University of Washington, Tacoma CampusTenure and Promotion for the Computing and Software System Program in the Institute of TechnologyGuidelines for Implementing Provisions of the Handbook Policies for UW Tacoma Campus.

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The CSS Program affirms the principles and procedures for faculty tenure as outlined in both Chapter 24 of the UW handbook and Part II Chapter 1 of the UWT handbook. This document provides additional guidelines specific to the CSS program, with comments specific to Research, Teaching, and Service.

Research

Research takes place within a community of researchers. Particular research communities determine the range of questions that its members pursue, the kind of evidence that is accepted to adjudicate truth claims, and the methods that are used for acquiring evidence. Research communities determine what work gets published and funded through the processes of peer review and public debate in the forums particular to this research community.

Regardless of the research focus, the expectation is that a candidate for promotion from Assistant to Associate Professor or Associate to Professor is an active participant of the public discourse within one or more research communities. This does not mean that the candidate performs research in direct collaboration with others, although this might be the case. Rather, it means that the candidate can situate his or her work with respect to a larger community of researchers. In particular, we expect a candidate for promotion to: explicitly identify the research communities of which he or she is an active contributor; clearly identify the set of research questions and issues that the candidate is investigating; describe the methods used in carrying out the research and explain why the methods chosen are appropriate for answering the research question; link the candidate's research to the theories and methods of the candidate's chosen communities.

In evaluating the scholarly achievement of candidates for promotion and tenure, the CSS Program endorses the criteria as described in the "Best Practices Memo: Evaluating Computer Scientists and Engineers for Promotion and Tenure" as approved by the Computing Research Association Board of Directors, August 1999, and published as a Special Insert in the September 1999 issue of the Computing Research News (also available at the time of the writing of this document on the Internet at www.cra.org/reports/tenure_review.pdf). The CSS director will include this memo along with his or her recommendation to the appropriate Dean and Vice Provost for each candidate for promotion.

The summary of the CRA Memo states:

Computer science and engineering is a synthetic field in which creating something new is only part of the problem: the creation must also be shown to be "better". Though standard publication is one indicator of academic achievement, other forms of publication, specifically conference publication, and the dissemination of artifacts also transmit ideas. Conference publication is both rigorous and prestigious. Assessing artifacts requires evaluation from knowledgeable peers.
As indicated by this passage, much of the work created by faculty in CSS is synthetic in nature. The memo quotes Fred Brooks of the University of North Carolina, Chapel Hill who states "When one discovers a fact about nature, it is a contribution *per se*, no matter how small. Since anyone can create something new [in a synthetic field], that alone does not establish a contribution. Rather, one must show that the creation is better." As the memo points out, these synthetic contributions tend to be one of two kinds: either theoretical contributions, generally expressed in the form of theorems and proofs, and experimental contributions involving the construction of computational artifacts, such as a "chip, circuit, computer network, sofware, robot, etc". These computational artifacts not only *embody* the research ideas, but are themselves the means for observation and measurement. That is, one constructs a robot (or network, or algorithm, etc.) and measures its effectiveness at solving the task for which it was designed.

As to evaluating this "better" quality, the memo states: "The fundamental basis for academic achievement is the impact of one's ideas and scholarship on the field. ... For the purposes of evaluating a faculty member for promotion or tenure, there are two critical objectives of an evaluation: a) Establish a connection between a faculty member's intellectual contribution and the benefits claimed for it, and b) Determine the magnitude and significance of this impact."

For theoretical research, "though conference publication is highly regarded ... there is a long tradition of completing, revising, and extending conference papers for submission and publication in archival journals." For experimentalists who create computational artifacts, however,

A key research tradition is to share artifacts with other researchers to the greatest extent possible. Allowing one's colleagues to examine and use one's creations is a more intimate way of conveying one's ideas than journal publishing, and is seen to be more effective. For experimentalists conference publication is preferred to journal publication, and the premier conferences are generally more selective than the premier journals.

The reason conference publication is preferred to journal publication, at least for experimentalists, is the shorter time to print (7 months vs. 1-2 years), the opportunity to describe the work before one's peers at a public presentation, and the more complete level of review (4-5 evaluations per paper compared to 2-3 for an archival journal).

As for assessing impact, the memo states that

The primary direct means of assessing impact -- to document items (a) and (b) above -- is by letters of evaluation from peers. Peers understand the contribution as well as its significance. ...

From the point of view of documenting item (a) ... evaluators may be selected from the faculty member's collaborators, competitors, industrial colleagues, user, etc. so that they will have the sharpest knowledge about the contribution and its impact. ...

The letter writers need to be familiar with the artifact as well as the publications. The artifact is a self-desribing embodiment of the ideas. Though publications are necessary for the obvious reasons ... the artifact encapsulates information that cannot be captured on paper. Most artifacts "run," allowing evaluators to acquire dynamic information. Further, most artifacts are so complex that it is impossible to explain all of their characteristics; it is better to observe them. Artifacts, being essential to the research enterprise, are essential to its evaluation, too.

It should also be noted that research carried out by Computer Scientists is commonly performed in teams. In such circumstances, the author listed first is not always the member of the research team making the largest contribution. For multi-authored works, it is incumbent on the candidate to provide an explanation of the candidate's role. Supporting evidence for the candidate's contributions can also be provided by co-authors and research partners.

