



Who Is Teaching Whom?

Fall 2009 CPT Survey of Chemistry Faculty Status

Significant Findings

Faculty Characteristics

- 22% of tenure-track faculty are women
- 48% of long-term, full-time faculty are women
- 61% of temporary faculty hold a PhD

General Chemistry Lecture

Percentage of students who see non-tenure-track faculty in:

- Courses suitable for majors: 33%
- Courses not suitable for majors: 60%

Organic Chemistry Lecture

Percentage of students who see non-tenure-track faculty in:

- Courses suitable for majors: 20%
- Courses suitable for non-majors: 50%

Course Staffing Trends

- 60% of programs reported that the proportion of undergraduate chemistry courses taught by tenure-track faculty has not changed in the past five years.

Introduction

While there has been considerable discussion about the apparent increase in non-tenure-track faculty at colleges and universities, no hard data has been available to measure this increase or to show how non-tenure-track faculty and instructional staff are utilized in chemistry programs. This prompted the American Chemical Society (ACS) Committee on Professional Training (CPT) to survey 1012 chemistry programs in the United States and its territories to determine how categories of faculty are utilized in chemistry departments and which categories of faculty chemistry students are seeing in the classroom and laboratory. This is the first survey aimed at measuring “who is teaching whom?” in chemistry programs. Department chairs from 422 chemistry programs (354 ACS-approved programs and 68 non-approved programs) provided data on faculty employment practices. This special report discusses some of the survey results. A more extensive discussion and the full data set can be found at www.acs.org/cptfacultystatusreport.

Quality of the Data and the Analysis

The survey results are based on self-reported data and consequently reflect the quality of the information provided by the departments. Departments were not contacted to verify the accuracy of the information provided. While all survey responses were included in the analysis, several responses to particular questions

were removed when they were inconsistent with responses to other questions or clearly impossible. Smaller inconsistencies in the answers from several departments across the questions were also identified, but these were generally not removed from the data set. As a result, when responses to some questions are discussed in terms of percentages, the percentages do not always add up to 100%.

**Tenure-track faculty represent
68.5% of the instructional staff
teaching chemistry.**

Institutional Data

Part I of the survey collected information about whether the department had ACS approval and the highest degree offered in chemistry. This information was used to sort the survey responses to the later questions. Most of the results are categorized by responses from public/private ACS-approved BS/BA-, MS-, and PhD-granting departments, and public/private non-ACS-approved BS/BA-granting departments. The responses from non-ACS-approved, MS- and PhD-granting departments were too small (only one response from each) to include in the analysis of results by institutional type.

Faculty Characteristics

Part II of the survey gathered information about different categories of faculty and their gender and ethnicity distributions. Categories of faculty were defined as:

- tenured/tenure-track,
- long-term, full-time, non-tenure-track (LT/FT, defined as full-time, non-tenure-track faculty who had been employed in the chemistry program for more than three years or were currently under a three-year contract),
- long-term, part-time (LT/PT, part-time instructors who had been employed in the program for more than three years or were currently under a three-year contract), and
- temporary (all faculty and instructors who were sabbatical replacements or held other types of short-term appointments).

The survey did not include teaching assistants.

Table 1 shows the total number of faculty and instructional staff with their gender distribution in each category at all 422 responding departments. The 4542 tenure-track faculty represent 68.5% of the instructional staff in these departments. A recent article in *The Chronicle of Higher Education* reported, using Department of Education data, that in 2007 the percentage of tenured/tenure-track faculty across all disciplines at institutions comparable to those included in the CPT survey ranged from a low of 21% to a high of 49% at private MS-granting and public PhD-granting institutions, respectively.³ The percentage of tenure-track faculty in the chemistry departments responding to the CPT survey is significantly higher than the national average found across all disciplines.

