the Graduate Dean, develop a detailed plan for the new program, including goals and objectives; academic requirements, policies, and procedures; estimated costs to the institution; and a statement of standards to be followed based on those recommended by the Council of Graduate Schools and those required by the institutional Board of Directors, the Board of Regents of the state (if appropriate), the regional or provincial accrediting associations (where appropriate), the applicable professional organizations, and practices at other leading universities granting the Doctor of Philosophy degree in the same or a closely related area.

3. Develop a tentative schedule for establishing the new program and reviewing it, allowing sufficient time (usually one year after approval of the program) for adequate recruitment of a quality applicant pool.

4. Present the proposal to the faculty and heads of cognate departments for their suggestions and approval.

5. Present the proposal to the appropriate school or college committee on graduate education for suggestions and approval.

6. Present the proposal to the graduate dean for initial approval.

7. Invite outside consultants to review the proposal, make recommendations, and visit the campus to determine whether the department and the university are prepared to embark on a new program that meets expectations of quality. If appropriate, consult with the public coordinating or regulating agency to which the proposal must ultimately be submitted.
8. Submit a revised "final" version for submission to the graduate dean and other appropriate authorities, such as the graduate council or the college or university curriculum committee.
9. Submit the proposal to relevant bodies, such as the appropriate faculty governance committee, the administration and the governing board, the state or provincial agencies (where appropriate), and the regional or provincial accrediting association (where appropriate).

PART III: REQUIREMENTS AND SPECIFIC ASPECTS OF THE DOCTORAL PROGRAM

GENERAL OVERVIEW

A doctoral program is an apprenticeship that consists of lecture or laboratory courses, seminars, examinations, discussions, independent study, research, and, in many instances, teaching designed to help the students make significant contributions to knowledge in a reasonable period of time. The first year or two of study is normally a probationary period, during which most of the effort of doctoral students will be devoted to acquiring a working knowledge of the field through study of the literature, taking formal courses and seminars, learning research and experimental techniques, problem-solving, and beginning to teach and do research. After being admitted to candidacy, as defined by each institution, students devote time to completing the dissertation research planned with the major adviser and the dissertation committee. For students engaged in full-time study, preparation of the dissertation itself usually occupies two to four years, depending on the field. An oral defense of the research and dissertation by the candidate constitutes the final examination. The final oral defense of the doctoral dissertation is presented before the graduate dissertation committee. In addition to the dissertation committee, some institutions open the defense to interested members of the academic community. All requirements for the degree should be available to the student in written form.

Doctoral programs are usually arranged so that well-prepared and self-motivated students can complete all degree requirements in five to six years of full-time study and research beyond the baccalaureate degree in the sciences. Time to program completion varies in other disciplines, particularly in the humanities and social sciences where national studies have shown that the time to complete the Ph.D. degree has expanded during the past decade or

two. The reasons behind the recent expansion of time to degree completion may include inappropriate expectations regarding the scope of the dissertation; laissez-faire advising; inadequate funding; uncontrolled expectations regarding the amount of teaching to be done; and external factors such as family responsibilities and changes in the job market. In any event, it often takes longer for students with heavy teaching loads or those working on dissertations that require extensive fieldwork to complete degree requirements. Unfortunately, increasing numbers of doctoral students feel the need to leave campus entirely and take full-time employment before finishing the dissertation; this inevitably delays or derails completion of the Ph.D. and sometimes disrupts the expected career plan. For detailed discussion, see the CGS publication, *Ph.D. Completion and Attrition: Policy, Numbers, Leadership, and Next Steps* (2004). While it is the responsibility of the faculty to provide guidance to students regarding their academic career, it is equally the responsibility of the graduate student to consult with the adviser and provide information about work done, problems that have arisen, and plans for study.

ADMISSION

Since the Ph.D. degree is awarded as the mark of highest academic achievement in preparation for active scholarship and research, aspirants for the degree are expected to have demonstrated a high level of ability in their prior programs and potential for completing with distinction the requirements for the degree. In some programs, doctoral students may be admitted directly from baccalaureate programs. In others they may be admitted only from master's programs. A third variation, as used by some business administration and education programs, requires a considerable period of postbaccalaureate or post-master's professional work experience.

Admission to the Ph.D. degree program is based on a variety of criteria established by the graduate division and by the graduate faculty of the department or organizational unit of the university in which the program resides. This admission process seeks to ensure quality among programs at a given institution as well as quality within particular programs. The graduate division requirements almost always set forth minimal standards to be met by all persons admitted to graduate study. Normally, the graduate division requires that an applicant hold an awarded baccalaureate degree from an accredited institution where the basic requirements are comparable to those of the admitting institution, including adequate preparation in the chosen field(s) of study. In rare cases, and only after consultation and approval of the Graduate Dean, institutions will accept students whose academic credentials are considered *equivalent* to the baccalaureate.

