

The Performance of Worcester Polytechnic Institute's Chemistry Department

An Interactive Qualifying Project Report
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By

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Abstract

This project uses five sources to compare the Chemistry department's performance at Worcester Polytechnic Institute against 198 other institutions. The resources that the institutions provided played a critical role in determining their success. Twenty-two graphs were made using the compiled data. Using the graphs, one can easily determine Worcester Polytechnic Institute's results based on its resources. There are several areas in which Worcester Polytechnic Institute, with its small program, needs to improve.

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Chapter I: Introduction

Institutions and mathematical functions can be connected; both institutions and mathematical functions have inputs and outputs. In math, a variable (the input) is put into a function so that an output can be produced. Likewise, institutions provide resources (inputs) that produce certain outputs. The resources that institutions provide can either make the institutions or break them. An institution must provide sufficient resources in order to be on top. Institutional resources are evidently important factors in determining an institution's success. This interactive qualifying project looks at the resources and outputs of 199 institutions granting chemistry Doctoral degrees in the United States. Worcester Polytechnic Institute's performance was specifically compared against 198 other institutions.

Data was gathered for all 199 institutions using 5 main sources, namely *Peterson's Graduate Programs*¹, the *American Chemical Society Directory of Graduate Research 2007*², the American Chemical Society website³, the National Science Foundation web site⁴, and Michael Rivet's Interactive Qualifying Project report *Ranking the PhD-Granting Chemistry Departments in the United States from 2000-2007*⁵. *Peterson's Graduate Programs*¹ was a good source for obtaining the number of faculty members at various institutions, the number of students at various institutions, research assistantships, teaching assistantships, and the number of fellowships granted in 2007 and 2008 by various institutions.

The *American Chemical Society Directory of Graduate Research 2007*² provided the number of faculty members at various institutions. It also provided the number of Doctoral

¹ Peterson's Graduate Programs in the Physical Sciences, Mathematics, Agricultural Sciences, the Environment & Natural Resources 2009.

² American Chemical Society Directory of Graduate Research 2007. Washington D.C., 2007.

³ American Chemical Society Chemistry for Life. 2009. <http://portal.acs.org/portal/acs/corg/content>

⁴ The National Science Foundation. Nov 05, 2009. <http://www.nsf.gov/statistics/nsf09303/pdf/tab58.pdf>

⁵ Rivet, Michael. *Ranking the PhD-Granting Chemistry Departments in the United States from 2000-2004*. April 28, 2005

degrees granted in 2004-2005 and 2005-2006 at the various institutions. The American Chemical Society website³ provided supplement information on the number of faculty at various institutions.

As one can tell by now, three sources provided information on the number of faculty members at various institutions. How did I select the number of faculty members for each institution? I mainly used the *American Chemical Society Directory of Graduate Research 2007*². It was the most convenient way from which I could obtain information. However, it did not have all the numbers of faculty members at each institution. I used *Peterson's Graduate Programs*¹ and the American Chemical Society website³ as back up plans. I made sure that each of the three sources provided similar numbers for the number of faculty members at various institutions; the sources relatively agreed.

Michael Rivet's interactive qualifying project report, *Ranking the PhD-Granting Chemistry Departments in the United States from 2000-2004*⁵ was a good source that provided information on which I could build. Michael Rivet's interactive qualifying project "seeks to rank the two hundred PhD-granting chemistry departments in United States' universities based on their impact on chemistry research in the years 2000-2004 and by the excellence of their faculty during that time" (Rivet 1). Rivet used publication and citation information to achieve his objective. Rivet's Interactive Qualifying Project provided data on the total number of papers from various institutions, the total number of citations to authors at various institutions, and the number of papers and citations per faculty member. I combined Michael Rivet's data with mine to obtain information for my project. Finally, the National Science Foundation web site⁴ provides information on research/development expenditures in Chemistry at universities and colleges.

All these sources reveal resources that were supplied for research at the 199 universities. Using the information obtained from all 5 of these sources, I made graphs from which we could observe Worcester Polytechnic Institute's performance against the various institutions. The graphs are either histograms or scatter plots. On each scatter plot, Worcester Polytechnic Institute is denoted by a solid diamond. One can see where Worcester Polytechnic Institute lies compared to the other institutions. Finally, conclusions concerning Worcester Polytechnic Institute's resources and outputs were obtained after analyzing both the graphs and write-ups.

In the following section (Chapter 2), are the figure captions. The write-ups for each of the twenty-two graphs come before the graphs themselves. Chapter 3 discusses and concludes our findings. Worcester Polytechnic Institute is the main focus in Chapter 3. The bibliography comes before Appendix A, which provides tables of data used to make the graphs.

Figure One is a histogram showing how many institutions had a specific number of chemistry graduate students in 2007. The information used to make this histogram comes from *Peterson's Graduate Programs*⁶. The histogram is divided into eight intervals. The abscissa shows the number of graduate students. The ordinate shows the number of institutions that have a number of graduate students in each range. More institutions have smaller numbers of graduate students than larger numbers. The average number of graduate students is 89. The median number of graduate students is 71. The mode is 150. The histogram is right skewed, non-symmetric, and lower bound.

Worcester Polytechnic Institute, with 14 graduate students, falls in the 1 to 40 range. All Worcester Polytechnic Institute graduate students are full-time. Six of the 14 graduate students are women. Thirty-three institutions fall in the 1 to 40 range. There are 40 institutions that have 41 to 80 graduate students. The 41 to 80 range of graduate students is the most common, while the 1 to 40 range comes in second. Twenty-six institutions have 81-120 graduate students. Thirteen institutions have 121 to 160 graduate students. Eight institutions have 161 to 200 graduate students. Five institutions have graduate students that lie within the 201-240 range. Three institutions have 241 to 280 graduate students. Finally, one institution has more than 280 graduate students. The University of Illinois at Urbana-Champaign has 298 graduate students. Out of the 298 graduate students, 289 are full-time, while nine are part-time. Of the 289 full-time graduate students, 85 are women.

⁶ Peterson's Graduate Programs in the Physical Sciences, Mathematics, Agricultural Sciences, the Environment & Natural Resources 2009.

Graduate Students, 2007

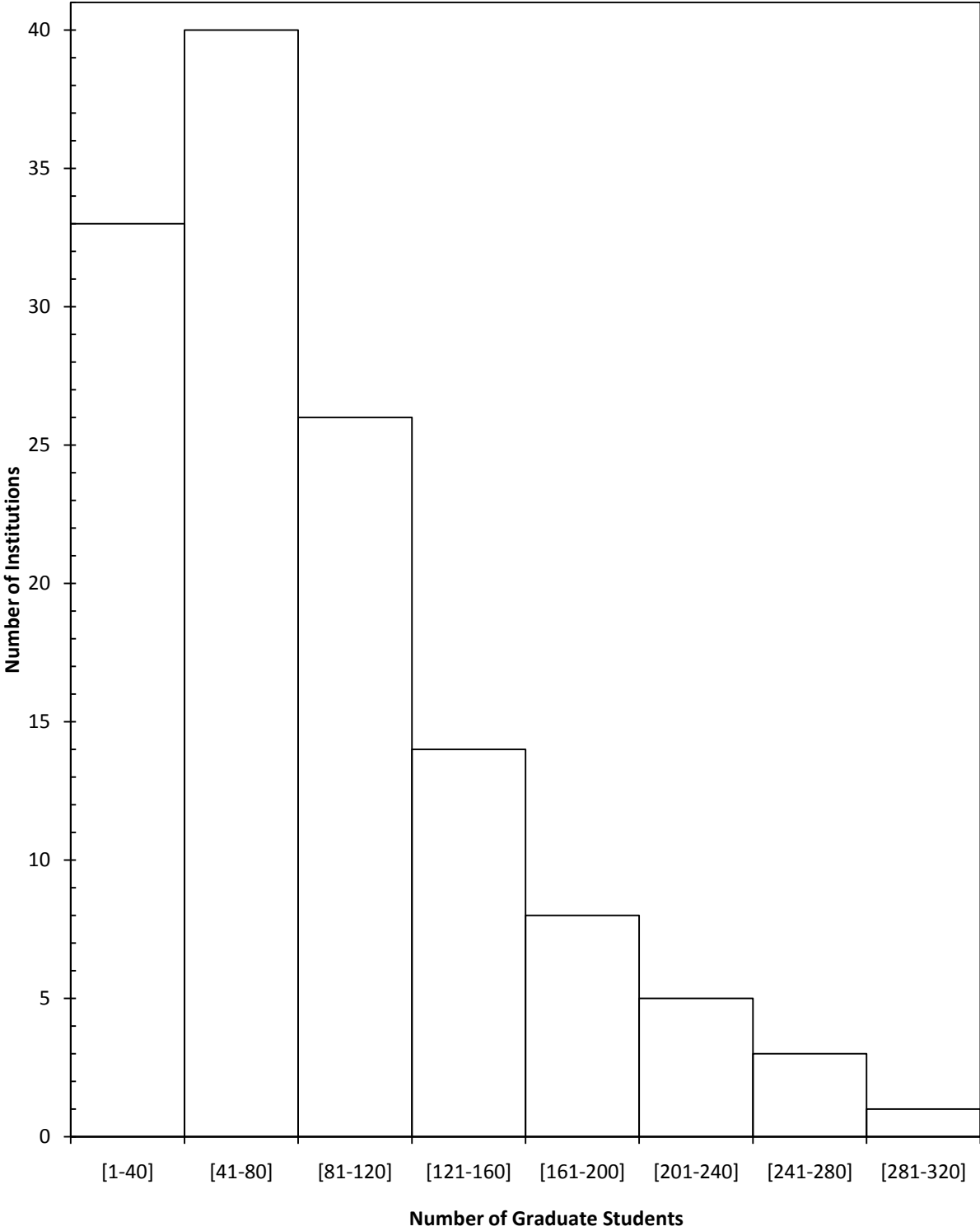


Figure 1 Graduate students. WPI has 14 graduate students. The source was Peterson's Graduate Programs¹.

Figure Two is a histogram showing how many institutions have a specific number of chemistry faculty members. The histogram is divided into 13 intervals. Most institutions have between 16 and 20 faculty members. The most common number of faculty members is 20. The average number of faculty members is 25 and the median number of faculty members is 21. Institutions with 40 or less faculty members are more common than institutions with 41 or more faculty members, which results in a right skewed non-symmetric histogram that is lower bound. The number of faculty members at each institution comes from the *American Chemical Society Directory of Graduate Research 2007*⁷ and the American Chemical Society website⁸.

Worcester Polytechnic Institute, with 15 faculty members, falls in the 11-15 range along with 33 other institutions. Eleven of Worcester Polytechnic Institute's faculty members are full-time, while four are part-time. The second most common range of faculty is the 11 to 15 range. Twenty institutions have 21 to 25 faculty members, Twenty-two institutions have 26 to 30 faculty members, and nine institutions have 31 to 35 faculty members. Six institutions have 6 to 10 faculty members. There are also six other institutions that have 36 to 40 faculty members. Two institutions have 51 to 55 faculty members. The 1 to 5, 41 to 45, 46 to 50, and 61 to 65 ranges have one institution each at the small end. Wake Forest University has five faculty members, Arizona State University has 44 faculty members, The University of California, Berkeley has 44 faculty members, The University of Notre Dame has 61 faculty members.

⁷ American Chemical Society Directory of Graduate Research 2007. Washington D.C., 2007.