There are clear differences in gender distributions among different faculty categories. While women account for only slightly over 20% of the tenure-track faculty, their numbers are much greater in the non-tenure-track ranks, accounting for nearly 50% of the LT/FT faculty. A further breakdown of the data by highest degree granted at public and private institutions shows that women account for a smaller proportion of the faculty in all categories at PhD-granting institutions. While overall, women make up about 22% of tenure-track faculty, this percentage is smaller, 15 to 16%, at PhD-granting institutions and higher at both BS- and MS-granting institutions (as high as 33% at private BS-granting institutions). While women account for 48% of LT/FT faculty overall, this percentage is lower at PhD-granting institutions, 42%, and higher at BS- and MS-granting institutions (as high as 60% at private BS-granting institutions).

Across institution and faculty type, the racial/ethnic makeup of chemistry faculty is predominately white/Caucasian. The percentage distribution of faculty among other racial/ethnic groups, shown in Table 2, remained consistent throughout the different categories of faculty, with Asian Americans making up the largest group and Native Americans the smallest. This distribution was fairly consistent among all types of institutions.

The highest degree held by the faculty members in the responding departments also varies among the categories of faculty. This distribution is shown in Table 3 for all 422 responding institutions. Not surprisingly, over 98% of tenure-track faculty earned a PhD degree. This percentage decreases for the non-tenure-track faculty to a low of about 61% for temporary faculty. Nearly 13% of temporary faculty have only a bachelor's degree.

Table 1. Number and Gender Distribution of Faculty and Instructional Staff in Each Category at All 422 Institutions^a

Faculty Category	Total Number of Faculty and Instructional Staff	Percentage Male Faculty and Instructional Staff	Percentage Female Faculty and Instructional Staff
Tenure-track	4542	79.5%	22.4%
Long-term, FT	712	52.7%	48.3%
Long-term, PT	505	57.6%	39.6%
Temporary	867	58.0%	41.3%

^aInconsistencies in responses from some departments prevent percentages in all rows of Tables 1 and 3 from totaling 100%.

Table 2. Ethnic Distribution among Faculty and Instructional Staff at All 422 Institutions

Faculty Category	Asian American	African American	Hispanic American	Native American
Tenure-track	8.8%	3.0%	2.1%	0.8%
Long-term, FT	6.4%	3.5%	1.9%	1.0%
Long-term, PT	7.7%	4.0%	0.4%	0.2%
Temporary	9.3%	2.9%	2.1%	0.3%

Table 3. Degree Distribution among Faculty and Instructional Staff at All 422 Institutions

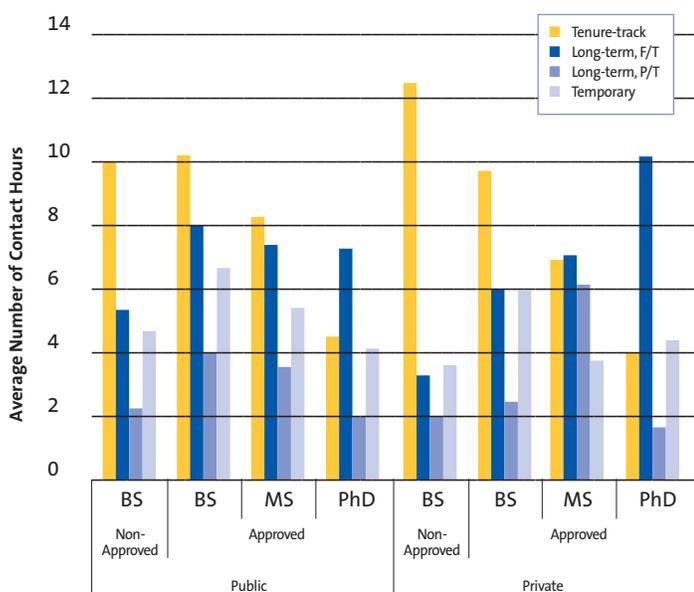
Faculty Category	Highest Degree Held is Bachelor's	Highest Degree Held is Master's	Highest Degree Held is PhD
Tenure-track	0.1%	0.9%	98.2%
Long-term, FT	5.6%	23.2%	71.2%
Long-term, PT	6.9%	33.1%	61.8%
Temporary	12.6%	25.0%	61.2%