The standards set by the department or program are specific for that department and may be higher or more demanding than those of the graduate division. The department into which the applicant is seeking admission will specify the minimal acceptable undergraduate preparation necessary in the areas appropriate to the chosen field or fields of graduate study, including grade point averages and the specific course content that must have been completed. (It should be noted, however, that completion of a "major" in the field(s) to be pursued at the doctoral level is not always necessary.) Provisional admission with specific conditions attached is used as a way to admit students (1) who have not provided evidence of completion of their baccalaureate degree, (2) who have borderline academic credentials but show promise, or (3) who need to take additional undergraduate courses to make up deficiencies.

Initial admission to the graduate division may be for a program leading to a master's degree. The degree program to which the student is admitted should be specified in the admissions letter. Criteria and requirements for continuing on to the Ph.D. after receiving the master's degree should be specified and should be included in a formal admissions letter. Criteria for admission to doctoral programs used by departmental faculty committees and the graduate dean typically include undergraduate and graduate grades, scores on tests, a statement of purpose by the student, a sample of the student's work, recommendations and personal statements by current or former professors, interviews, work records and references, and, sometimes, completion of the master's degree or its equivalent.

In order to help determine the admissibility of the applicant, most graduate schools require satisfactory performance on one or more standardized tests. The tests are intended to help admissions officers compare the individual applicants with each other and to evaluate and predict program success compared to current and past applicants to the program. One widely used test is the Graduate Record Examinations (GRE). The GRE Board's own caution should be widely recognized: GRE scores should never be taken as the sole criterion for admission but rather should be used in conjunction with other measures, such as those mentioned above. As an aid in determining adequate competence, universities often require satisfactory scores on standardized verbal or quantitative tests or on those developed within the institution. In general, students whose native language is not English or who have not attended an undergraduate institution where English is the medium of instruction must, in addition, demonstrate mastery of English by submitting a satisfactory score on the Test of English as a Foreign Language (TOEFL), offered worldwide by the Educational Testing Service, or by other equivalent methods.

In seeking ways to diversify the student body, it has long been recognized that some students who do not score well on standardized tests or perform well in traditional programs may have the potential and talent for advanced study. Graduate division staff and faculty need to find alternative performance predictors or ways to identify such students. While motivation and dedication to learning are difficult to measure directly, clues to these characteristics are evidenced by specific skills relevant to the program, whether or not they were developed as part of the baccalaureate training or tested by standardized means. Only those considered capable of completing the doctoral degree should be admitted.

FULL-TIME STUDY AND RESIDENCE

Most universities require at least one or two years of continuous residence. This allows students to concentrate exclusively on course work or research; to acquire the habits, attitudes, skills, and insights necessary for attaining the Ph.D.; and to find opportunities to work closely with the professors and other students.

The on-campus residence provision provides other advantages as well. For example, fluency in the language and vocabulary of the specialization is enhanced by frequent and close association with other students in the same field; competence in the field is enhanced by close familiarity with the university's libraries; valuable experience is gained by attending and participating in both formal and informal seminars, colloquia, discussions led by specialists visiting from other campuses, laboratories, or governmental research organizations; and thesis or dissertation research is facilitated by frequent consultation with the adviser.

Students employed on campus during their study toward the doctorate as teaching assistants, research assistants, or in other capacities can meet the stated residence requirement in ways that fulfill the objectives of the requirement. Students employed full-time in off-campus positions encounter difficulty not only in meeting the residency requirement but also in gaining the benefits that this requirement is intended to provide.

REGISTRATION

Requirements for residency and for registration are not necessarily the same. Graduate students are usually required to register for courses and/or research each quarter or semester in which they are working toward their doctorate. This is necessary in order to document the full commitment of the university, in terms of faculty, staff, and resources available to the student.

Some institutions require full-time and continuous registration from the time a student is admitted and enrolls in the doctoral program until the degree requirements are completed, whether the student is on campus or not. Continuous registration arrangements vary among institutions. Some institutions require students to register and pay tuition and fees at the same rate for all credits earned, including research credits, during the course of acquiring the degree. Other institutions may require registration for a minimum number of years of full-time study (usually through the completion of course and seminar work, typically a year for the master's degree or its equivalent and two years for the doctorate, and admission to candidacy), after which reduced registration fees may be permitted.

