College of Science and Technology Guidelines for Tenure and Promotion Reviews
Last revised 11/13/2007

I. Scope and Purpose

These collegial guidelines are intended to supplement the provisions of the Collective Bargaining Agreement between Temple University and the Temple University Association of University Professionals that pertain to tenure and promotion, and the Guidelines for Review of Promotion and Tenure Applications issued by Temple University. These collegial guidelines are not intended to alter any provision of the Collective Bargaining Agreement or the university guidelines, and therefore do not include, repeat, or paraphrase any provision of those documents. These collegial guidelines provide a description of disciplinary expectations and metrics that are intended to preserve the integrity of the discipline, to advance the mission of the college, and to sustain the excellence of the college's faculty. These collegial guidelines are intended for use by 1) candidates preparing applications for promotion and tenure, 2) departmental and collegial Promotion and Tenure committees in their review of the candidates' applications, and 3) the University Promotion and Tenure Committee and the Provost in their review of recommendations forwarded by the College. Any provision of these collegial guidelines that is determined to be out of compliance with either the Collective Bargaining Agreement or any present or future guidelines issued by Temple University is void, and will be superseded by the appropriate provisions of those documents.

II. Criteria common to all CST departments

A. Teaching

Outstanding performance in teaching is a primary criterion for tenure and for promotion to any rank. For teaching in regularly scheduled courses, the level of performance is determined by the following kinds of evidence:

1. Course and teaching evaluations (CATE) reports.
2. In-class evaluations by departmental and/or collegial faculty.
3. Student comments.
4. Examples of course and classroom innovations provided by the candidate.
5. Presentations by students such as posters or papers at competitive or scholarly meetings.
6. Participation in University-sponsored mentoring programs or other special instructional venues.

Success in the training of undergraduates, graduates, and postdoctoral students is also an important measure of teaching ability. Such performance may be evidenced by supervision of research experiences for undergraduates, by supervision of Graduate Teaching Assistants and Research Assistants, by supervision of students in Independent Study and individual project courses, by supervision of completed MA, MS and Ph.D. degrees, and by peer-reviewed publications authored by students or postgraduate fellows.

B. Research

Outstanding performance in research is also a primary criterion for tenure and promotion. Candidates for tenure are expected to have established independence in determining the area, aims, and methods of their research, as shown by success in obtaining funding as principal investigator, publishing as sole author or lead author, or other means appropriate to the discipline. For either tenure or promotion, the candidate is expected to provide evidence of an outstanding research program, as determined by the following metrics:

1. Publications authored by the candidate in high quality peer reviewed journals or other appropriate venues.
2. Success in obtaining appropriate external funding to carry out the research program.
3. Active participation at national and international meetings and symposia.
4. External evaluations of the research program by established experts in the candidate's field. Typically, 8 to 10 external references should be sought, to insure that at least 5 are obtained. If the number obtained exceeds a maximum set by University guidelines, permission will be sought to include them in the review.

The threshold for promotion to Professor is higher than for tenure and promotion to Associate Professor. Promotion to Professor requires sustained excellence in research. The candidate for promotion to Professor should be recognized by his or her peers as an authority in their area(s) of research. Evidence of a nationally and internationally recognized research program is expected.

The application of metrics 1, 2, and 3 varies with the discipline. Of particular importance to the evaluation of research are the differences among disciplines in the necessity and availability of funding, the role of the author in multiple-author publications, the usefulness of citation analysis and journal impact factors, and the importance assigned to presentations at meetings. Some of these variants for each department in the College of Science and Technology are discussed in Section III below.

C. Service

In compliance with the Collective Bargaining Agreement, service is not primary in evaluation of applications for tenure or promotion.

Assistant Professors in the College of Science and Technology typically carry a reduced service load, so that their effort during the tenure probationary period can be concentrated on teaching and research. Candidates for tenure and/or promotion to Associate Professor, however, should have a record of service, usually at the departmental level, that demonstrates both willingness and ability to perform successful service after tenure. Examples of expected service are participation in such departmental activities as faculty and/or student recruiting and departmental seminars.

The candidate for promotion to Professor is expected to have a sustained and productive record in departmental service. Such service may include participation on departmental committees, including chairing some of the committees. Participation in college and university committees is also expected. Active membership in professional societies is particularly important, as such activities enhance the visibility of the department and the college.