⁸ American Chemical Society Chemistry for Life. 2009. <http://portal.acs.org/portal/acs/corg/content>

Faculty, 2007

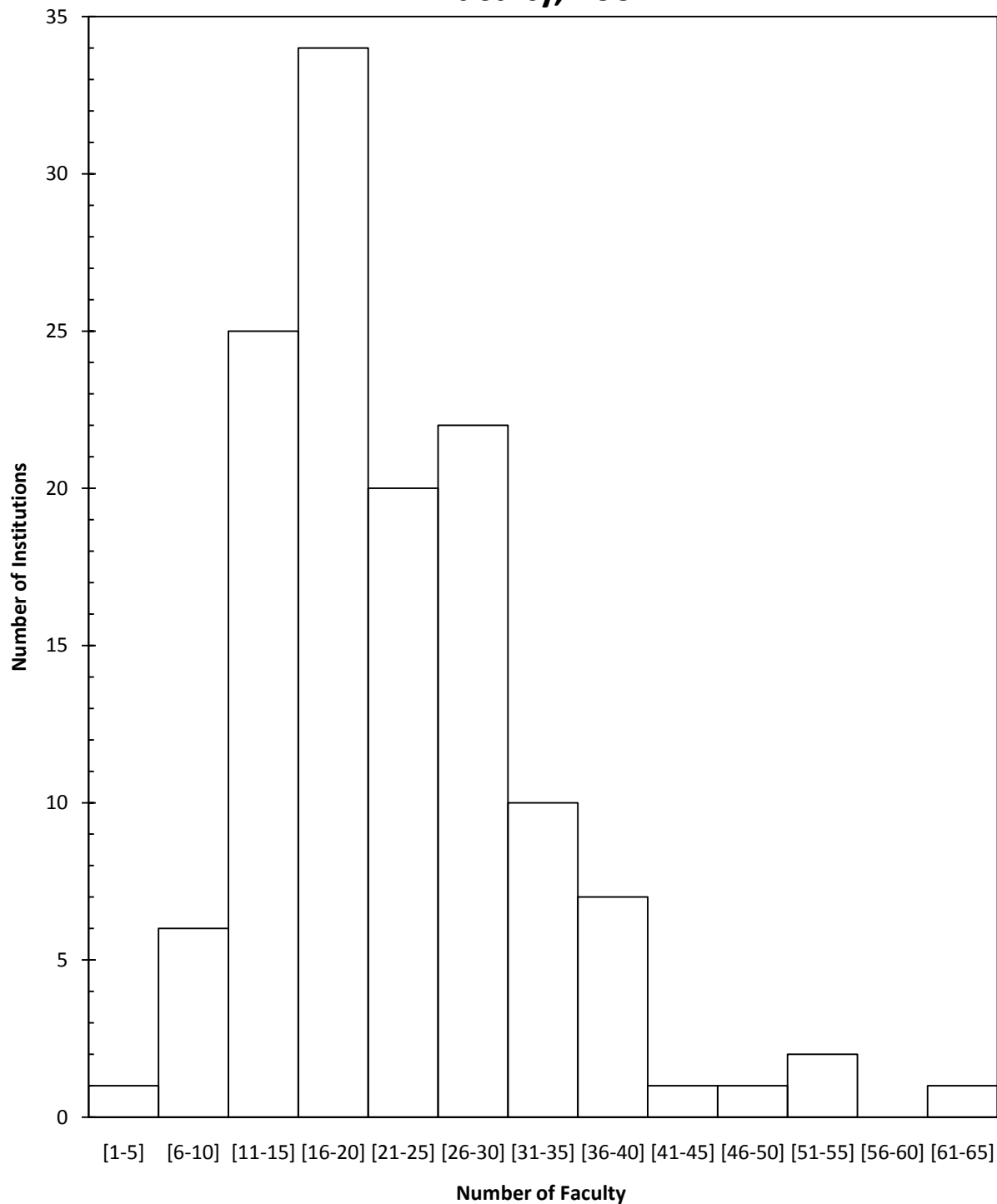


Figure 2 Faculty . WPI has 15 faculty members. The sources were Peterson's Graduate Programs¹, the American Chemical Society Directory of Graduate Research 2007², and the ACS website³.

Figure Three is a scatter plot showing the number of faculty versus the number of chemistry graduate students. The sources for these numbers are the *American Chemical Society Directory of Graduate Research 2007*², the American Chemical Society website³, and *Peterson's Graduate Programs*¹. The number of faculty was taken to be the independent variable, while the number of graduate students was taken to be the dependent variable. It makes sense that the number of graduate students enrolled depends on the availability of faculty. The correlation coefficient is 0.5393 and the linear fit is $y = 4.7792x - 19.96$. The linear fit shows that as the number of faculty increases, so does the number of graduate students. The fit equation also reflects there is a ratio of 1 faculty member to four graduate students. The equations will result in a negative number if the number of faculty members is fewer than five. The number of faculty available is pretty effective at forecasting the number of graduate students, which is revealed by the correlation coefficient.

Worcester Polytechnic Institute, with 15 faculty and 14 graduate students lies under the linear trend line and is denoted by a solid diamond. Evidently, Worcester Polytechnic Institute lies near the bottom of the graph. There are other institutions that have around 15 faculty members, but many have a greater number of graduate students than Worcester Polytechnic Institute. Almost all institutions have a greater number of faculty and graduate students than Worcester Polytechnic Institute. Based on comparison with other institutions, Worcester Polytechnic Institute should have 60 graduate students for its 15 faculty.

Number of Faculty against Number of Graduate Students

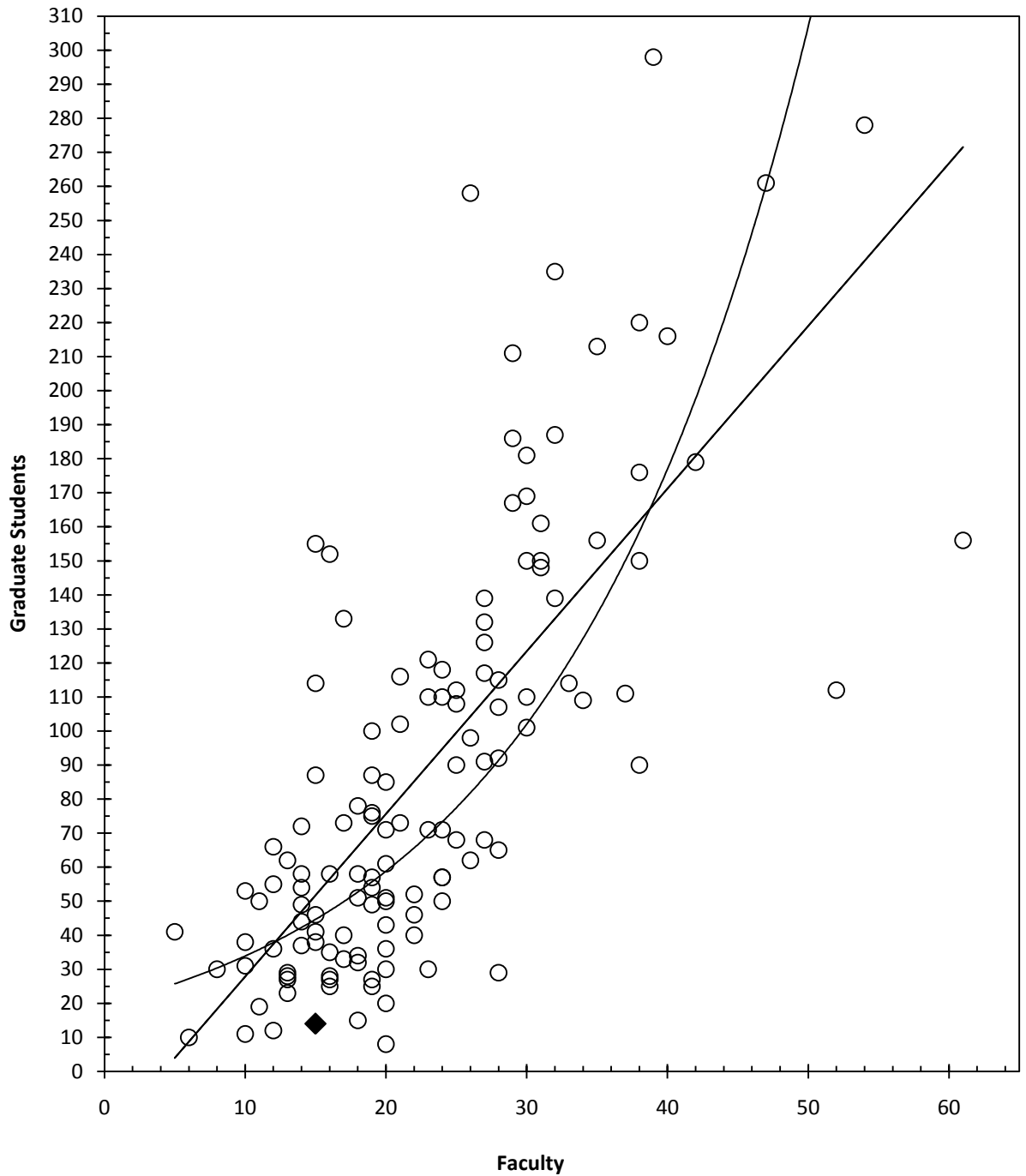


Figure 3 The number of faculty versus the number of graduate students. WPI is denoted by a solid diamond. The sources were Peterson's Graduate Programs¹, the ACS Directory of Graduate research 2007², and the ACS website³. The linear fit is $y = 4.7792x - 19.96$. Its correlation coefficient is 0.5393. The exponential fit is $y = 19.551e^{0.0551x}$. Its correlation coefficient is 0.4815.

Figure Four is a histogram showing the number of Doctoral degrees granted in 2007 at various institutions. The abscissa is divided into eight intervals that represent the number of Doctor of Philosophy degrees granted to chemistry graduate students. The ordinate shows the number of institutions that granted a number of Doctor of Philosophy degrees in each range. Thirty-two institutions fall in the 6 to 10 range of Doctor of Philosophy degrees granted. Eleven institutions fall in the 11 to 15 range, fourteen institutions fall in the 16-20 range, nine institutions fall in the 21 to 25 range, seven institutions fall in the 26 to 30 range, three institutions fall in the 31 to 35 range, and two institutions fall in the 36 to 40 range. The histogram is right skewed, non-symmetric, and lower bound. The information used to make this histogram comes from the *American Chemical Society Directory of Graduate Research 2007*².

The mean value of Doctor of Philosophy degrees granted by various institutions in 2007 is 11. The median number of Doctor of Philosophy degrees granted by various institutions is eight. The number of Doctor of Philosophy degrees that was granted most often is four. Worcester Polytechnic Institute, which granted two Doctor of Philosophy degrees, is in the 1 to 5 range, along with 35 other institutions. In fact, this is the most common range of Doctor of Philosophy degrees granted. More institutions granted a smaller number of Doctor of Philosophy degrees than a bigger number of Doctor of Philosophy degrees.

Ph.D Degrees Granted in 2007

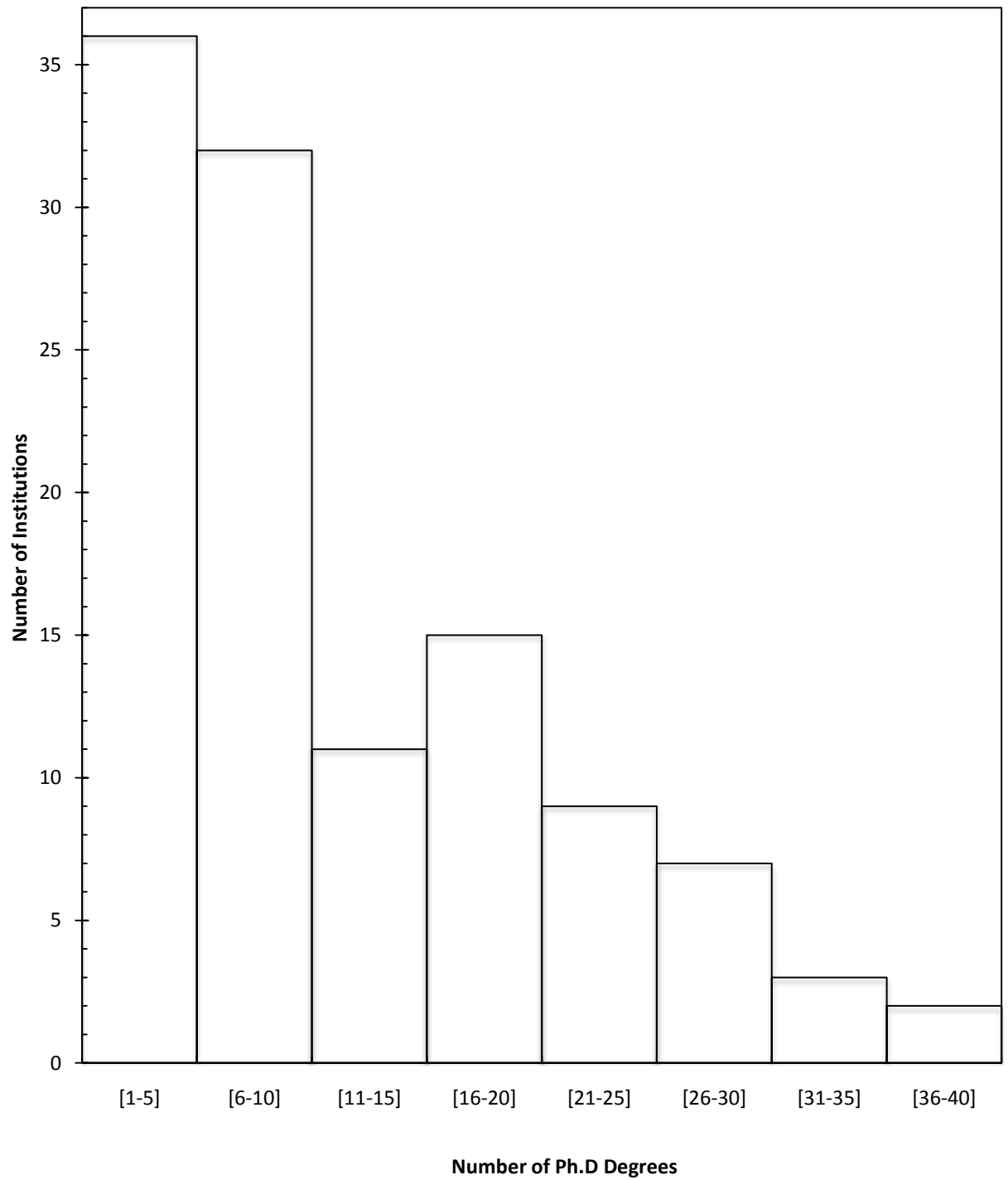


Figure 4 A histogram of Ph.D degrees granted in 2007. WPI granted two Ph.D degrees. The source used was the ACS Directory of Graduate Research 2007².