A further breakdown of the data by highest degree granted at public and private institutions shows there is little difference among the different types of institutions in the tenure-track faculty, with nearly all holding a PhD. More non-tenure-track faculty of all categories hold PhD degrees at PhD-granting institutions, than at any of the other types of institutions. At PhD-granting institutions, about 84% of LT/FT faculty hold a PhD, while at private BS-granting institutions only 56% of the LT/FT faculty hold PhDs. At public BS-granting institutions, about 13% of LT/FT faculty hold only BS degrees. At PhD-granting institutions, 87% of LT/PT faculty hold PhD degrees, while this percentage goes as low as 46% at public BS-granting institutions. At these same public BS-granting institutions, 11% of the LT/PT faculty hold only a BS degree. At private PhD-granting institutions, about 86% of the temporary faculty hold PhDs while the lowest percentage of temporary faculty holding a PhD (50%) is found at public and private MS-granting institutions.

Who Taught in Fall 2009?

Part II of the survey also gathered information about how many faculty in each category had contact with students in both classroom and laboratory settings and

Figure 1. Average Lecture and Laboratory Contact Hours Taught Weekly per Faculty in Each Category



how many contact hours they spent in these settings. Figure 1 illustrates the average total number of undergraduate and graduate lecture and undergraduate lab contact hours taught per faculty member on a weekly basis. At PhD-granting institutions, LT/FT faculty have higher contact hours than tenure-track faculty. At the same time, however, LT/FT faculty have lower average contact hours than tenure-track faculty at BS- and MS-granting institutions. One reason for this may be that LT/FT faculty in these programs may have other responsibilities. For example, a stockroom manager/lab director who is a LT/FT employee may teach only 3–6 contact hours each week.

Who Taught the Undergraduate Courses with the Highest Student Enrollments?

Chemistry departments typically have large service-teaching responsibilities for other majors, particularly in introductory and organic chemistry. Therefore, departments were asked to provide information on four groups of courses which likely have the highest student enrollments. These included:

- all introductory chemistry courses taught in fall 2009 that a student could count toward a chemistry degree
- all other introductory chemistry courses
- all introductory organic chemistry courses that a student could count toward a chemistry degree, and
- all other introductory organic chemistry courses.

Respondents to questions about these courses were instructed to include all sections of the courses taught in fall 2009. If the courses were taught as a two-semester or multiple-quarter sequence and more than one course in the sequence was taught in fall 2009, departments were asked to include all these sections in their responses.

Introductory Chemistry Courses

Responses to the survey showed that the distribution of faculty contact hours and the percentage of students who saw each type of faculty, particularly in lecture, were quite different in introductory courses that could count toward a chemistry degree than in all other introductory courses. In the courses suitable for chemistry majors, non-tenure-track faculty spend more time in the laboratory than in

Figure 2a. Introductory Courses in Which a Chemistry Major Could Enroll: Percentage of Students at All Institutions Who See Faculty in Each Category in Lecture