In some instances, the faculty may consider altering an individual student's registration requirements based on graduate work completed prior to enrolling in the doctoral program. Transfer of graduate credits traditionally has not been accepted between programs at different institutions. However, as society and the academic environment have become more mobile, the number of programs that will accept transfer credits has increased. This acceptance is on a case-by-case basis and is limited in scope. One option is for a student who has been awarded a relevant master's degree by another institution to request advanced standing toward the course work required for a doctoral degree program. A second option is to transfer, count, or substitute a different course for a required course that has already been taken at another institution.

FINANCIAL SUPPORT

Students who have the required academic qualifications frequently lack the financial resources needed for doctoral study so, in order to ensure that highly qualified students are able to attend graduate school, most institutions provide financial assistance in the form of loans, scholarships, fellowships, and assistantships. Scholarships and fellowships are usually grants that require no service from the recipients. Assistantships usually require the students to perform some service for the university, such as aiding faculty in teaching classes or conducting research. In return for the service, which may or may not be a stated degree requirement, the assistants are provided stipends and apprentice-like teaching and research experience. In addition to institutionally funded scholarships and assistantships, a number of external organizations provide financial support for doctoral students in the form of grants, fellowships, and assistantships. Additional support for graduate education is provided through research grants and traineeships with a number of federally supported research groups, for example the National Science Foundation

(NSF), the National Institutes of Health (NIH), and the National Academy of Science (NAS).

Because teaching and research assistants provide a time-consuming service in addition to course work for the Ph.D., they normally register for fewer classes than students not on assistantships; this means that the time needed for students on assistantships to complete degree requirements may be extended. However, unless the length of time is exceptionally protracted, the benefits of the assistantships, especially for development of research topics and for later career development, far outweigh the disadvantages in terms of time.

EXAMINATIONS

Placement Examinations

Some institutions and departments administer an inventory or placement examination when students are first admitted to the master's and/or doctoral programs to determine the extent to which previous educational experiences have prepared them for advanced study. Since courses bearing the same title may vary in content from institution to institution, the placement examinations are designed to ensure that the student is adequately prepared to undertake advanced work.

Language Examinations

A number of doctoral programs, particularly in the humanities and social sciences, require students to demonstrate written and oral proficiency in one or more foreign languages. The purpose of the language examination is to assess the student's ability to conduct research and communicate in an increasingly bilingual or multilingual society. Language proficiency requirements, and the number of language proficiencies a student must demonstrate, are determined by the faculty in each graduate program based on the relevance of language skills to the discipline. For example, foreign language proficiency might be unnecessary for a biochemist but vital for a student of international relations. The choice of foreign languages may also be unique to each student, based on his or her area of research within the field. The examinations themselves often consist of both a written and an oral component and are usually prepared, administered, and evaluated by faculty from the language departments. The completion of language examinations is typically one of the milestones a doctoral student must achieve prior to candidacy.

Qualifying or Comprehensive Examinations

In some cases, often dependent on field, an examination (its labels vary, e.g., preliminary, qualifying) may be required after the first year of graduate study or after half the course work has been completed; its purpose is to ensure that the student is making satisfactory progress.

Although not all universities require preliminary examinations, virtually all universities require an examination for admission to candidacy after the student has completed appropriate courses and seminars. This examination also has different labels depending, for the most part, on the tradition of the institution (it is often called a general, comprehensive, or qualifying examination). Regardless of its title, its purpose is to determine the student's readiness to undertake independent research. As in most things in graduate education, there is a great deal of departmental autonomy in the design of this examination but, in many universities, the graduate division is responsible for establishing the general conditions for the examination, including the fact that such an examination shall take place. This examination often consists of both a written and an oral part and is usually prepared, administered, and evaluated by a committee of faculty members approved by the DGS or the graduate school. Because of the importance of these examinations, most schools allow students a second attempt if they do not perform satisfactorily on the first attempt. Usually, the examination may be repeated only after a waiting period (a quarter, a semester, or a year), which allows the student time to take appropriate courses and otherwise prepare more adequately for the second examination. Students who fail the examination on the second attempt are not advanced to continue working toward a Ph.D. (The requirement of a final university oral examination, usually based on the dissertation research, is discussed below.) The conditions and standards for passing the qualifying examination, including the number of attempts allowed, should be explicitly included in the program descriptions provided to each entering student.