Figure Five is a scatter plot showing the number of Doctoral degrees granted to chemistry graduate students in 2005 and 2006. The sources for these numbers are the *American Chemical Society Directory of Graduate Research 2007*², the American Chemical Society website³, and *Peterson's Graduate Programs*¹. A linear trend line was graphed. The linear regression is $y = 0.142x - 1.99$. The correlation coefficient is 0.716. One Doctor of Philosophy degree will be granted per year for every seven graduate students. As one would assume, the number of graduate students does affect the number of Doctor of Philosophy degrees granted. Smaller programs produce smaller outputs; a larger program has an advantage over a smaller one. Obviously, an institution with more graduate students will grant more Doctor of Philosophy degrees than an institution with fewer graduate students.

Worcester Polytechnic Institute is represented by a solid diamond, while all of the other institutions are shown as open circles. Worcester Polytechnic Institute, with 14 graduate students, granted two Doctor of Philosophy degrees in 2005 and 2006. Worcester Polytechnic Institute clearly lies above the bottom end of the line. Evidently, Worcester Polytechnic performed well. Many other institutions granted more Doctoral degrees than Worcester Polytechnic Institute. The small program issue should be taken into account. A possible reason why Worcester Polytechnic Institute only produced 2 Doctoral degrees is because Worcester Polytechnic Institute has a small program.

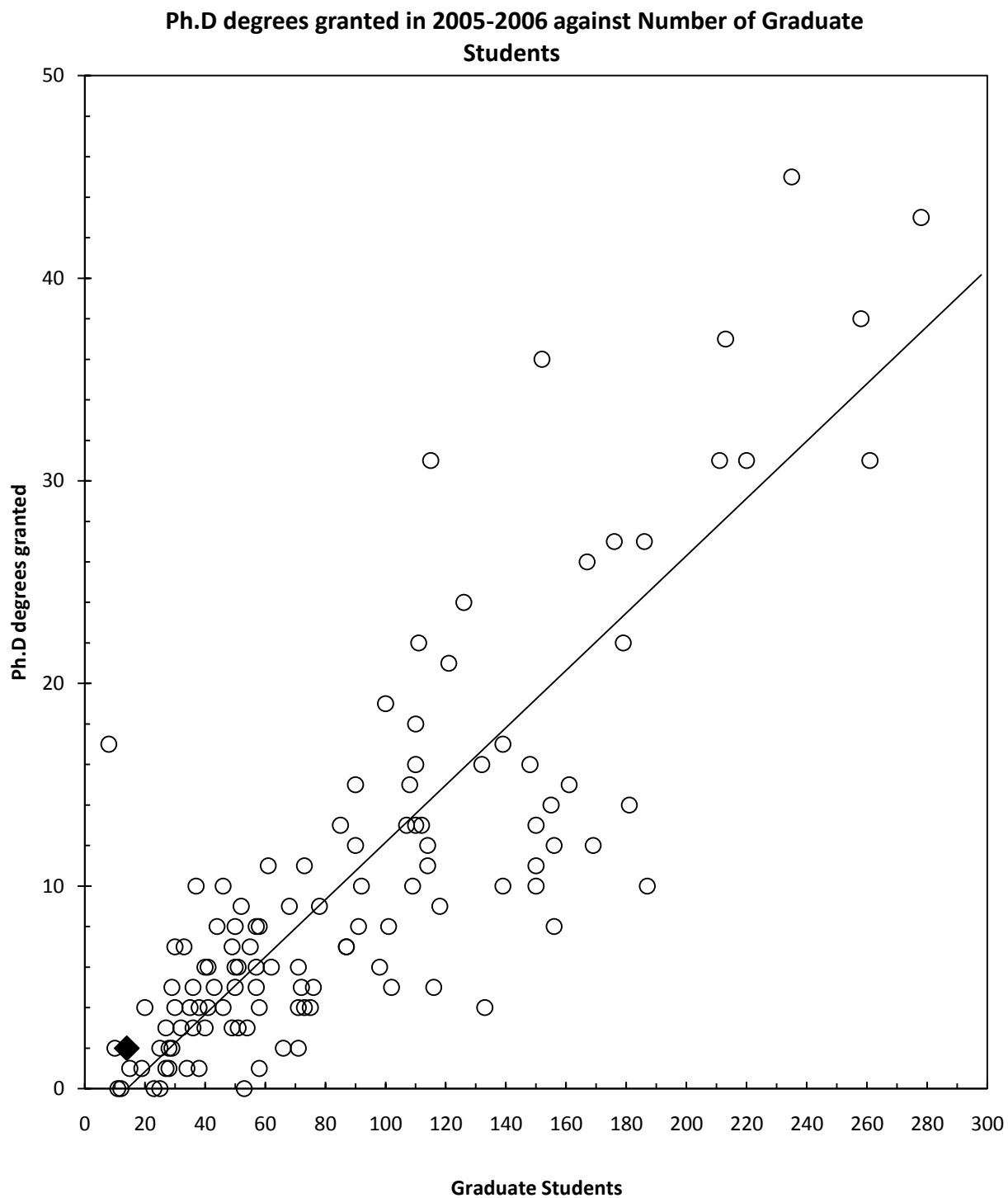


Figure 5 The number of Ph.D degrees granted in 2005 and 2006 depending on the number of graduate students. WPI is denoted by a solid diamond. The sources were Peterson's Graduate sources¹, the ACS Directory of Graduate Research 2007², and the ACS website³. The linear fit is $y = 0.1415x - 1.9933$. The correlation coefficient is 0.7159.

Figure Six is a scatter plot showing the number of Doctor of Philosophy degrees granted to chemistry graduate students in 2005 and 2006 versus the number of faculty members at each institution. The sources for these numbers are the *American Chemical Society Directory of Graduate Research 2007*² and the American Chemical Society website³. A linear trend line was graphed. The linear regression is $y = 0.507x - 0.436$ and the correlation coefficient is 0.318. The graph shows that institutions with more faculty members will grant more Doctor of Philosophy degrees. According to the fit, one Doctor of Philosophy degree will be granted each year for every two faculty members.

Worcester Polytechnic Institute is denoted by a solid diamond, while all of the other institutions are represented as open circles. Worcester Polytechnic Institute, with 15 faculty members, granted two Doctor of Philosophy degrees in 2005 and 2006. From the fit, Worcester Polytechnic Institute would have been expected to grant eight, not two Doctor of Philosophy degrees. Worcester Polytechnic Institute clearly lies under the line. Looking at the graph and the equation allows one to see that Worcester Polytechnic Institute is disappointing in this situation. Evidently, Worcester Polytechnic Institute needs to improve. There are institutions that granted more Doctor of Philosophy degrees than Worcester Polytechnic Institute. Many other institutions have more faculty members and graduate students than Worcester Polytechnic Institute. Once again, Worcester Polytechnic Institute's small program creates an issue. This could be a possible explanation as to why it did not grant more Doctor of Philosophy degrees in 2005 and 2006. The number of faculty members definitely has an effect on the number of Doctor of Philosophy degrees granted to graduate students.

Ph.D degrees Granted in 2005-2006 against Number of Faculty

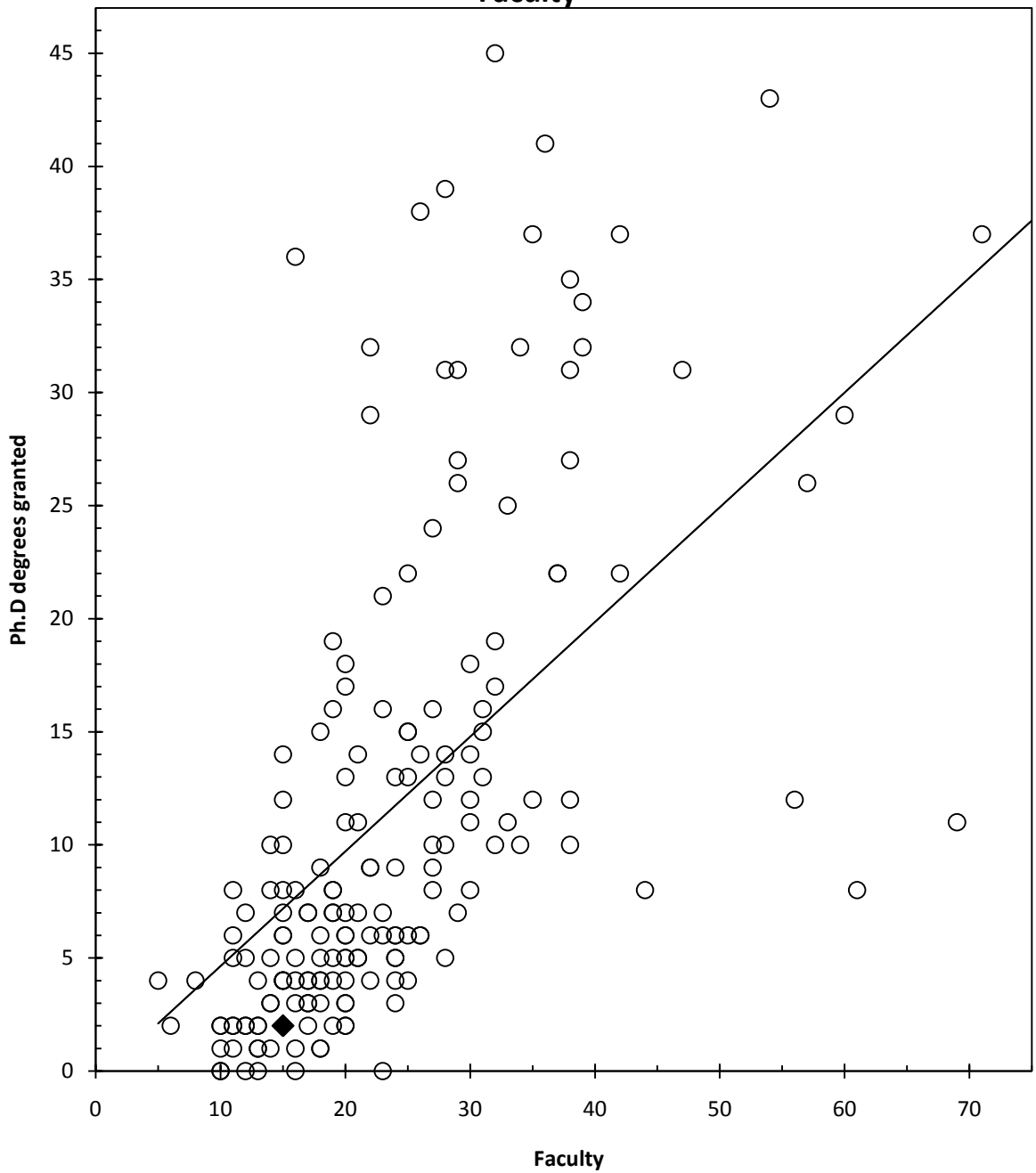


Figure 6 The number of Ph.D degrees granted to graduate students in 2005 and 2006 depending on the number of faculty. WPI is denoted by a solid diamond. The sources used were the ACS Directory of Graduate Research 2007² and the ACS website³. The linear fit is $y = 0.5071x - 0.4364$. The correlation coefficient is 0.3175.