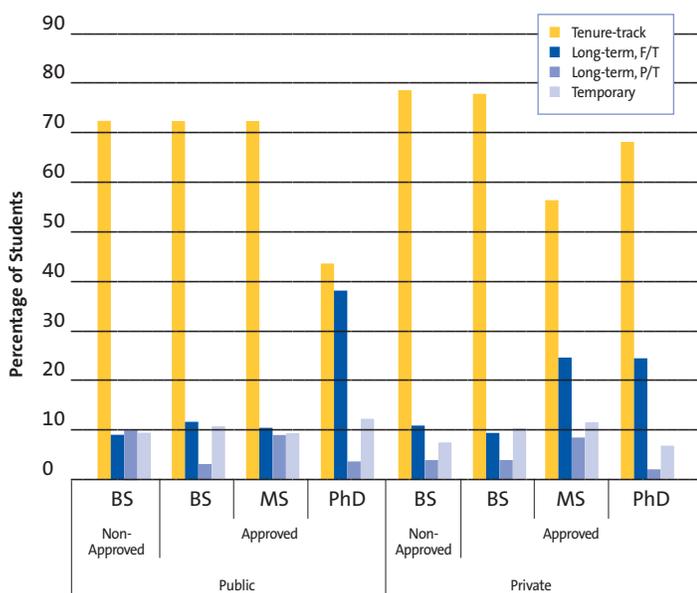
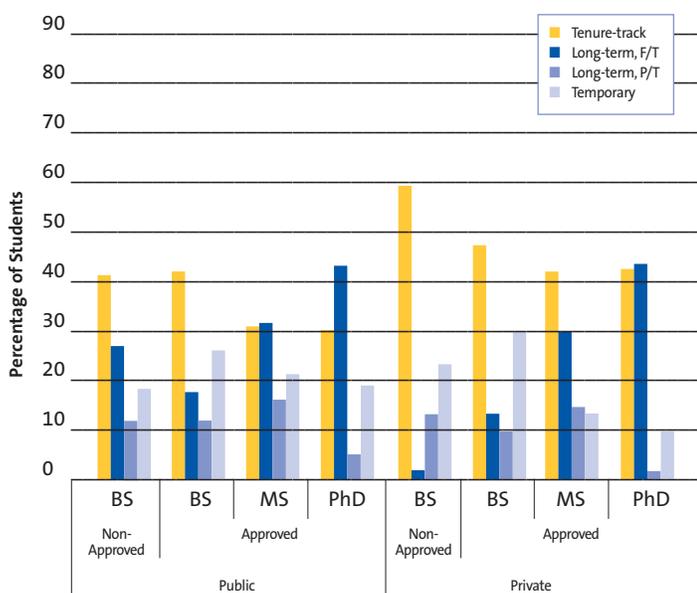


Figure 2b. Introductory Courses Not Suitable for a Chemistry Major: Percentage of Students at All Institutions Who See Faculty in Each Category in Lecture



the classroom. The majority of lecture contact hours in these courses are accounted for by tenure-track faculty. Even so, at PhD-granting institutions, non-tenure-track faculty spend more time in the classroom than do their counterparts at any of the other groups of institutions. The majority of these classroom hours are spent by LT/FT faculty. The percentages of students at all institutions

who see each category of faculty in the classroom in courses suitable for chemistry majors are shown in Figure 2a. These percentages were calculated in the following way. For each group of institutions, the total number of students enrolled in courses taught by each category of faculty was divided by the total number of students enrolled in the courses at all institutions in the group. The percentages in Figure 2a show that, except for public PhD-granting institutions, the majority of students see tenure-track faculty in the classroom.

In the introductory courses not suitable for chemistry majors, the majority of lecture and laboratory contact hours at most of the groups of institutions are accounted for by non-tenure-track faculty. Although LT/FT faculty accounted for a large fraction of the non-tenure-track lecture hours in introductory courses in which a chemistry major might enroll, this is not the case for the non-major introductory courses. In these courses, LT/PT and temporary faculty generally account for a larger portion of the non-tenure-track faculty lecture contact hours. The percentages of students who see each type of faculty in the classroom in these courses are shown in Figure 2b. As might be expected from the contact hour information, over 50% of the students enrolled in non-major introductory courses at all institutions other than private non-approved BS institutions see non-tenure-track faculty in lecture. At approved public MS- and PhD-granting institutions, 70% of the students in non-major introductory courses see non-tenure-track faculty.