III. Application of metrics for the evaluation of research

As noted in II.B. above, the application of metrics for research varies among the disciplines of the College of Science and Technology. Quantitative measures of the reputation of journals, citation frequencies, publication rates, and funding levels are useful, but cannot substitute for the informed judgment of qualified members of the discipline. This section discusses some of the variances among the disciplines. The details of this section will be updated as appropriate to reflect changes in the disciplines and the indices used.

Publications

Journals

The candidate for either tenure or promotion in all departments is expected to have published in high-quality peer-reviewed journals. For **most departments**, journal quality can be estimated by the Journal Impact Factor (JIF). However, care must be taken in using the JIF. *Nature* and *Science* are prestigious journals where important results are published, but these journals are for the Science community at large, and the JIF may not be useful for a given discipline. For **Geology**, ISI catalogs only a few journals, for relatively brief periods of time, and does not catalog special publications, books, or other modes of research dissemination important in Geology. For example, articles in the Geological Society of America's Special Publications, or in the U.S. Geological Survey Publications, are also important in Geology, but are not indexed by ISI. For **Mathematics**, ISI information about mathematical journals is not particularly useful. There is some degree of correlation between the JIF and the perceived quality of the journal, but since ISI does not segregate by subdiscipline, this correlation may be misleading. For example, the highest ISI Impact Factor for a mathematics journal (2005 data) is 2.323 (*J. Am. Math. Soc.*, a well regarded general journal), but *J. Symbolic Logic*, the best journal in logic, has an Impact Factor of 0.470 (the lowest Impact Factor is 0.073). Almost all journals have Cited Half-life and Citing Half-life > 10.0. The largest immediacy index is 0.660 and the lowest is listed is 0.000. *Acta Math.* and *Duke Math J.*, two of the most respected journals, with respective Impact Factors of 1.998 and 1.304, have no listed immediacy index. For **Physics**, the most prestigious journal is *Physical Review Letters*, which allows for a relatively rapid publication of significant results with a limited number of pages permitted, typically four in the double column format of the journal. This journal has an impact factor of about 7.5. Another letters format journal is *Physics Letters*, an Elsevier publication which has an impact factor of about 5. Here, the number of pages can be larger than 5 but less than ten. In fact most Nobel Prize winners have published their work in *Physical Review Letters* or *Physics Letters*.

Meetings and conference proceedings

In **all disciplines** in the College of Science and Technology, the candidate for tenure is expected to participate actively at professional meetings and symposia, as evidenced by presentation of papers, posters, and invited plenary lectures. Invited lectures are a particularly important measure of how the scientific community views the candidate's research program. The candidate for promotion to Professor is typically expected to have been invited to participate in national and international meetings, and symposia.

Conference proceedings are a venue for publication with varying values for different disciplines. For **Computer Science**, journals are still more prestigious than conference proceedings, but are often avoided due to the very slow review process; 1-2 years is typical turnaround time, and the backlog at some good computer science journals is more than 3 years. Conferences are therefore a major forum for publishing research results. As a standard practice, submitted papers are rigorously reviewed by at least three reviewers, and the review process takes between 2 and 5 months. The acceptance rate at major computer science conferences ranges between 10%-30%. The publications of some top computer scientists consist almost exclusively of conference papers. Since the impact factor of conference publications is not measured by the Web of Science, the computer science community relies on various unofficial estimates (e.g. *Citeseer* uses the average citation rate for all articles in a given year transformed using $ln(n+1)$, where $\boldsymbol{n}$ is the number of citations). Overall, by *Citeseer*'s measure, an impact factor >1.44 means the top 10% of publications, and a factor >2.3 corresponds to the top 1% publications among computer and information science journals and conference proceedings. In Mathematics, the typical venue of publication is refereed periodicals. The time between submission and print tends to be long; for the best general journals, both submission to acceptance and acceptance to print range from 7 months to over a year. Publications in serials specializing in proceedings of conferences are usually refereed, but delivery of a paper at a meeting is usually not restricted to those that have undergone a previous refereeing process. For **Geology**, some specialties use proceedings regularly as a mode of publication (for example geophysics and geochemistry), and in these areas the papers are reviewed and become important references. Each area of Geology also has different specialty journals. For **Physics**, conference proceedings are a recognized form of publication, but without the same prestige and impact as refereed journals. What is important is that the contribution was invited rather than contributed. Invited contributions (especially written versions of plenary talks) are a sign of peer recognition for the impact of the work in the field. They are usually given more time for the address and more pages for the proceedings.