Figure Seven is a scatter plot showing the number of Doctoral degrees granted in 2007 against the number of chemistry graduate students. The sources for these numbers are the *American Chemical Society Directory of Graduate Research 2007*² and *Peterson's Graduate Programs*¹. The number of Chemistry graduate students was chosen to be the independent variable because it makes sense that the number of Doctoral degrees granted depends on the availability of graduate students. Institutions with more graduate students are likely to grant more Doctoral degrees. One sees from the trend that the number of Doctoral degrees granted increases with the number of graduate students. A linear trend line was performed. The linear fit and correlation coefficient were then calculated. The linear fit is $y = 0.129x - 0.831$. Its correlation coefficient is 0.777. The exponential fit is $y = 2.6653e^{0.0116x}$. Its correlation coefficient is 0.6084. The number of graduate students is highly correlated with estimating how many Doctoral degrees are granted. According to the linear fit, one Doctoral degree will be granted per year for every seven graduate students.

Worcester Polytechnic Institute is denoted by a solid diamond, while all other institutions are open circles. Worcester Polytechnic Institute, with 14 chemistry graduate students, granted two Doctoral degrees in 2007. Unfortunately, Worcester Polytechnic Institute lies above the very bottom end of the linear regression line. In fact, Worcester Polytechnic Institute had a fewer number of chemistry graduate students in 2007 than did other institutions. Almost all other institutions granted more Doctoral degrees than Worcester Polytechnic Institute. Worcester Polytechnic Institute performed really poorly compared to other institutions. One way Worcester Polytechnic Institute can increase the number of Doctoral degrees granted is by increasing the enrollment of graduate students.

Ph.D degrees granted in 2007 against Graduate Students

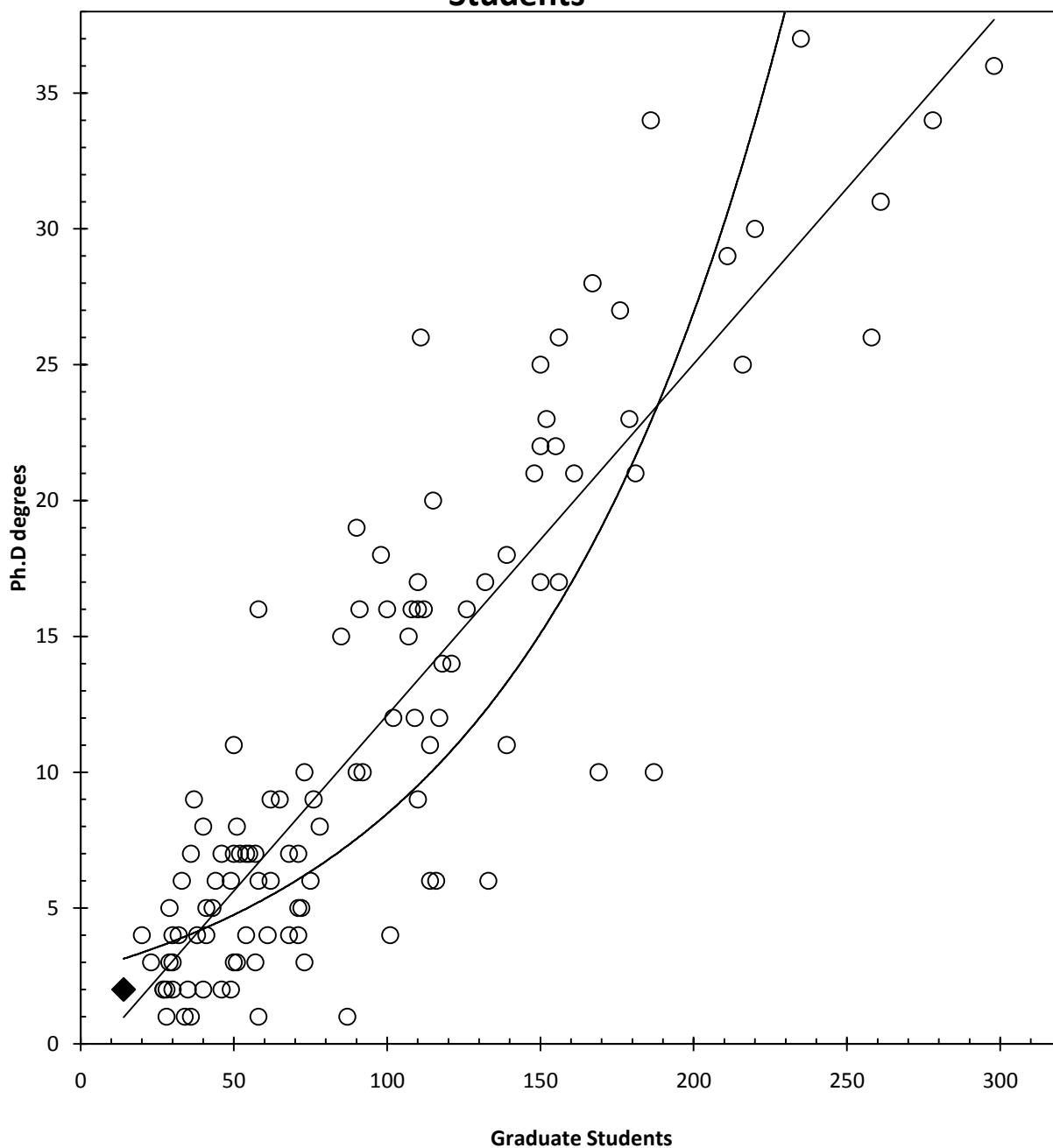


Figure 7 The number of Ph.D degrees granted depending on the number of graduate students at each institution. WPI is denoted by a solid diamond. The sources used were Peterson's Graduate Programs¹ and the ACS Directory of Graduate Research 2007². The linear fit is $y = 0.1293x - 0.831$. Its correlation coefficient is 0.7771. The exponential fit is $y = 2.6653e^{0.0116x}$. Its correlation coefficient is 0.6084.

Figure Eight is a scatter plot showing the number of Doctoral degrees granted in 2007 against the number of faculty members. The sources for these numbers are the *American Chemical Society Directory of Graduate Research 2007*², *Peterson's Graduate Programs*¹, and the American Chemical Society website³. Faculty members are an important resource to graduate students, which is why the number of faculty was chosen to be the independent variable. Faculty members played a role in the number of Doctoral degrees granted in 2007, which can be seen by the correlation coefficient of 0.4059. The linear fit is $y = 0.58x - 2.65$. From the linear fit, two faculty members were required per year in order for one Doctoral degree to be granted.

Worcester Polytechnic Institute is denoted by a solid diamond, while all other institutions are open circles. Worcester Polytechnic Institute, with 15 faculty members, granted two Doctoral degrees. Almost all other institutions granted more Doctoral degrees than Worcester Polytechnic Institute. As one can see from the graph, Worcester Polytechnic Institute performed disappointingly compared to other institutions. Worcester Polytechnic Institute lies under the bottom end of the curve. Compared to Figure Five, Worcester Polytechnic Institute has not changed that much over a span of a year. Since 2005 and 2006 up to 2007, Worcester Polytechnic Institute still needed two faculty members in order to grant one Doctoral degree. Also, Worcester Polytechnic Institute never placed above the linear fit since 2005 and 2006 up to 2007.

Figure Nine is a histogram showing the stipend for teaching assistantships in 2007 and 2008 at various institutions. The information used to make this histogram comes from *Peterson's Graduate Programs*¹. The histogram is divided into six intervals. The abscissa shows the average stipend for a teaching assistantship. The ordinate shows the number of institutions that have a number of stipends in each range. The interval range of \$16,000-\$20,999 has the most occurrences, with twenty-seven institutions. The second most popular range of stipends is \$11,000-\$15,999, with 24 institutions. Fourteen institutions had a stipend of \$21,000-\$25,999. Six institutions had a stipend of \$6,000-\$10,999. Two institutions had a stipend of \$26,000-\$30,999. Finally, only one institution had a stipend of \$1,000-\$5,999.

The average value of a stipend is \$16,967. The median value of a stipend is \$17,390. The mode is \$20,000. More institutions fall within the higher end of stipends. Worcester Polytechnic Institute, with a stipend of \$15,500, falls in the second most common range of stipends. Worcester Polytechnic Institute does not appear to be an outlier in this situation. In fact, Worcester Polytechnic Institute is included within the majority of institutions.

Average Stipend for Teaching Assistantships in 2007-2008

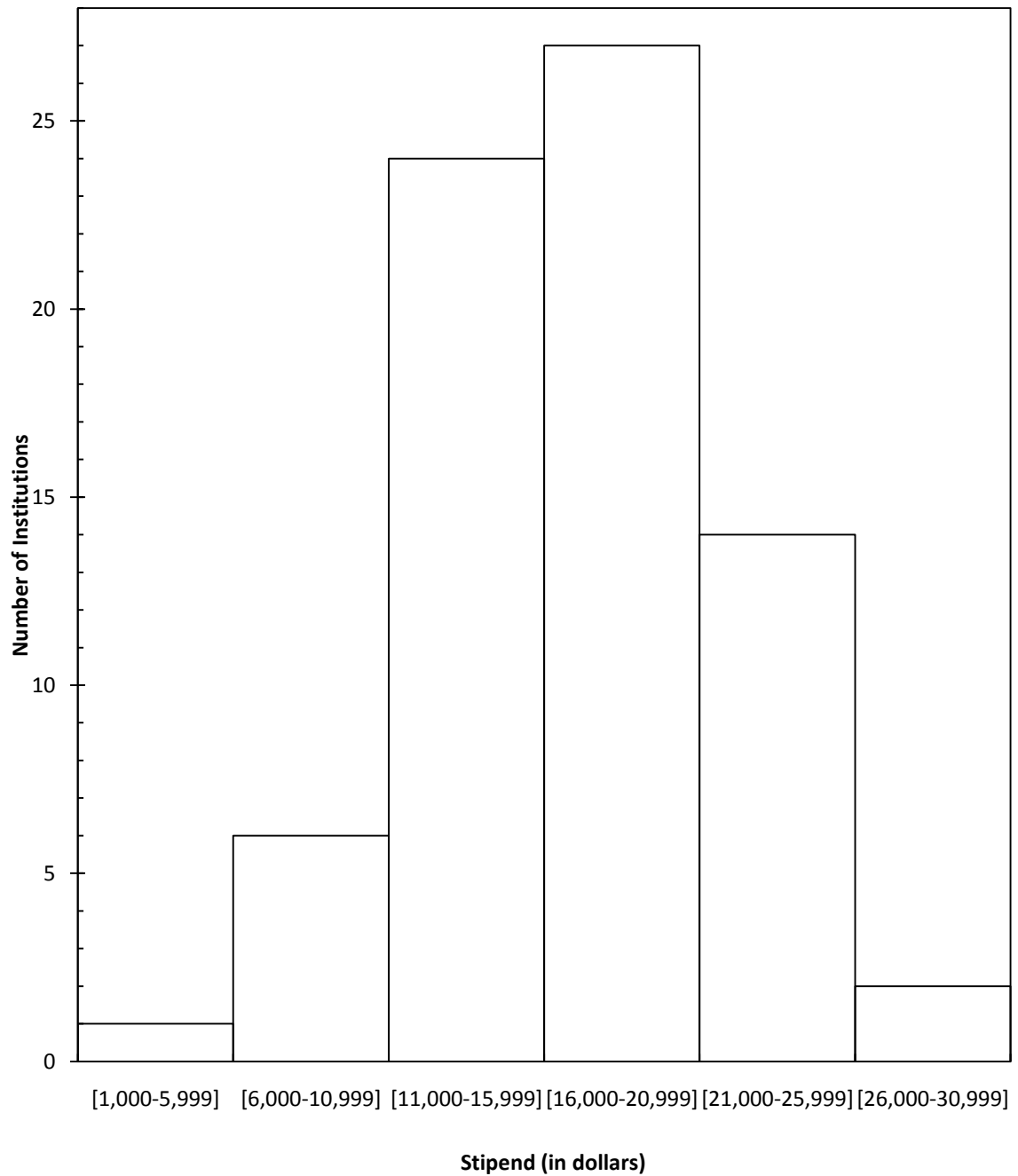


Figure 9 A histogram showing the average stipend for teaching assistantships. WPI has a stipend of \$15,500. The source used was Peterson's Graduate Programs¹.