As to the content of the research, the CSS program acknowledges that given the penetration of computational ideas, methods, and artifacts into virtually every discipline, a faculty member's research may be directed not just to others within computer science and engineering, but to a cross-disciplinary audience, e.g. computational linguists or design engineers. Further, a faculty member might direct their research to audiences outside of those traditionally associated with computing, for example by creating software to help medical researchers visualize and classify viruses, or using computational theories to account for economic market behavior. In such cases, the criterion of relevance and appropriateness to the CSS program is the extent to which the candidate has applied computational methods, algorithms, concepts, or artifacts to the chosen application domain. Given the mission of the program within the broader goals of the Institute of Technology and Washington state, such cross-disciplinary research is not only tolerated but encouraged, and it will be evaluated using the methods and criteria as outlined above.

In addition, given both the undergraduate and professional focus of the CSS educational programs, scholarship aimed at improving professional practices or the teaching and learning of computational methods and concepts is likewise encouraged. Because such research will likely borrow method from other disciplines (e.g. ethnography, statistical inference), it should be evaluated with respect to the audience to which it is directed. For example, if published within a traditional discipline, such as Psychology or Education, it should be evaluated by standards within those disciplines. If published within an emerging, hybrid discipline, such as Computer Science Education, or the Scholarship of Teaching and Learning, it should be evaluated with respect to the standards within that discipline. In such a case, it will be incumbent on the candidate to both provide information to evaluators for such standards, as well as recommend external evaluators who can likewise provide an assessment of the candidate's work with respect to prevailing standards within this research community.

Teaching

Excellence in teaching is ultimately evaluated by the extent to which 1) the candidate's objectives for student learning are consistent with the mission of the CSS program, the Institute, the University, and the discipline, and 2) the extent to which the candidate's teaching leads to student achievement of these learning objectives.

A scholarly approach to teaching promotes this excellence. As Lee Shulman states in "The Course Portfolio",

A scholarship of teaching will entail a public account of some or all of the full act of teaching - vision, design, enactment, outcomes, and analysis - in a manner susceptible to critical review by the teacher's professional peers and amenable to productive employment in future work by members of that same community.
Evidence for this public accounting can be found in the documents that candidates provide in support of their promotion, and can include such things as course syllabi and sample assignments, course design rationales, teaching statements in annual reports, teaching statements in the tenure file, peer evaluations, and student evaluations.

There are special considerations known by faculty within technologically-based programs, but often less known outside these fields. Given the fast rate of technological change, some courses in a curriculum will come and go with greater rapidity than in other more stable fields, and the rate of evolutionary change within a given course is often more rapid than in other fields. Even when particular topics remain the same, textbooks, software/hardware tools, languages, and formal notations can change with surprising rapidity (e.g. new versions of Java or the Unified Modeling Language). Further, given the increasing professionalization of the discipline, there are a number of external, discipline-wide curricular issues that individual faculty and faculty-as-a-whole must keep abreast of. These include such things as ABET accrediting standards, and ACM and IEEE curriculum guidelines. In addition, there is a large and growing literature of models of software development and professional practice, and many of these are being incorporated into the classroom. Competent educators must thus keep abreast of these practices. Examples include such things as test-driven software development, agile methods, pair programming, and peer code inspections, to name just a few.

Faculty who teach in the computational sciences also share the same challenges that their colleagues do in other laboratory sciences. Faculty expend considerable effort in researching, securing, and developing appropriate state-of-the-art laboratory environments to support student learning, an absolute prerequisite to effective student learning in the discipline. This can include such activities as searching the software and hardware market for appropriate tools, arranging for software purchase and installation, securing the appropriate licensing agreements for intellectual property, and learning to use and program specialized hardware and software, many of which are in a state of flux. These hardware/software systems are often multi-layered systems of astonishing complexity, which can be programmed at various levels of abstractions through different interfaces. Examples of these multi-layered complex systems include embedded computers, mobile robots, client-server systems and enterprise applications environments. A CSS faculty member must thus not only ensure that these systems are functional, that students have ready, affordable access, that the faculty member has gained a sufficient mastery of the specific technology as well as the underlying principles that the technology embodies. But the faculty member must plan pedagogically meaningful sequences of student activities and assignments using these tools to enable student learning of the technologies and underlying principles.

The CSS program maintains an active program of student internships and research projects, and both the undergraduate and graduate levels. These one-on-one relationships between students and faculty are often the most meaningful and important relationships that students develop during their time in the CSS program. Most faculty spend considerable time in advising and mentoring students in these projects, and it is important that the time necessary to carry out this vital "apprenticeship" model of teaching be accorded due consideration in a faculty member's promotion decision.

Because of the instrumental uses of technology in society, one of the additional responsibilities of faculty in CSS is in helping students to recognize the ethical and social implications of the use of technology within specific social settings. This includes the effect of technology on human relationships, work, the distribution of power, and the potential risks and benefits to human health and welfare. As a result, each faculty member should play some role in helping students in CSS to recognize their ethical obligations as computing professionals, as described in such things as the IEEE and ACM Codes of Ethics, though the extent of this role will vary considerably. Examples of teaching that demonstrates this role include adding units related to the social and ethical implications of computing into otherwise technical courses, discussing these issues with student interns and advisees, bringing in external speakers who address these issues to address students, and teaching courses where these issues comprise a substantial part of the course material.

Service

There is a high degree of program-level service within CSS, for two primary reasons. The first is related to the discussion above concerning the lab-based nature of the courses; considerable service is required of most faculty at some time during their tenure to maintain a computing infrastructure that enables student learning. The second reason concerns the role of CSS within the Institute of Technology in carrying out its unique mission in the state. In addition to faculty representation on over 12 permanent committees in the Institute (not including ad-hoc committees and faculty review committees), faculty are involved in such things as quarterly meetings with Community College faculty, working with CTC Faculty Fellows, working closely with advisors, and guest speaking in the high schools and community.