CANDIDACY FOR THE DOCTORATE

A strong doctoral program is designed to ensure a relatively early decision on the doctoral aspirant's ability to complete the degree. In many institutions students are essentially on probation for the first two years of graduate study. They are "admitted to candidacy" for the doctoral degree by the end of the second year or the beginning of the third after a number of qualifying procedures have been satisfactorily completed. Admission to candidacy means that, in the judgment of the faculty, the doctoral student has an adequate knowledge of the field and the specialty, knows how to use the academic resources,

has potential to do original research autonomously, and presumably will complete the dissertation. The qualifying procedures may include one or more of the following: formal course work, proficiency examinations in language and/or other research tools, comprehensive (or general) written and oral examinations, and one or more research papers showing evidence of the ability to do original work. (Examples include papers presentable at a professional conference, mini grant proposals, and an accepted doctoral dissertation proposal.) Research, advanced seminars, optional courses, and, in some fields, further examinations occupy the student's attention from this point until the dissertation has been written and the final oral examination has been passed.

TEACHING

The primary purpose of a graduate teaching assistantship should be to prepare the student for a future career, whether academic or not. Experience in teaching adds active experience in lecturing, leading discussion, and evaluating other students. As an act of learning, refining, and transmitting the knowledge acquired, teaching is a direct part and outcome of scholarly research. Financial support for the graduate student and support of the undergraduate teaching program should be secondary objectives in good Ph.D. programs.

Programs of training, such as pedagogy courses, and evaluation are essential in the development of teaching assistants and in the effort to provide high-quality undergraduate teaching. Such training programs may be conducted by faculty in departments, by central teaching facilities devoted to teacher training, or by some combination of the two. Ideally, a faculty member works directly with the teaching assistant in developing the course and in evaluating the teaching. Training programs are therefore effective in reinforcing the role of faculty as mentors in the doctoral student's professional training. At the same time, teaching assistants can be important resources for course material, expertise, and feedback to faculty preparing syllabi. Experienced teaching assistants frequently also serve an important role in training less experienced teaching assistants. Awards to teaching assistants for excellence in teaching can serve to emphasize the value of good pedagogy to the academic community.

RESEARCH

Depending on field, some students may begin work on research under the direction of an adviser or major professor soon after admission. Others may rotate through several laboratories in order to become familiar with different research techniques and possibilities. Still others may not begin work on re-

search until after admission to candidacy. The adviser may design the student's first research experience, which may or may not be used ultimately for the dissertation. Pre-dissertation and dissertation research are both guided by the same principles concerning ethical issues and classified or proprietary research.

In some fields, doctoral students may serve as research assistants on sponsored research grants or contracts under the guidance of a faculty member. The degree to which the research done by the students is independently conceived and conducted may vary greatly, depending on the nature of both the field of research and the sponsorship. In all cases, however, students will be expected to make original contributions if the research is to form part of the doctoral dissertation.

THE DISSERTATION

There is no assurance that, having completed the course work, seminars, examinations, and teaching and research requirements, the student will be awarded the degree, since the quality of the dissertation and the significance of the contribution to knowledge are important considerations that must be weighed by the committee in making the final recommendation for award of the Ph.D. During the dissertation research, the student should be able to demonstrate to the adviser and committee that he or she is making progress toward the degree. Lack of progress over a period of several semesters can be a reason for separation from a program, provided that appropriate conditions are established in policy.

The process of writing the Ph.D. dissertation includes developing a hypothesis, engaging in appropriate research activities, analyzing and interpreting research results, and drawing conclusions. It fulfills two major purposes: (1) it is an intensive, highly professional training experience, the successful completion of which demonstrates the candidate's ability to address a major intellectual problem and arrive at a successful conclusion independently and at a high level of professional competence, and (2) its results constitute an original contribution to knowledge in the field. Doctoral research should be a mutually energizing experience between student and adviser; the student should therefore participate actively in identifying a good research topic. Graduate schools require that the research activities connected with a dissertation be approved in advance and performed under the direct and continuing supervision of an appropriate member of the university faculty. Prior work, not so approved and supervised, is not acceptable for a doctoral dissertation.

Once an area of research is selected and approved, a dissertation committee is appointed, usually by the graduate program or dean, which may or

may not include the same committee members who formerly advised the student. Three to five professors–from the department, from other departments, and occasionally from another university–are usually asked to serve. The major professor directing the student's research serves as chair of this committee. The research interests and expertise of the committee should complement the candidate's dissertation topic so that the student is able to gain the maximum benefit from the exchange of ideas. Such a committee provides a means of exposing the candidate's ideas to a variety of views early in the planning. This may help avoid the development of an ill-advised research project and embarrassment, or worse, at the time of the final oral examination. An active dissertation committee has the potential to provide the most concentrated expertise for guidance in research that the candidate will ever have; the advantages implicit in this once-in-a-lifetime experience should be transmitted to the candidate. The committee members can also serve as additional mentors who may be called upon to buffer the sometimes volatile student/adviser relationship.