Figure Ten shows the stipend for teaching assistantships in 2007 and 2008 versus the number of graduate students at various universities. The source for these numbers is Petersons Graduate Programs¹. The linear fit is $y = 31.434x + 14291$. The correlation coefficient is 0.1897. As one expects, larger schools have more graduate students. As one also expects, the opportunity for more teaching assistantships comes with an increase in the number of graduate students. Bigger schools have more money to support their teaching assistantships. As one can see from the graph, smaller institutions pay teaching assistantships less money.

Worcester Polytechnic Institute is denoted by a solid diamond. All other institutions are open circles. The average value of a stipend was \$16,967 in 2007 and 2008. Worcester Polytechnic Institute, with 14 graduate students, had a stipend of \$15,500. Worcester Polytechnic Institute fell below the average value of a stipend for teaching assistantships by \$1,467, which is not too bad. Worcester Polytechnic Institute lies above the trend line, along with half of the other institutions. One sees from the scatter plot that Worcester Polytechnic Institute performed fairly compared to other institutions. One has to keep in mind that Worcester Polytechnic Institute has a small program.

Figure Eleven shows the stipend for teaching assistantships in 2007 and 2008 versus the number of faculty at various institutions. The sources for these numbers are *Petersons Graduate Programs*¹, the *American Chemical Society Directory of Graduate Research 2007*², and the American Chemical Society website³. The linear fit is $y = 136.78x + 14,100$. The correlation coefficient is 0.1158. Once again, smaller institutions pay teaching assistantships less money. One way for institutions to pay more money is to increase the size of their programs. As one expects, bigger institutions have advantages over smaller institutions.

Worcester Polytechnic Institute is denoted by a solid diamond. All other institutions are open circles. Worcester Polytechnic Institute, with 15 faculty members, had a stipend of \$15,500. Worcester Polytechnic Institute lies below the trend line. It would be a good idea for Worcester Polytechnic Institute to increase the size of its program. Worcester Polytechnic Institute would perform better in all areas if it increases the number of faculty members it has.

Average Stipend for Teaching Assistantships in 2007-2008 against Number of Faculty

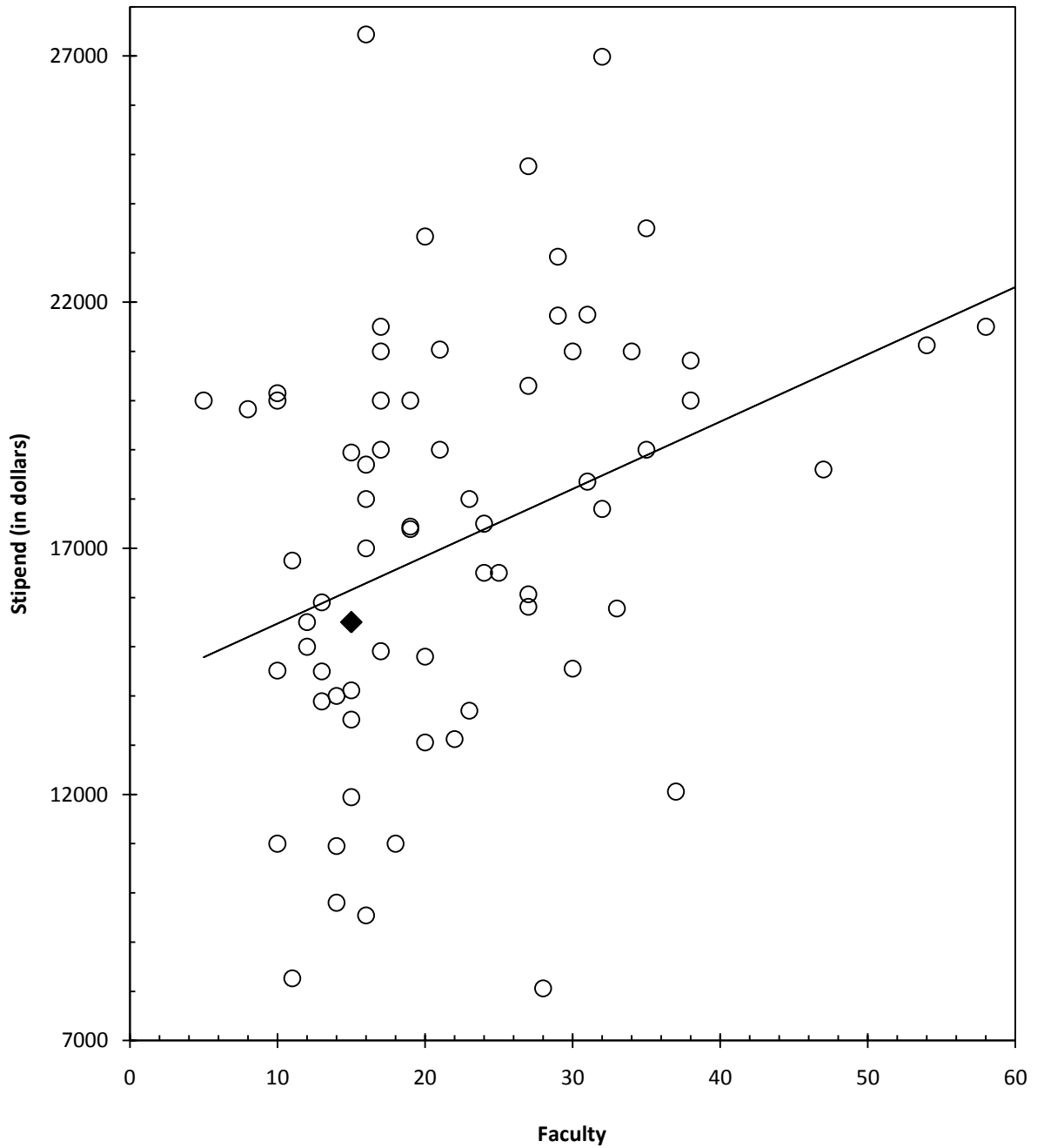


Figure Twelve is a histogram showing the number of fellowships granted in 2007 and 2008 by various institutions. The abscissa shows the number of fellowships granted. The ordinate shows the number of institutions that granted a number of fellowships in each range. The 1 to 35 range of number of fellowships granted has 46 institutions. The 36 to 70 range of number of fellowships granted has two institutions. The 71 to 105 range of fellowships granted also has two institutions. The source used for these numbers is *Peterson's Graduate Programs*¹.

Worcester Polytechnic Institute, with one fellowship, falls in the most common range of fellowships along with 45 other institutions. The mean value of number of fellowships granted is 13. The median value of number of fellowships granted is five. The mode is three. Worcester Polytechnic Institute falls under the average number of fellowships granted by twelve fellowships. From the histogram, one sees that the majority of institutions fall in the 1 to 35 range of fellowships granted.

Fellowships in 2007-2008

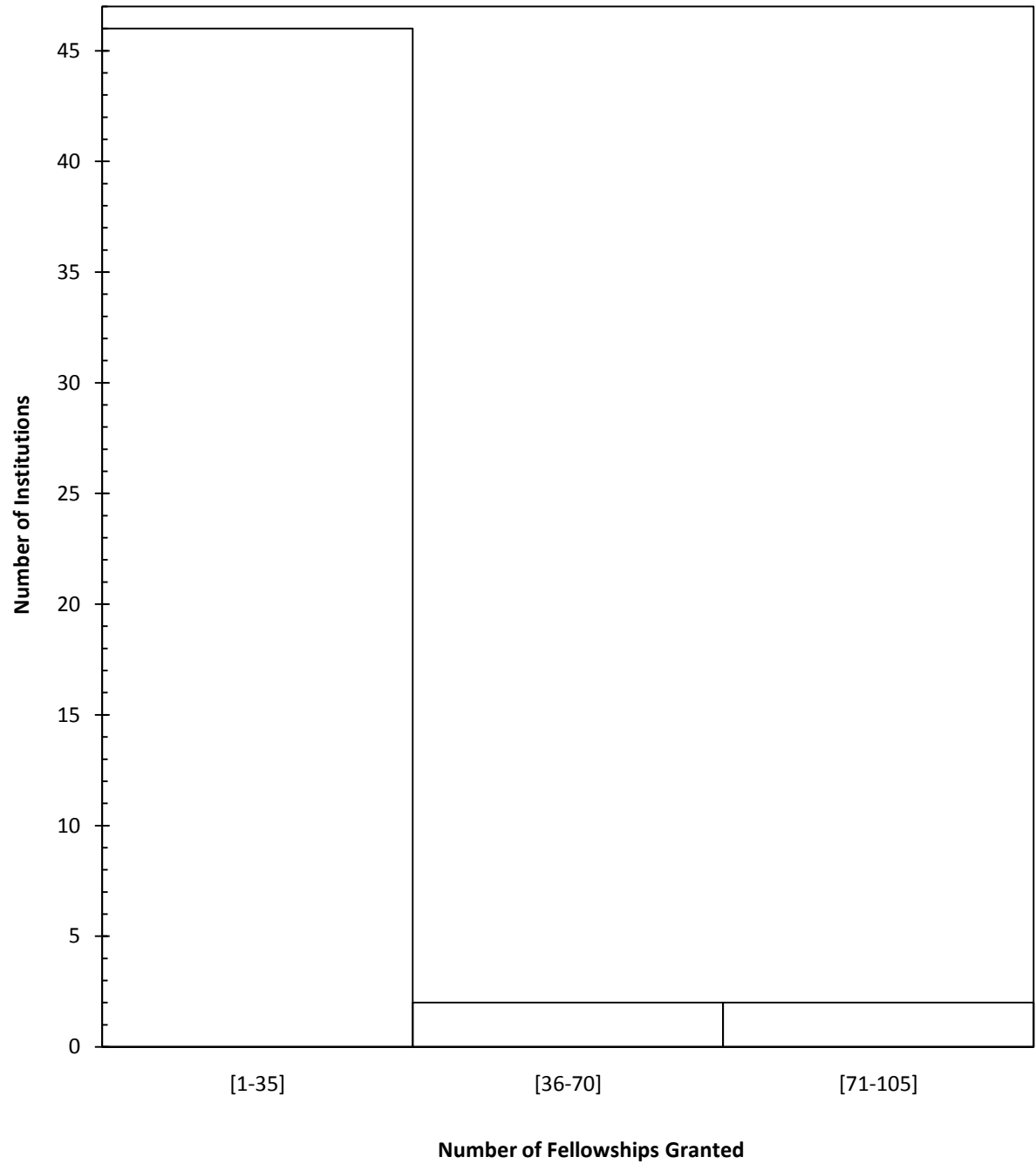


Figure 12 The number of fellowships granted. WPI granted one fellowship. The source used was Peterson's Graduate Programs¹.

Figure Thirteen shows the number of chemistry graduate students versus the number of fellowships granted in 2007-2008. An exponential fit, as opposed to a linear one, is seen on the graph. The exponential fit is $y = 1.7809e^{0.0128x}$. The correlation coefficient is 0.4274. According to the fit, one fellowship will be granted for every four graduate students over a course of a year. From the exponential fit, one sees that an institution with more graduate students will grant more fellowships. Once again, institutions with bigger programs will produce bigger outcomes. The source for these numbers is *Peterson's Graduate Programs*¹.

Worcester Polytechnic Institute is denoted by a solid diamond. All other institutions are open circles. Worcester Polytechnic Institute lies under the bottom end of the curve. Worcester Polytechnic Institute, with 14 chemistry graduate students, granted one fellowship. Worcester Polytechnic Institute has the fewest number of graduate students, but is not the only institution that granted only one fellowship. There are four other institutions, with a greater number of graduate students than Worcester Polytechnic Institute that granted one fellowship.