Introductory Organic Chemistry Courses

An introductory organic chemistry course was defined in the survey as the first organic course using a dedicated organic chemistry textbook. Analysis of the data for organic courses that can count toward a chemistry major shows that the majority of lecture contact hours in these courses are accounted for by tenure-track faculty. Although the average number of contact hours in the organic course is lower for all categories of faculty than in the introductory course appropriate for chemistry majors, the proportion of lecture contact hours taught by tenure-track faculty is higher in the organic course than in the introductory course. As in the introductory course, LT/FT faculty account for the majority of non-tenure-track lecture hours. At most types of institutions, 80% or more of the students see tenure-track faculty in the classroom, although, as in the introductory course, fewer students at PhD-granting institutions see tenure-track faculty in lecture (only 60–70%). While a higher percentage of students at all institutions see tenure-track faculty in lecture in this course than in the introductory course, a larger percentage of students at PhD-granting institutions see LT/FT faculty in lecture in this course than at any of the other groups of institutions.

A relatively small number of the responding institutions taught an introductory organic course that cannot count toward a major in fall 2009, although 48% and 44% of approved MS- and PhD-granting public institutions, respectively, reported teaching such a course. The overall low percentages limit the reliability of these data. It is useful, however to look at the percentages of students who see each type of faculty in the non-major introductory organic lecture at public MS- and PhD-granting institutions. Students are very likely to see non-tenure-track faculty in the classroom in this course with around 45% and 60% of the students at public MS- and PhD-granting institutions, respectively, seeing non-tenure-track faculty in lecture.

Summary: Who Is Teaching Whom?

Non-tenure-track faculty play a significant role in both classroom and laboratory teaching in all of these courses. In both the introductory and organic courses in which a chemistry major might enroll, non-tenure-track faculty contribute most to laboratory teaching. In lecture, tenure-track faculty account for the majority of contact hours, but non-tenure-track faculty (particularly LT/FT faculty at PhD-granting institutions) account for a significant proportion of these contact hours. While overall, at all types of institutions, about 70% of students in the introductory course see tenure-track faculty in lecture, at public PhD-granting institutions nearly 40% of students in this course see LT/FT faculty and over 15% see temporary or part-time faculty. The overall percentage of students who see tenure-track faculty in lecture increases to over 80% in the introductory organic course, but about 25% of students in this course at PhD-granting institutions see LT/FT faculty.

The picture is different for the introductory and organic courses not intended for chemistry majors. The distribution of faculty lecture contact hours in the introductory course looks quite different from that in the course in which a chemistry major might enroll. In the non-major introductory course, all categories of non-tenure-track faculty account for the majority of lecture contact hours, and the majority of students see non-tenure-track faculty in lecture. While the limited data on the organic course not intended for majors precluded a detailed analysis, it does suggest that a

larger proportion of students see non-tenure-track faculty in this course than in the organic course in which a chemistry major might enroll.

Course Staffing Trends

In Part III of the survey, respondents were asked if the proportion of undergraduate courses taught by tenure-track faculty had increased, decreased, or stayed the same in the last five years. The responses show that on average over 60% of programs of all types reported that this number has stayed the same. On average, over 15% of programs reported that the proportion has decreased, but interestingly, more than 20% of programs reported that the proportion has increased. This increase may reflect an increase in teaching loads due to faculty cutbacks or attrition at some institutions.

Employment of Non-tenure-track Faculty at Multiple Institutions

Part III of the survey also gathered information about non-tenure-track faculty who were teaching at more than one institution. Table 4 shows the percentages of non-tenure-track faculty at all institutions in each group who were reported to be teaching at more than one institution. Very few of the LT/FT faculty were employed at more than one institution, but the percentage increases for LT/PT and temporary faculty, particularly for BS- and MS-granting institutions. The percentages reported for private MS-granting institutions should be viewed with caution since only 11 institutions in this category responded to the survey, but a significant percentage of LT/PT and temporary faculty at non-PhD-granting institutions were teaching at more than one institution.