The dissertation committee has a number of responsibilities to the doctoral student, the institution, and the integrity of the doctoral degree. It is one of the primary responsibilities of the dissertation committee to ensure that the doctoral candidate has the ability not only to conduct research but also to write intelligently in the field. In some instances publications are submitted in lieu of a dissertation manuscript. Whether the publications are the product of the doctoral student or a collaborative effort of one or more authors, the dissertation committee must be able to evaluate the contributions and writing of the student. In instances of joint-authorship, the committee may require that the candidate write introductory and concluding chapters in order to ensure that the candidate writes independently on the project. It is vital to the future success of candidates that their own ability to write with clarity in their discipline be part of the evaluation of the dissertation. See the CGS publication *The Role and Nature of the Doctoral Dissertation* (1991).

Selection of Topic

Final choice of the dissertation topic involves the student, the adviser, the committee members, and sometimes other university committees. The method of identifying a dissertation project or topic varies markedly both among and within disciplines, but its final selection is by agreement between the candidate and the research adviser or advisory committee. Frequently, the candidate submits a formal research proposal for the advice and suggestions of the adviser(s) and for permission to proceed. When this procedure is followed, it establishes a kind of contract–an agreement not only on the research topic but also on its scope.

The allowable scope of the dissertation project is difficult to state precisely. The dissertation should clearly be a substantial and significant undertaking, yet not so extensive or open-ended that it cannot be successfully concluded in a reasonable period of time. The trend in recent years has been away from the long and comprehensive dissertation project and in the direction of a more sharply delineated task requiring perhaps a year to two years of full-time productive effort. The dissertation should be the introduction to a career of research and scholarship, not its apex.

Probing the unknown often leads to unforeseen outcomes. The risks vary greatly from one research topic to another. Universities and even departments may differ on whether negative research results are acceptable, assuming the quality of the work is high. A careful assessment should be made of the risks of obtaining negative results; if they appear significant, the consequences must be clearly understood by the candidate and the adviser in the context of larger institutional expectations.

Some institutions require that the dissertation topic be approved by the candidate's department as well as by the advisory committee and some require that the tentative (working) title of the dissertation be filed in advance in the graduate dean's office. If the research will involve human subjects, it will be necessary to obtain prior approval from the appropriate university committee on research involving human subjects; see Ethical Issues, below.

Ethical Issues

Graduate students must be sure they understand the ethical issues involved in research as well as the consequences to themselves, their institutions, and to scholarship itself from any erosion of integrity.

In all types of research, including dissertation research, the highest standards of conduct are expected. Despite the enormous variety of fields and disciplines, certain general standards apply to all. The most important ones concern plagiarism, the faking or falsification of experimental data, improper use of human and animal subjects, and disregard of health and safety standards.

If the research a student has proposed will involve the use of either human or animal subjects for any reason and regardless of the nature of the research, including survey research, the investigator must submit a proposal and seek research approval from the appropriate Institutional Review Board (IRB). In addition to research involving human or animal subjects, if the research has implications for such matters as safety, environmental impact, or other areas under governmental regulation, it must be reviewed and approved by the appropriate university committee or board. The IRB is the only group on the university campus that can make the determination of whether

or not approval is required and is the only group that can grant approval to conduct the research. Both the adviser and the student should be sure such approval has been received before the research is begun; data obtained from human subjects prior to IRB approval are not publishable.

Another area of ethical concern is conflict of interest. Research should be conducted independently of the particular and immediate interest of industrial and private companies that may fund the research or research space, even when research results are not subject to publication delays as outlined above. In any kind of research, one confronts the question of originality. The synergy of teamwork and pressure on both faculty and students to publish results or to prepare conference papers often create significant ambiguities concerning academic authorship and "originality." Open discussion of authorship issues and of the importance of full acknowledgments and other forms of attribution should be part of graduate training.

Off-campus Research

There may be some situations in which off-campus dissertation research is justified. However, the department and/or the graduate dean must give prior approval for off-campus research. A typical example is extensive fieldwork, such as is required for the Ph.D. in anthropology. Another is the opportunity for a student in engineering to carry out dissertation research in an industrial or governmental setting that provides resources (such as major research facilities) that the university department cannot furnish. Supervision by the adviser can be difficult in such circumstances, and it is mandatory that universities develop adequate procedures to guarantee proper oversight and supervision of the research. The university may require that such a student return to the campus to complete the writing of the dissertation, so that the library, the computer center, and the research adviser(s) are available. In any event, the key considerations are whether prior approval for topic and methods has been given and whether adequate supervision can be given by the appropriate university research adviser(s).