Number of Graduate Students against Number of Fellowships, 2007-2008

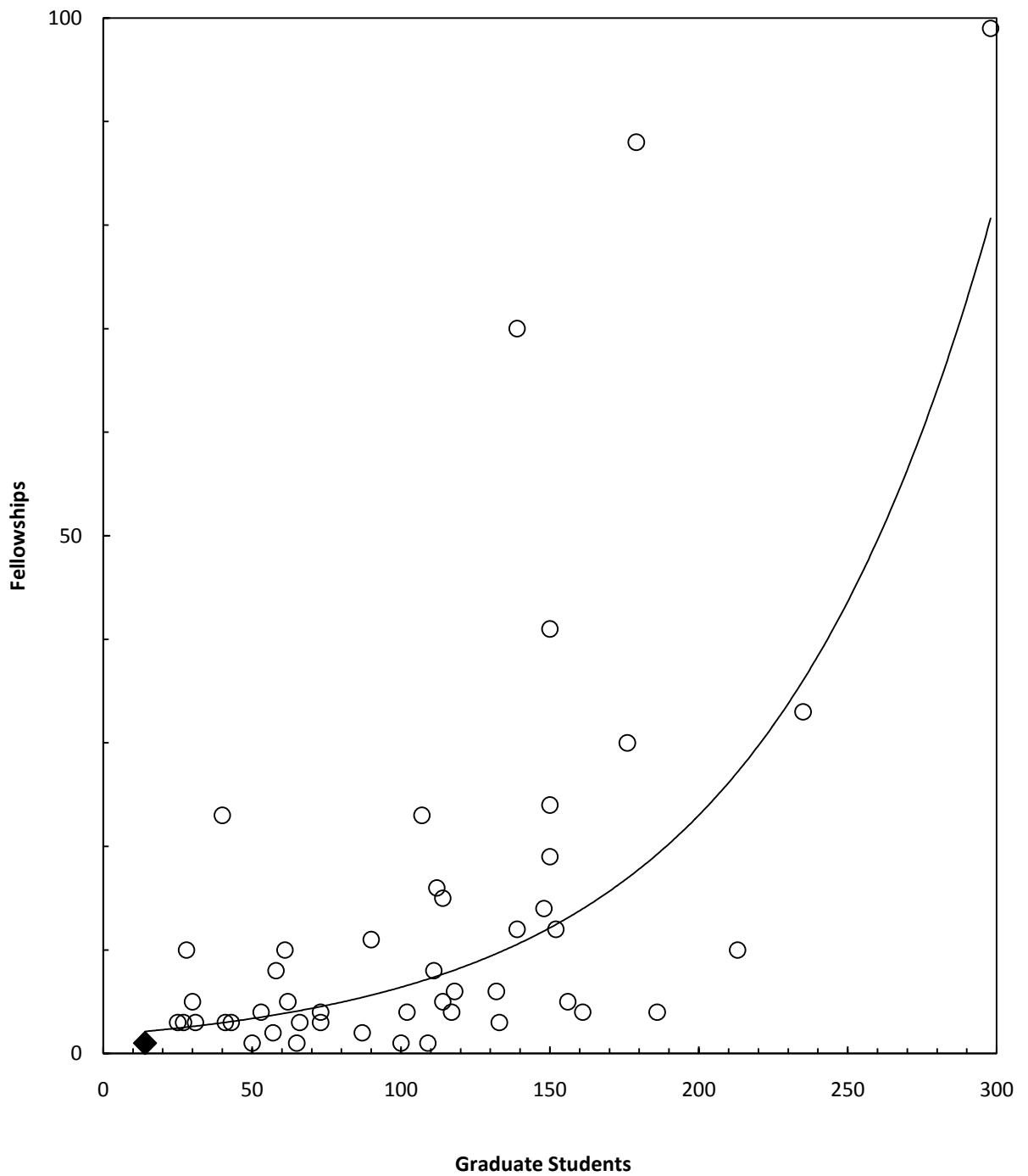


Figure 13 Fellowships granted to graduate students. WPI is denoted by a solid diamond. The source used was Peterson's Graduate Programs¹. The linear fit is $y = 1.7809e^{0.0128x}$. The correlation coefficient is 0.4274.

Figure Fourteen is a histogram showing the average stipend for research assistantships in 2007 thru 2008 at various institutions. The information used to make this histogram comes from *Peterson's Graduate Programs*¹. The histogram is divided into five intervals. The abscissa shows the research assistantships average stipend in 2007 and 2008. The ordinate shows the number of institutions that have a number of stipends in each range. More institutions have higher stipends than lower ones. The average value of stipend is \$17,723. The median number of stipend is \$18,650. The mode is \$20,000.

The interval range of \$16,000-\$20,999 has the most occurrences, with twenty-eight institutions. The second most common range of stipends is \$21,000-\$25,999, with 19 institutions. Eighteen institutions had a stipend of \$11,000-\$15,999. Two institutions had a stipend of \$6,000-\$10,999. Finally, two institutions had a stipend of \$1,000-\$5,999. As one can see, Worcester Polytechnic Institute, with a stipend of \$21,715, falls in the second most common range of stipends. Worcester Polytechnic Institute is above the average stipend. Worcester Polytechnic Institute does not appear to be an outlier in this situation. In fact, Worcester Polytechnic Institute is included within the majority of institutions.

Average Stipend for Research Assistantships in 2007-2008

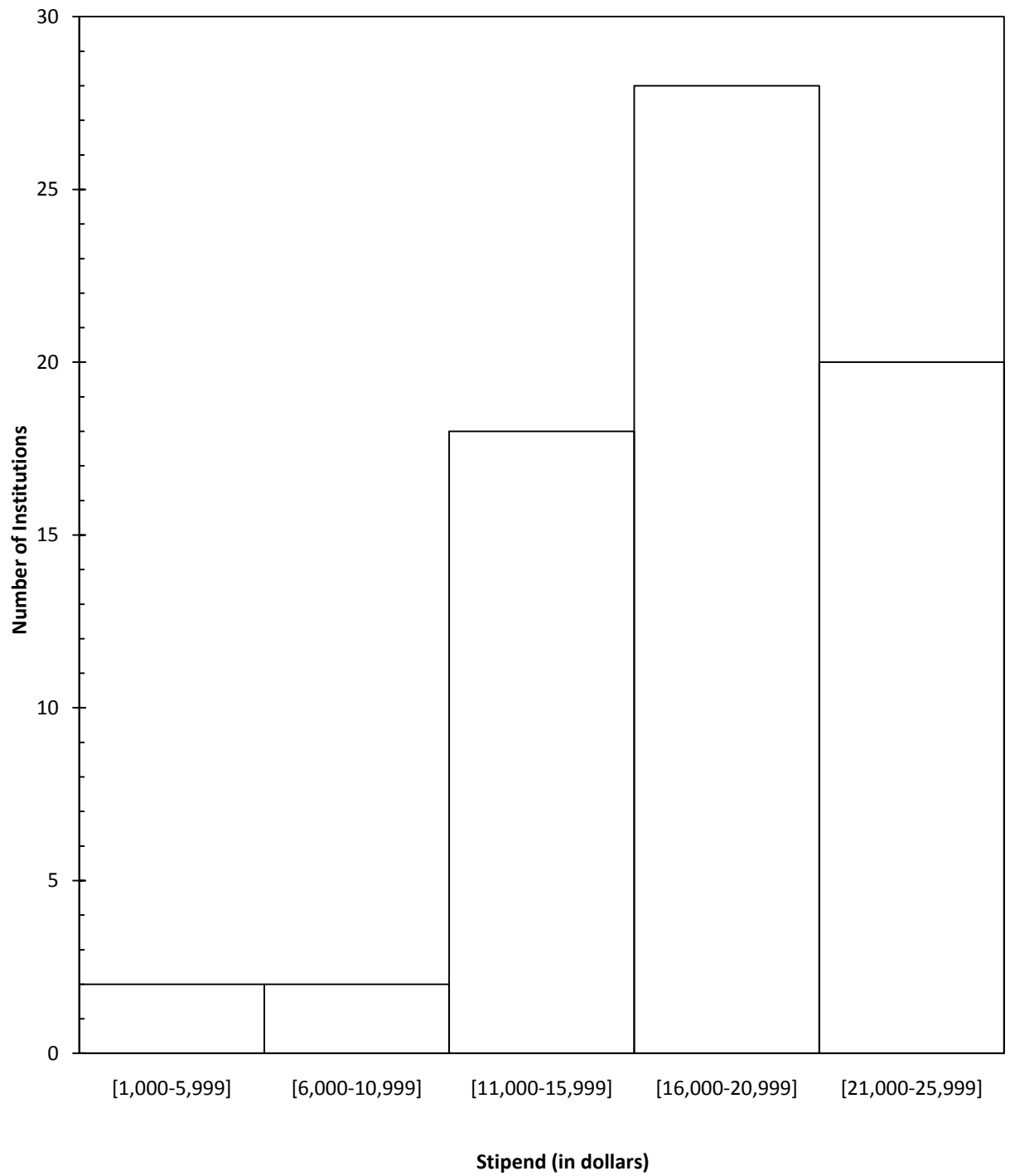


Figure 14 The average stipend for research assistantships. WPI has a stipend of \$21,715. The source used was Peterson's Graduate Programs¹.

Figure Fifteen is a scatter plot showing the stipend for research assistantships in 2007 thru 2008 versus the number of faculty members at various institutions. The linear fit is $y = 74.14x + 15975$. The correlation coefficient is 0.0347. From the graph, one sees that the data are scattered. According to the graph, institutions with bigger programs will pay their research assistantships more money. The sources used for these numbers are the *American Chemical Society Directory of Graduate Research 2007*², *Peterson's Graduate Programs*¹, and the American Chemical Society web site³.

Worcester Polytechnic Institute is denoted by a solid diamond. All other institutions are open circles. Worcester Polytechnic, with 15 faculty members, has a stipend of \$21,715. Worcester Polytechnic Institute lies above the line. There are several other institutions that have fewer, as well as more faculty members than Worcester Polytechnic Institute and have a lower stipend. Worcester Polytechnic Institute, despite its small program, pays its research assistantships real well. From the graph, it appears as if Worcester Polytechnic Institute performed well compared to the other institutions.

Average Stipend for Research Assistantships in 2007-2008

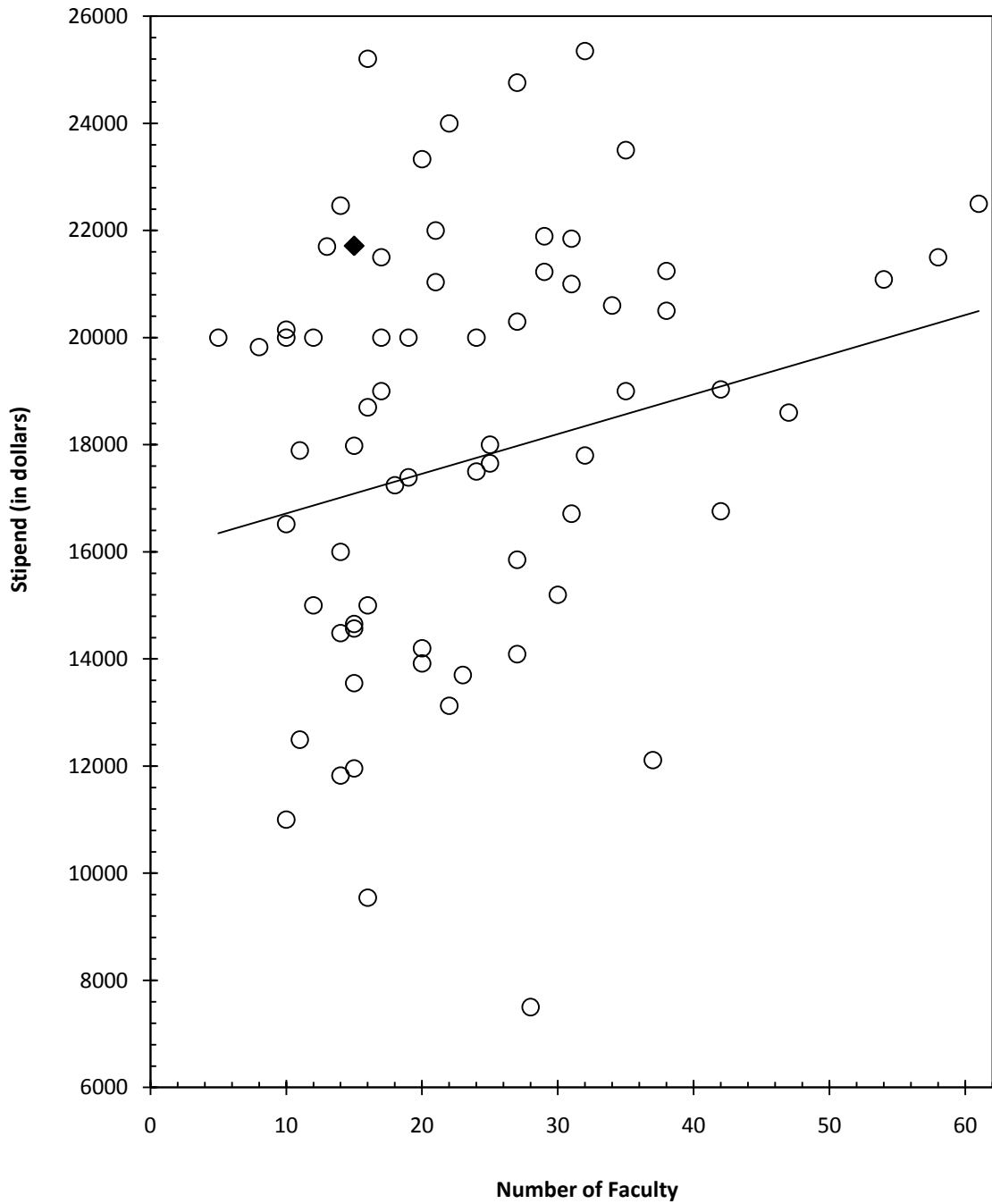


Figure 15 The average amount of stipend for research assistantships against the number of faculty. WPI is denoted by a solid diamond. The sources used were Peterson's Graduate Programs¹, the ACS Directory of Graduate Research 2007², and the ACS website³. The linear fit is $y = 74.14x + 15975$. The correlation coefficient is 0.0347.