<u>Number of papers</u>

Expected publication rate also varies by discipline. In **Biology**, investigators working in well-funded areas such as cancer research may publish as many as 10 papers per year; investigators in less well-funded areas such as environmental science will typically have lower publication rates. In **Chemistry**, a typical expectation is that the candidate for tenure should have a minimum of 6 publications within the evaluation period and that he/she is the corresponding author (on papers with multiple authors the initiator is usually the corresponding author and designated by an asterisk by his/her name). In **Computer and Information Sciences**, a rate of about two papers per year is expected. In **Mathematics**, the expected rate of publication is one to two papers per year in good professional journals. This rate, however, may vary considerably with the mathematical subdiscipline. For example, researchers in applied mathematics tend to publish more papers per year than those in more "pure" areas. For **Geology**, with a masters program only, the publication rate is somewhat less, typically 1 per year or every other year. Considerable effort is given to preparing undergraduate and Masters students to present abstracts at meetings.

Citations

For **most disciplines** in the College of Science and Technology, citation counts for tenure review may not reliably indicate the quality of the work, because the candidate's publications may have appeared too recently to be frequently cited. The number of citations of mature publications gives a good sense of the importance of the work, and a significant journal citation count is an important requirement for promotion to Professor. Work that is 4 to 5 years old should have an acceptable number of citations (excluding self citations) to be judged as meeting a criterion of minimal quality. As an example, here is a table of categories based upon work in **high energy/particle and nuclear physics**:

Renowned Papers (500+ citations)
Famous Papers (250-499 citations)
Very Well-Known Papers (100-249 citations)
Well-Known Papers (50-99 citations)
Known Papers (10-49 citations)
Less Known Papers (1-9 citations)
Unknown Papers (0 citations)

Therefore a paper in this subdiscipline needs at least 10 citations to be considered as known.

Citation counts are also less useful in **Computer Science** because of the importance (discussed above) of publications of conference proceedings, which are not included in the citation accounts in the Web of Science.

For **Geology**, at present, ISI citation counts are not an adequate measure of research productivity or importance, because (as discussed above), several important modes of research dissemination are not indexed by ISI. Again, each area of Geology also has different specialty journals.

Citation counts for **Mathematics** tend to be low compared to other disciplines. Their usefulness is primarily to provide positive evidence of extraordinarily important work if the count is high (>20 for a 10-15 year old paper), while lower numbers do not necessarily reflect poor quality. This is due in part to the highly specialized nature of mathematical research. A. Wiles's 1994 paper proving Fermat's last theorem, which is probably the most famous accomplishment in mathematics in the last century, had a citation count of 209 in November 2006. Below, for comparison, are the citation counts for the most-cited papers published by some other world-famous mathematicians:

41 for a 1958 paper

225 for a 1972 paper
87 for a 1975 paper
43 for a 1981 paper
54 for a 1992 paper

Multiple authorship of publications

The role of the author in multiple-author papers is important in determining the degree of independence of the tenure candidate. The conventions for indicating that role vary by discipline, but there are usually no fixed rules. For that reason, it is important that the candidate for tenure or promotion provide information explaining his or her authorial role. Some examples of this variation are given below.

In **Biology**, the first author is often the person who has done most of the work; the last author is often the one who mentored or led the study. Therefore these two positions may indicate a higher level of responsibility for the work. The corresponding author is also considered significant in the study. On occasion, although rarely, the corresponding author is neither the first nor the last author.

In **Chemistry**, as noted above, the initiator is usually the corresponding author and is designated by an asterisk beside his or her name.

In **Computer Science**, a single-author paper is unusual, and even two-author papers are rare in rapidly developing areas; more than 5 authors is also unusual unless an interdisciplinary topic is addressed, when teams of up to 10 authors are common. All authors are considered to be major contributors, and each should be able to present details of the entire work at any time. Consequently, there are no clear guidelines about author order. Papers published by computer scientists in non-computer science journals follow the authorship order rules of the specific discipline (e.g. in bioinformatics, the senior author is typically listed last).