Sponsored, Classified, or Proprietary Research

Graduate students involved in sponsored research should be informed of relevant research policies governing issues such as patents, copyright, disposition of tangible research property, and guidelines on secrecy in research. They should also be informed of the identity of the sponsor.

Research that is classified by a government agency or that is proprietary in nature and restricted with regard to publication is widely held by universities to be unsuitable for doctoral research. An essential aspect of dissertation research and scholarship is the free and full dissemination of research results.

Restrictions, either in the conduct of dissertation research or in the sharing of its results, are antithetical to that spirit. While this continues to be true in principle following the September 11, 2001, attacks on the United States, the category of "sensitive, but unclassified" research is challenging universities to work in new ways to articulate the value of free dissemination while recognizing legitimate national security concerns. Other considerations regarding the publication of doctoral dissertations may include proprietary research and patent application processes. A student and an institution may reach an agreement to delay the publication of a dissertation for a specified period of time, e.g., 90 days, so that the student, or the sponsor who provided the funds and perhaps even the laboratory space or equipment for the research, can seek a patent.

Intellectual Property

A dissertation is the product of an intensely collaborative research experience and substantial intellectual engagement with the doctoral candidate's research adviser, other faculty and students, and, in some cases, international collaborators. Within the increasingly collaborative environment of doctoral education and with the unprecedented access to information made possible by electronic media, intellectual property issues are very complex. Every university must therefore develop clear, written policies about the ownership of intellectual property.

The rapid expansion of electronically submitted theses and dissertations has raised unique intellectual property issues. (See Electronic Theses and Dissertations, below.) Ph.D. recipients may opt to grant as much access as possible to their works and elect to make the entire text of their dissertation available on a Web site. Others may choose to restrict public access to the electronically submitted text out of a concern that complete access may render their ideas more susceptible to unattributed borrowing.

The doctoral candidate retains copyright over the dissertation. The university typically retains ownership of any research products described within the dissertation or otherwise produced during candidacy that result from the student's use of university resources (including financial support), facilities, and faculty supervision. In the period during which advisers and advisees attempt to find a productive match, doctoral candidates may be asked to sign institutional agreements regarding how authorship responsibilities for research results will be allocated, how patentable materials will be handled, and who will process the patent application and own royalties.

In certain fields, dissertation research may depend upon an infrastructure that reflects partnerships between the university and corporations or industry. Dissertation research fully or partially supported by business or industry may necessitate special intellectual property procedures. Some research

products may require patent or proprietary protections that necessitate special permission by the university to delay the publication of the submitted thesis to allow sufficient time for patent or copyright application.

Joint Authorship

In all cases of joint authorship, individuals working together should establish ahead of time the criteria for their coauthorship. There are certain customs (which vary according to field) with regard to the order in which authors' names are listed or whether running an experiment as opposed to designing it entitles a researcher's name to appear among the coauthors. Policies regarding authorship are part of the instructions to authors provided by most journals. All coauthors in a collaborative project share responsibility for its integrity and should have the opportunity to review all data prior to publication of the results.

Since the doctoral dissertation is, at least in part, a demonstration that the candidate has now reached a level of mastery of the field adequate for a career of scholarship and research, the research being reported should be the candidate's own work. Many universities explicitly state that the doctoral dissertation must be the work of a single author, i.e., a joint or coauthored dissertation is not acceptable. However, recognizing the frequency of collaborative and team efforts in present-day research, some institutions specify conditions under which collaborative research may be acceptable for doctoral dissertations. In such cases, it is usually required that the major part of the presented dissertation be the candidate's own work and that it be stated clearly (in the preface or elsewhere) exactly what the candidate's contributions were and what was contributed by another author. In those instances in which jointly-authored journal articles or manuscripts are submitted as part (or all) of the dissertation, the candidate's own contributions should be a substantial part and it should be clearly indicated what they are.

Format

Over the course of time, universities have found that it is important that the dissertation have a well-defined format. In order for the dissertation to be useful to the scholarly community as a whole, the final document must meet a number of criteria. Universities typically set forth, either in the graduate school catalog or in a special publication, the specific requirements for preparing the dissertation manuscript, including typing or copying requirements, methods of citation, and related matters. Requirements for format may be dictated in part by such external criteria as availability of the dissertation for microfilming; in some cases, format requirements have been modified to meet the greater flexibility afforded by new technologies for the electronic repro-

duction of manuscripts, such as the Portable Document Format or PDF. (See Electronic Theses and Dissertations, below.)