Employee Benefits

Part IV of the survey asked programs to provide information about benefits offered to each category of faculty. Table 5 shows some examples of the responses. A complete presentation of the benefits data can be found in the more extensive report found at www.acs.org/cptfacultystatusreport.

Of the non-tenure-track faculty, LT/FT faculty receive the most generous benefits, but there is considerable disparity between the benefits received by LT/FT and tenure-track faculty. Far fewer LT/FT faculty than tenure-

Table 4. Percentage of Non-tenure-track Faculty Teaching at More Than One Institution

Faculty Category	Public			Private		
	BS	MS	PhD	BS	MS	PhD
Long-term, FT	3.4%	0.0%	1.1%	2.3%	0.0%	0.0%
Long-term, PT	20.9%	28.6%	8.6%	16.8%	5.7%	4.8%
Temporary	16.8%	15.7%	9.1%	19.7%	39.3%	11.4%

Table 5. Examples of the Percentage of Programs Reporting Benefits Offered to Different Categories of Faculty

Benefit	Tenure-track	Long-term, F/T	Long-term, P/T	Temporary
Private office space	98.6%	60.2%	29.9%	40.5%
Mailboxes	97.9%	66.6%	50.9%	71.8%
Parking	78.0%	52.4%	38.2%	57.6%
Private telephone	98.6%	65.4%	34.1%	47.4%
Photocopy access	97.6%	67.1%	52.1%	74.9%
Library privileges	98.1%	66.8%	51.9%	74.2%
Secretarial support	92.2%	63.0%	48.1%	67.5%
Advance notice of course assignments	95.7%	66.1%	48.1%	63.7%
Participation in departmental faculty meetings	98.1%	57.3%	25.6%	34.1%

track faculty have private offices, secretarial support, photocopy access, or even library privileges. Less than 60% of institutions included LT/FT faculty in faculty meetings. Of the two other groups of non-tenure-track faculty, temporary faculty fare better than LT/PT faculty. In many cases, temporary faculty receive benefits comparable to those received by LT/FT faculty. LT/PT faculty receive the fewest of what might be considered quality of life benefits: private office space, computer access, parking, secretarial support, photocopier access, library privileges, or a medical plan of any kind. These faculty, many of whom are teaching at more than one institution at the same time, clearly enjoy the fewest benefits of any of the non-tenure-track faculty.

Concluding Remarks

The survey results offer a number of insights into chemistry instruction and “who is teaching whom.” The percentage of tenure-track faculty in chemistry departments of all types appears to be higher than in

other disciplines across campuses.³ In addition, most programs report that the proportion of undergraduate courses taught by tenure-track faculty has stayed roughly the same over the past five years. Nevertheless, the gender and ethnic/racial make-up of the faculty do not reflect that of our society as a whole. Although tenure-track faculty make up the majority of faculty in chemistry departments, non-tenure-track faculty play a large role in teaching in both the classroom and laboratory. On average, 30% of students in introductory chemistry lecture courses suitable for majors see non-tenure-track faculty, but this increases to 55% at public PhD-granting institutions. Students are even more likely to see non-tenure-track faculty in the introductory lecture courses that are not intended for chemistry majors. Finally, while very few LT/FT faculty hold positions simultaneously at more than one institution, a significant percentage of LT/PT and temporary faculty do teach at more than one institution. In addition, all non-tenure-track faculty receive fewer benefits than tenure-track faculty, with LT/PT faculty receiving the fewest benefits.

¹ “Tracking the Invisible Faculty,” *The Chronicle of Higher Education* (December, 2006) <http://chronicle.com/article/Tracking-the-Invisible-Faculty/35173/> (accessed Aug 2010).

² University of Michigan report “Non Tenure Track Faculty: The Landscape at U.S. Institutions of Higher Education” (2006).

³ “Increasingly, Faculty Members are Part-Time and Non-tenured,” *The Chronicle of Higher Education* (August 2010). Note: the numbers used for the calculations reported in this article did not include teaching assistants.

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