In **Geology**, long author lists are less common, and typically everyone contributes significantly to papers. If there are more than 4 authors, the contribution of individual authors should be described. Author order varies. A faculty member may place a student as first author although most of the writing and design of the project was conducted by the faculty member (Masters students typically get a job before papers are submitted).

In **Mathematics**, authors are listed alphabetically, and are held equally responsible for the contents. The usual expectation is that all authors contribute equally. It is very rare to have articles with more than three authors; most have one or two.

In **Physics**, when the number of authors is small (roughly, less than 10), all have contributed significantly to the work. In some fields, the list of authors is larger, especially in the fields of high energy, nuclear physics and plasma physics, where the size of the collaboration is often larger than fifty individuals. Usually most authors have contributed one way or another to the success of the experiment; however, when a smaller core of people has been leading the analysis effort, more research is required to identify the leaders of the experiment. Spokespersons are people who are responsible for the idea and have a full understanding of the physics of the experiment as well as its technical aspects. They are usually invited speakers at conferences. In large collaborations, it is important to see whether a given author is asked to speak as an invited guest at national and international conferences.

Funding

Both the necessity and the availability of funding must be considered in evaluating the candidate's scholarly achievement. In **Biology** and **Chemistry**, success in obtaining competitive peer-reviewed external funding for the candidate's research program is expected. In these departments, it is unlikely that a candidate would be recommended for tenure without significant external funding. Research in **Computer Science** requires funding but most often does not require expensive equipment and technicians. As a consequence, typical grants in computer science are relatively modest, with the main cost component being funding for the PIs and graduate research assistants. In **Geology** and **Mathematics**, funding is desirable but not critical. In **Physics**, funding in support of experimental research is critical. Funding is highly desirable in theoretical physics, but not critical.

For promotion to Professor in departments where funding is critical, continued success in obtaining competitive, peer-reviewed external funding is expected. Departments would like to see the successful renewal of those grants obtained prior to tenure, and the acquisition of new grants.

The availability of funding varies with the discipline and the area, and some types of competitive funding are more prestigious than others. For example, **Biology** investigators working in areas such as cancer research typically have more success in receiving research funds. In areas where investigators are limited to submitting proposals only to the National Science Foundation, intense competition for a limited number of grants makes the likelihood of securing funding significantly lower than in more generously funded areas. For **Chemistry**, funding from federal agencies is considered to be more prestigious than funding from industrial grants or contracts because of the competitive nature of federal grants, and because of the public dissemination of the results. For **Computer Science**, grants from NSF are considered to be the most prestigious. In FY2006, the NSF Computer and Information Science and Engineering Division funding rate was estimated at 19%, where median annualized award size (direct + indirect costs) was $116,000 (page 81, NSF Budget Requests to Congress for CISE). Competitive research grants from other federal agencies such as NIH, NIJ, DOD, DOE etc are also highly regarded, but are less common. Industrial grants are often given smaller weight. For **Geology**, a non-doctoral program, it is important to note that the level of funding available to faculty in non-doctoral programs is generally lower than for doctoral programs. While some external funding is necessary, full and continuous funding up to the tenure decision is rare. Funding sources are varied, particularly among different specialties. For **Mathematics**, funding is typically difficult to obtain. Funding rates by NSF are around 30%. Grants in pure mathematics tend to be around $100K for three years, but substantially more in applied mathematics. For **Physics**, funding can range from amounts of about $50,000 per P.I. per year in theoretical physics to $500,000 per year in experimental physics. Funding in Particle/Nuclear Physics averages about $200,000 per year per P.I. at DOE, while at NSF the figure per year is about $100,000. Grants from NSF and DOE are equally prestigious because the competition for both is intense, and the reviewers (usually 5 per proposal) are usually drawn from the same pool. These two agencies work very closely in many physics areas where funding to a discipline is shared between the two agencies. The DOE Office of Science, however, funds some of the nation’s largest experimental facilities. Other Federal agencies like DOD are also well regarded in the applied fields of physics.