Some institutions permit the offering of one or more published articles, the research for which has met the requirements of the department and the graduate division, as part or all of a dissertation. Alternatively, with the approval of the department and the graduate dean, the candidate may be permitted to submit the dissertation in the form of a manuscript (or manuscripts) to be submitted for publication in a scholarly journal. In those instances in which the submission of published articles or of manuscripts is permitted, it is often required that the candidate include introductory, transitional, and concluding sections in order to achieve a more coherent and rounded piece of work. Also, the candidate may be required to include appendixes that provide more detailed materials on history, methods, and results than would ordinarily be presented in published journal articles.

All institutions expect, and some explicitly state, that the dissertation will be written in literate and lucid form, thus demonstrating the candidate's ability to communicate clearly and effectively. Most institutions require the dissertation to be in English. Others may allow or require the dissertation to be in another language, sometimes depending on the field.

Electronic Theses and Dissertations

A recent and quickly expanding trend in graduate education is the move toward electronic theses and dissertations (ETD). The ETD has assumed a number of different formats at various institutions, but the basic premise remains the same: the entire content of the traditional dissertation is submitted in one or more electronic formats in fulfillment of the thesis requirement for the doctoral degree. The processes of scholarly research and writing that are required of all doctoral students remain unchanged, while the dissertation is completed and delivered in a style that reflects new and evolving technologies.

The most basic version of the ETD, and that accepted by an increasing number of institutions, is a completed manuscript formatted according to the traditional paper guidelines and converted to a Portable Document Format (PDF) file. The ETD in PDF retains the look and feel of the traditional manuscript but offers the accessibility and reproduction capability available through modern technology. Other institutions have permitted doctoral students to prepare the ETD using Hypertext Markup Language (HTML) in either the traditional format or using more contemporary and cutting-edge designs. The ETD in HTML has introduced an entirely new dimension to the doctoral dissertation. A doctoral student can include 3-dimensional charts or graphs, a student of linguistics might incorporate audio or visual material to demonstrate the transmission of language, and a student of tumor biology might

include a small movie clip to demonstrate the reaction of a cancerous cell to drug treatment.

As with any form of modern technology, the possibilities for ETDs seem endless. Those wishing to foster the creativity and innovation possible via ETDs must understand fully the academic implications, challenges, and technical support required of such an initiative. Academically, the ETD as a product must demonstrate the same level of scholarly research and academic achievement as required for the traditional dissertation. The primary task of the dissertation committee remains to ensure that the highest academic standards have been achieved. The dissertation committee supervising the completion of an ETD must also ensure that the format, presentation, and flow of the ETD are coherent and that the academic contribution of the research is not compromised or neglected.

The student, the committee, and the institution will all need to address the challenges of storing, accessing, and reproducing ETDs. Unlike traditional paper dissertations, which are housed in the library stacks, ETDs require space on the library computer server and, in some instances, a static or permanent Universal Resource Locator (URL) also housed on the institution's server. The software and platform used in the creation of an ETD must also be taken into consideration. If the student uses software not owned or licensed by the institution, the ETD may not be accessible to members of the academic community. Furthermore, as technology continues to advance, the electronic platform used to house ETDs may become outdated or even dysfunctional, rendering the ETDs inaccessible. These challenges are not insurmountable but must be addressed in order to initiate and sustain a strong ETD program on any campus.

THE FINAL ORAL EXAMINATION

In most universities a final oral examination is required. The nature and scope of this examination, the composition of the examining committee, and the rules of procedure may vary, subject to policies set by the graduate dean, but the examination typically concentrates on a defense of the dissertation and its relation to the specialized field in which it lies. In some cases only the committee members attend; in some, the examination is open to the public.

The nature of the defense varies according to field. In some, the defense may essentially test the student's skills in intellectual analysis and debate; it may therefore consist primarily of the presentation of the student's ideas on or interpretations of some topic, which are defended against criticisms concerning their reasonableness, superiority over earlier interpretations, etc. In other fields, however, the student may have to defend experimental design,

data collection procedures, and the interpretation of the results. Frequently the student is expected to begin the proceedings with a general exposition of the research findings. There are varying practices with respect to the composition of the university oral examining committee. The committee may consist of the candidate's advisory committee, or it may be a committee named by the department head (typically with the approval of the graduate dean), or it may be appointed by the graduate dean (often with nominations from the department). The chairperson of the examining committee may be the graduate dean, the department head, the DGS, the dissertation adviser, or a member of the faculty from another department. A minimum number of committee members is usually specified (at least four or five) with the requirement that all be of assistant professor rank or higher and possess the Ph.D. degree or the highest degree in their field of specialization (although the graduate dean may be empowered to make exceptions).