Figure Sixteen is a scatter plot showing research/development expenditures per year versus the number of faculty members at various institutions per year. The sources for these numbers are the *American Chemical Society Directory of Graduate Research 2007*², *Peterson's Graduate Programs*¹, the American Chemical Society website³, and the National Science Foundation web site⁹. The exponential fit is $y = 845586e^{0.0628x}$. The correlation coefficient is 0.4098. Faculty members are an important resource because they contribute to the size of an institution. The more faculty members a department has, the bigger its department size will be. Bigger departments lead to bigger institutions, which leads to more money. As one can see from the figure, bigger institutions spend more money.

Worcester Polytechnic Institute is denoted by a solid diamond, while all other institutions are open circles. Worcester Polytechnic Institute, with 15 faculty members, had \$555,000 worth of expenditures. Worcester Polytechnic Institute lies under the bottom end of the curve. Almost all other institutions had more expenditures than Worcester Polytechnic Institute. As one can see from the graph, Worcester Polytechnic Institute performed disappointingly compared to other institutions. The size of Worcester Polytechnic Institute's chemistry department plays a role in Worcester Polytechnic Institute's disappointment. Worcester Polytechnic Institute has a small number of faculty members compared to the majority of other institutions. As one expects, increasing Worcester Polytechnic Institute's department size might lead to an increase in its expenditures.

⁹ The National Science Foundation. Nov 05, 2009. <http://www.nsf.gov/statistics/nsf09303/pdf/tab58.pdf>

Research and Development Expenditures against Number of Faculty

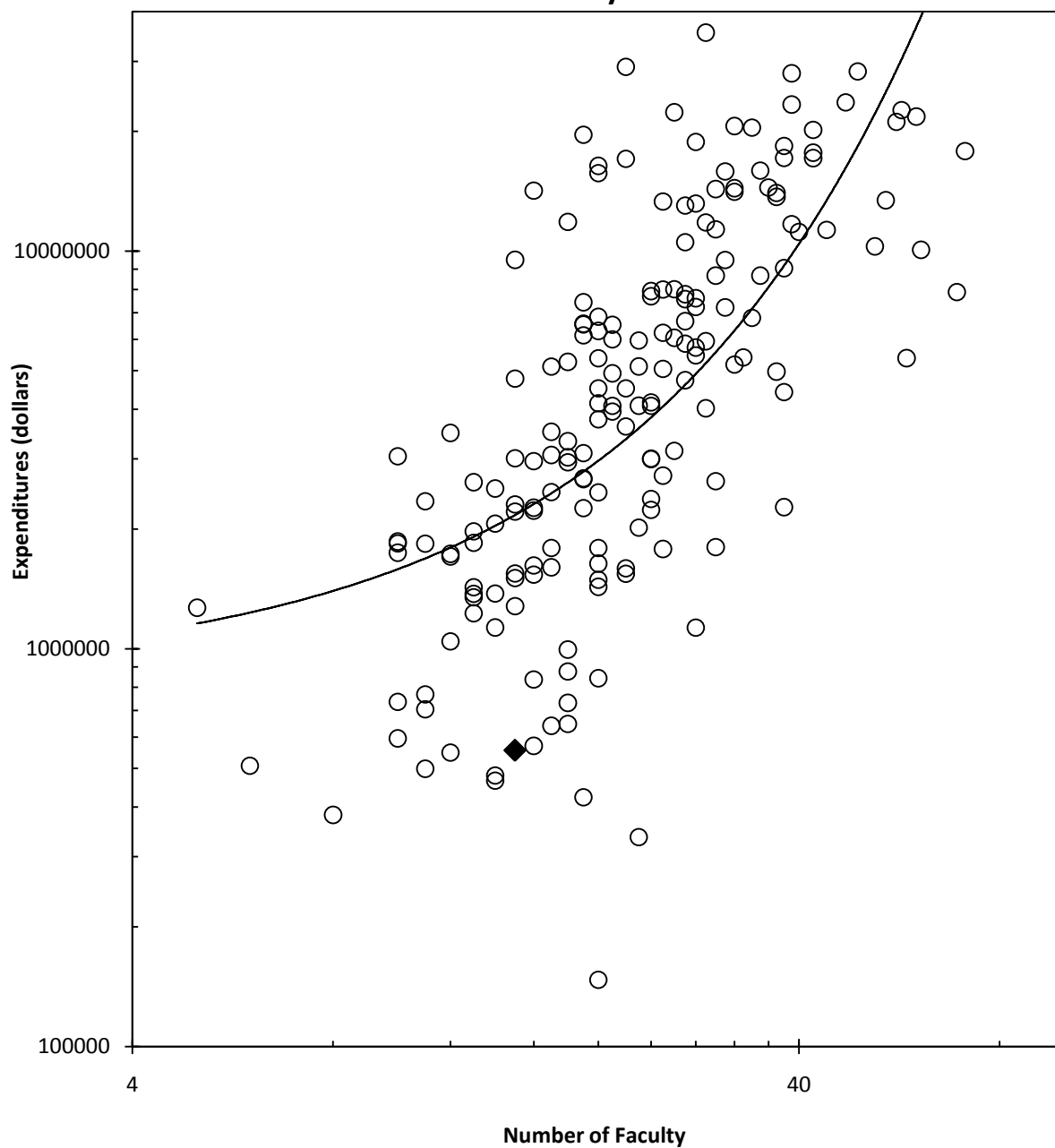


Figure 16 Total research and development expenditures in chemistry versus the number of faculty at each institution. WPI is denoted by a solid diamond. The source used was Peterson's Graduate Programs¹. The linear fit is $y = 845586e^{0.0628x}$. The correlation coefficient is 0.4098.

Figure Seventeen is a scatter plot showing the total number of citations produced in 2000 thru 2004 versus the number of faculty at various institutions. The linear fit is $y = 146.9x - 606.89$. The correlation coefficient is 0.2562. Institutions with more faculty members have more authors. This is an advantage because an institution can get more work done if it has more authors. As one can see from the graph, institutions with more faculty members have more citations to authors. The sources for these numbers are the *American Chemical Society Directory of Graduate Research 2007*², the American Chemical Society web site³, and Michael Rivets Interactive Qualifying Project report, *Ranking the PhD-Granting Chemistry Departments in the United States from 2000-2007*¹⁰.

Worcester Polytechnic Institute is denoted by a solid diamond. All other institutions are open circles. Worcester Polytechnic Institute, with 15 faculty members, has 363 citations. Worcester Polytechnic Institute lies under the bottom of the fit. Worcester Polytechnic Institute performed disappointingly. Almost all other institutions had more citations to authors than Worcester Polytechnic Institute. As one expects, Worcester Polytechnic Institute's small number of faculty members might have contributed to its small number of citations; having a lower number of faculty members means that it has a greater chance of getting less work accomplished.

⁵ Rivet, Michael. *Ranking the PhD-Granting Chemistry Departments in the United States from 2000-2004*. April 28, 2005.

Total Citations from 2000-2004 against number of Faculty

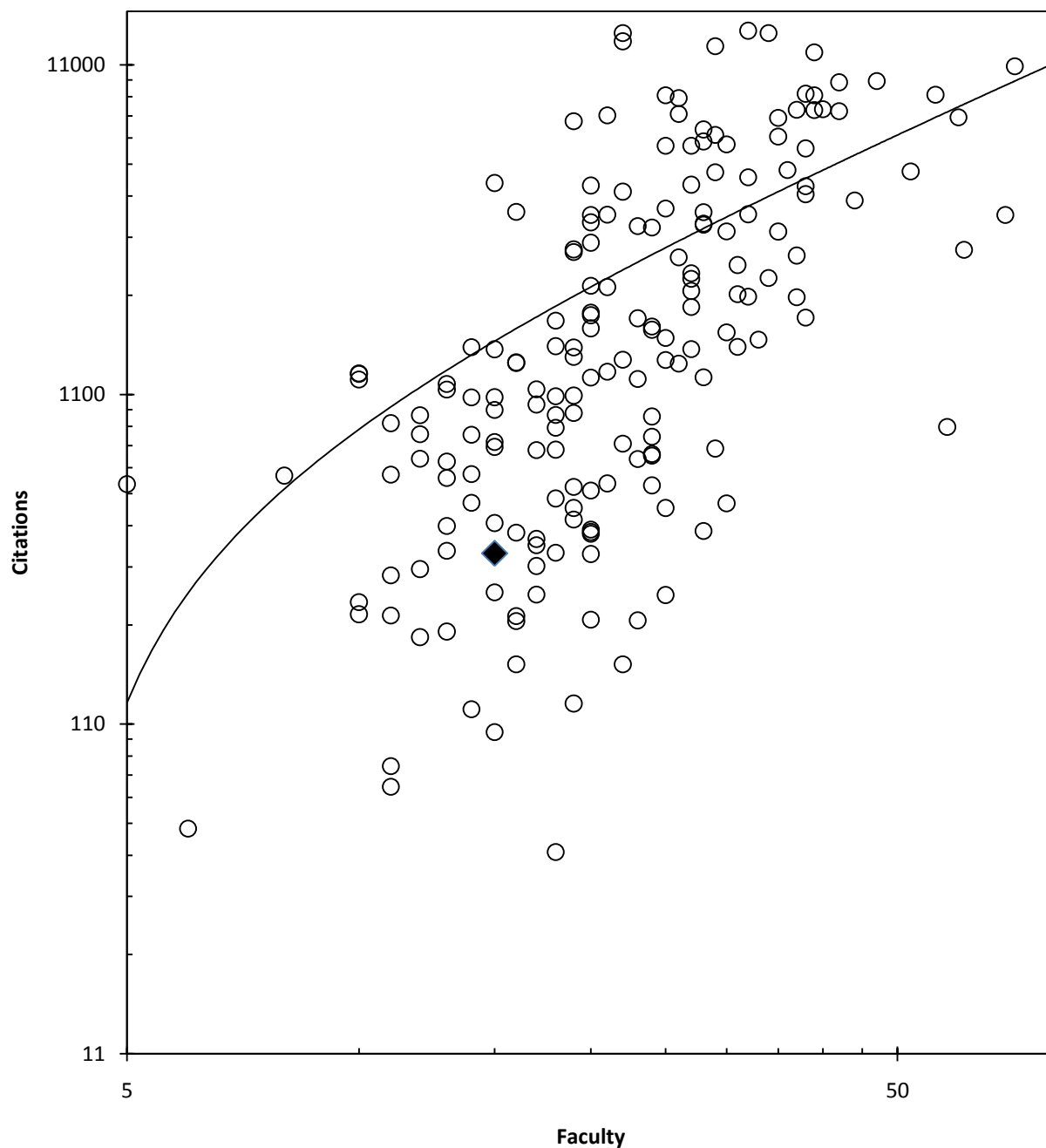


Figure 17 Total citation from 2000-2004 versus the number of faculty. WPI is denoted by a solid diamond. The sources used were Peterson's Graduate Programs¹, the ACS Directory of Graduate Research², the ACS website³, and Rivets IQP⁵. The linear fit is $y = 146.9x - 606.89$. The correlation coefficient is 0.2562.