Some institutions require that all members of the examining committee be full-time members of the university's faculty. Some may permit, encourage, or even require, the appointment of one or more appropriate members from outside the university, with the approval of the graduate dean. Sometimes such outside members are required to be in addition to the stated minimum number of members. Typically, the final examination is not permitted to be scheduled until the research adviser has read a draft of the dissertation and notifies the graduate dean that the dissertation is ready to defend with no more than minor revisions and requests that the examination be scheduled. A minimum waiting time is usually specified in order that members of the committee have sufficient time to read the dissertation.

The examining committee is charged with the task of determining, through the reading of the dissertation and by the conduct of the examination, whether (1) the dissertation is satisfactory and (2) the candidate defended it successfully. With respect to the committee's voting, almost all universities require more than a simple majority to pass the candidate. Some specify that a single negative vote fails the candidate, some that two or more negative votes are required to fail. If the candidate does fail the examination, a substantial waiting period (often three to six months) may be required before a reexamination may be scheduled. Typically, not more than one reexamination is permitted.

THE DOCTORATE

The student who has satisfactorily completed all requirements is awarded the Ph.D. degree. The degree is a recognition of the fact that the student has demonstrated mastery of a field and has successfully completed and defended a dissertation and also that the student has the ability to complete a substan-

tial piece of research work, to present formally the results of this work, and to appreciate its significance in the context of the general field.

PUBLISHING THE DISSERTATION

Once the dissertation has been successfully defended and the Ph.D. has been awarded, some students may wish to make the results of their doctoral research available to a wider audience as a book publication by a scholarly publisher. A university press or commercial scholarly publisher that publishes books in the field is most likely to consider turning a dissertation manuscript into a book for publication. Before approaching a potential publisher, the successful Ph.D. recipient must consider the manuscript changes that will be necessary to make the dissertation attractive to the publisher. *The Chicago Manual of Style* (15th Edition, 2003) and the *Handbook for Academic Authors* (4th Edition, 2002), by Beth Luey, are two resources that an author might consult when attempting to publish the dissertation. Both guides will assist the author with issues related to formatting the manuscript, broadening its focus or content to reach a wider audience, editorial questions, and permissions.

After revising the manuscript, the author is advised to research and compile a short list of publishers likely to be interested in publishing it. Publishers to consider include those with recent books in the field, particularly those that published the books and journals used in the preparation of the dissertation/manuscript. The author might also consult the *Literary Market Place* (LMP) or the directory published by the Association of American University Presses (AAUP), either of which can be found at the reference desk of any library, to add to the list of potential publishers. The LMP lists all U.S. publishers, and the AAUP lists all U.S. university presses. In addition, the LMP cross-references publishers by the subjects in which they publish, which may help the author to increase the number of possible publishers for the dissertation.

The initial communication with any publisher should consist of a cover letter offering the manuscript for publication. Authors should contact only one publisher at a time unless they specifically state in the letter that it is a simultaneous submission. The letter should be accompanied by a brief proposal (also called a prospectus) that includes a description of the manuscript. The description should reveal what makes the manuscript unique, suggest the market for the book and whether it has course-adoption potential, list the titles already available that the book will compete with, and indicate the manuscript's length and the suggested number of tables and illustrations. Interested publishers will request a review copy of the manuscript. If the manuscript is of publishable quality, the author can expect to receive an offer to publish.

ACADEMIC PUBLISHING RESOURCES

The following is a list of additional guides and resources that may assist with the publication process.

The Thesis and the Book, Eleanor Harman, Ian Montagnes, Siobhan McMenemy, Chirs Bucci, Editors, 1976

Writing and Publishing for Academic Authors, Joseph M. Moxley and Todd Taylor, Editors, 1996

Publish, Don't Perish: The Scholar's Guide to Academic Writing and Publishing, Joseph M. Moxley, 1992

An Author's Guide to Scholarly Publishing, Robin Derricourt, 1996

Getting It Published: A Guide for Scholars and Anyone Else Serious About Serious Books (Chicago Guides to Writing, Editing, and Publishing), William Germano, 2001

Getting Published: The Acquisition Process at University Presses, Paul Parsons, 1989

Publishing for Tenure and Beyond, Franklin H. Silverman, 1999

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