Figure Eighteen is a scatter plot showing the total number of papers from 2000 thru 2004 versus the number of faculty at various institutions. The linear fit is $y = 14.345x - 7.2369$. The correlation coefficient is 0.347. As one can see from the graph, institutions with more faculty members produce more papers. According to the linear fit, there will be 14 papers per faculty member over a five year period. The sources for these numbers are the *American Chemical Society Directory of Graduate Research 2007*², *Peterson's Graduate Programs*¹, the American Chemical Society website³, and Michael Rivets Interactive Qualifying Project report, *Ranking the PhD-Granting Chemistry Departments in the United States from 2000-2004*⁵.

Worcester Polytechnic Institute is denoted by a solid diamond. All other institutions are denoted by open circles. Worcester Polytechnic Institute, with 15 faculty members, had a total of 63 papers. Worcester Polytechnic Institute, along with the majority of institutions, lies beneath the bottom end of the line. According to the linear fit, Worcester Polytechnic Institute, with its 15 faculty members, should have produced 210 papers. However, Worcester Polytechnic Institute actually produced less than one third that number of papers.

Total Papers from 2000-2004 against Number of Faculty

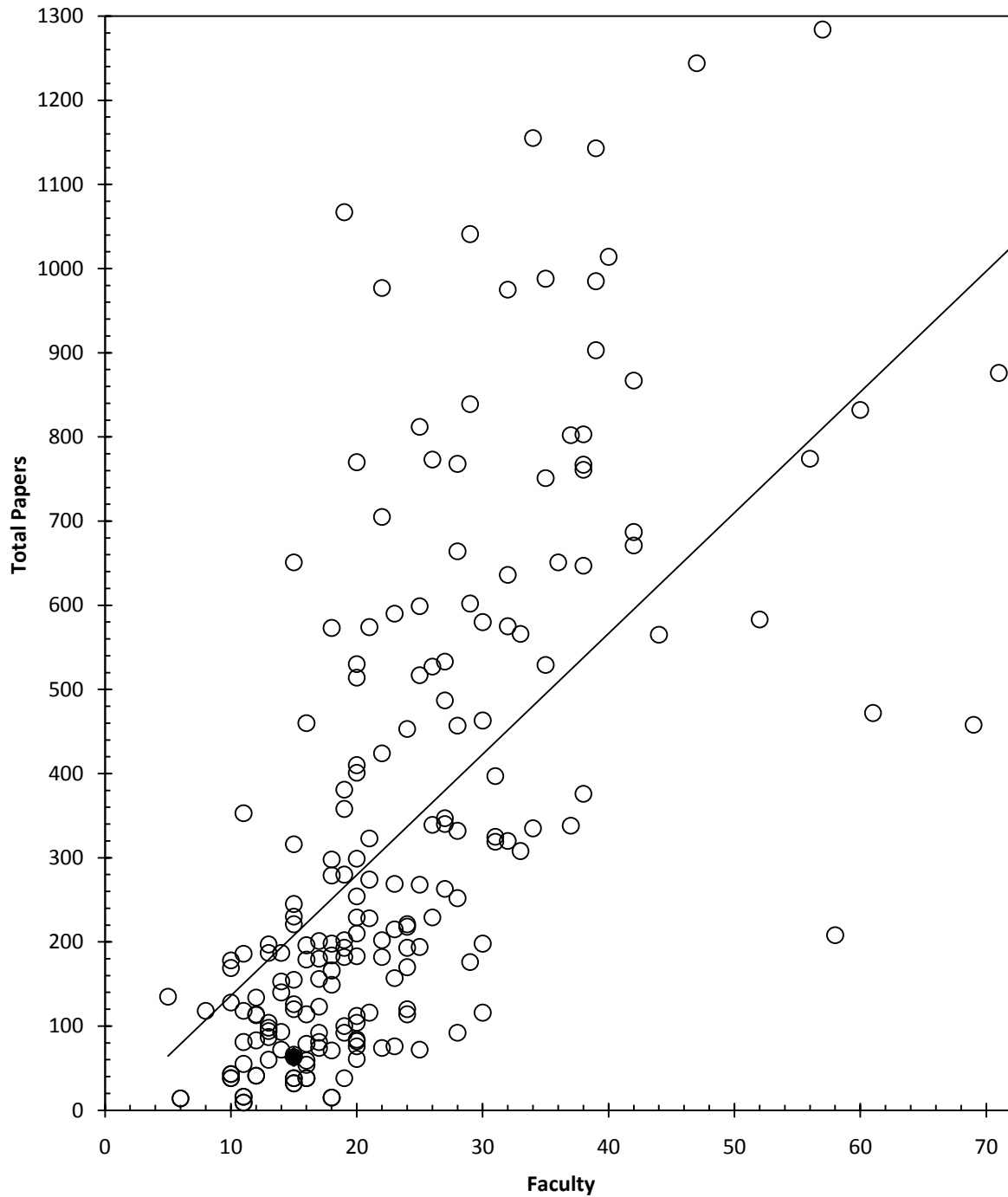


Figure 18 Total papers per institution against the number of its faculty. The sources used were Peterson's Graduate Programs¹, the ACS Directory of Graduate Research 2007², the ACS website³, and Michael Rivet's IQP⁵. The linear fit is $y = 14.345x - 7.2369$. The correlation coefficient is 0.347.

Figure Nineteen is a scatter plot, on a log scale, showing the total number of citations from 2000 thru 2004 versus research expenditures in 2007 at various institutions. The linear fit is $y = 0.4531x + 95.341$. Its correlation coefficient is 0.6358. The exponential fit is $y = 566.37e^{0.0001x}$. Its correlation coefficient is 0.56. According to the graph, institutions with more research expenditures will have more citations. Institutions with more research/development expenditures have more opportunities and advantages over institutions with less research/development expenditures; an institution with more money can do more than an institution with less money. The sources for these numbers are Michael Rivet's Interactive Qualifying Project report, *Ranking the PhD-Granting Chemistry Departments in the United States from 2000-2007*⁵, and the National Science Foundation web site⁴. [<http://www.nsf.gov/index.jsp>]. Michael Rivet's Interactive Qualifying Project provided the information for the number of citations at various institutions. The National Science Foundation web site provided the information for the expenditures at various institutions.

Worcester Polytechnic Institute is denoted by a solid diamond. All other institutions are open circles. Worcester Polytechnic Institute, with an expenditure of \$555,000, had 363 citations. Worcester Polytechnic Institute lies on the linear fit. Almost all other institutions had a greater number of citations than Worcester Polytechnic Institute. A possible way for Worcester Polytechnic Institute to increase its number of citations is to increase its expenditures. Getting more research expenditures will allow Worcester Polytechnic Institute to do more, such as write more papers, which leads to more citations.

Total Citations from 2000-2004 against Research/Development Expenditures

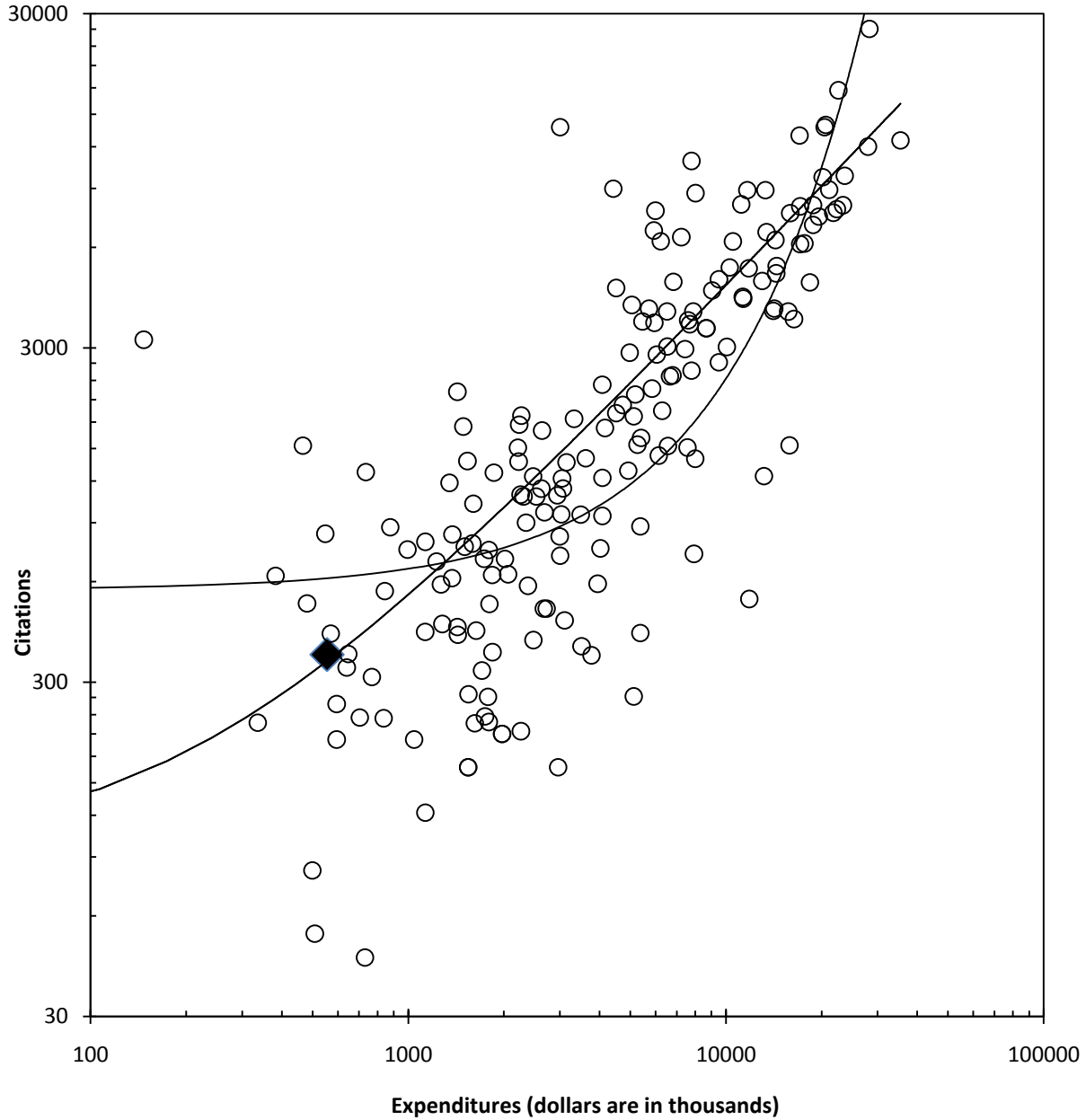


Figure 19 Total citations from 2000 and 2004 versus research expenditures. WPI is denoted by a solid diamond. The sources used were the NSF website ⁴and Michael Rivet's IQP⁵. The exponential fit is $y = 566.37e^{0.0001x}$. Its correlation coefficient is 0.56. The linear fit is $y = 0.4531x + 95.341$. Its correlation coefficient is 0.6358.

Figure Twenty is a scatter plot, on a log scale, showing the total number of papers produced from 2000 thru 2004 versus research expenditures in 2007 at various institutions. The exponential fit is $y = 97.28e^{0.0001x}$. The correlation coefficient is 0.5171. As one can see from the graph, institutions with more research/development expenditures produce more papers. Having more research/development expenditures broadens faculty members limits; faculty members with better experiences, due to more money, are expected to produce more papers. The sources for these numbers are Michael Rivet's Interactive Qualifying Project report, *Ranking the PhD-Granting Chemistry Departments in the United States from 2000-2004*⁵ and the National Science Foundation web site⁴. Michael Rivet's Interactive Qualifying Project provided the information for the number of papers at various institutions. The National Science Foundation web site provided the information for the expenditures at various institutions.

Worcester Polytechnic Institute is denoted by a solid diamond. All other institutions are denoted by open circles. Worcester Polytechnic Institute, with an expenditure of \$555,000, had a total of 63 papers. Worcester Polytechnic Institute lies under the line. The majority of all other institutions produced more papers than Worcester Polytechnic Institute. One way for Worcester Polytechnic Institute to produce more papers is to get more research/development expenditures.

Total Papers from 2000-2004 against Research/Development Expenditures

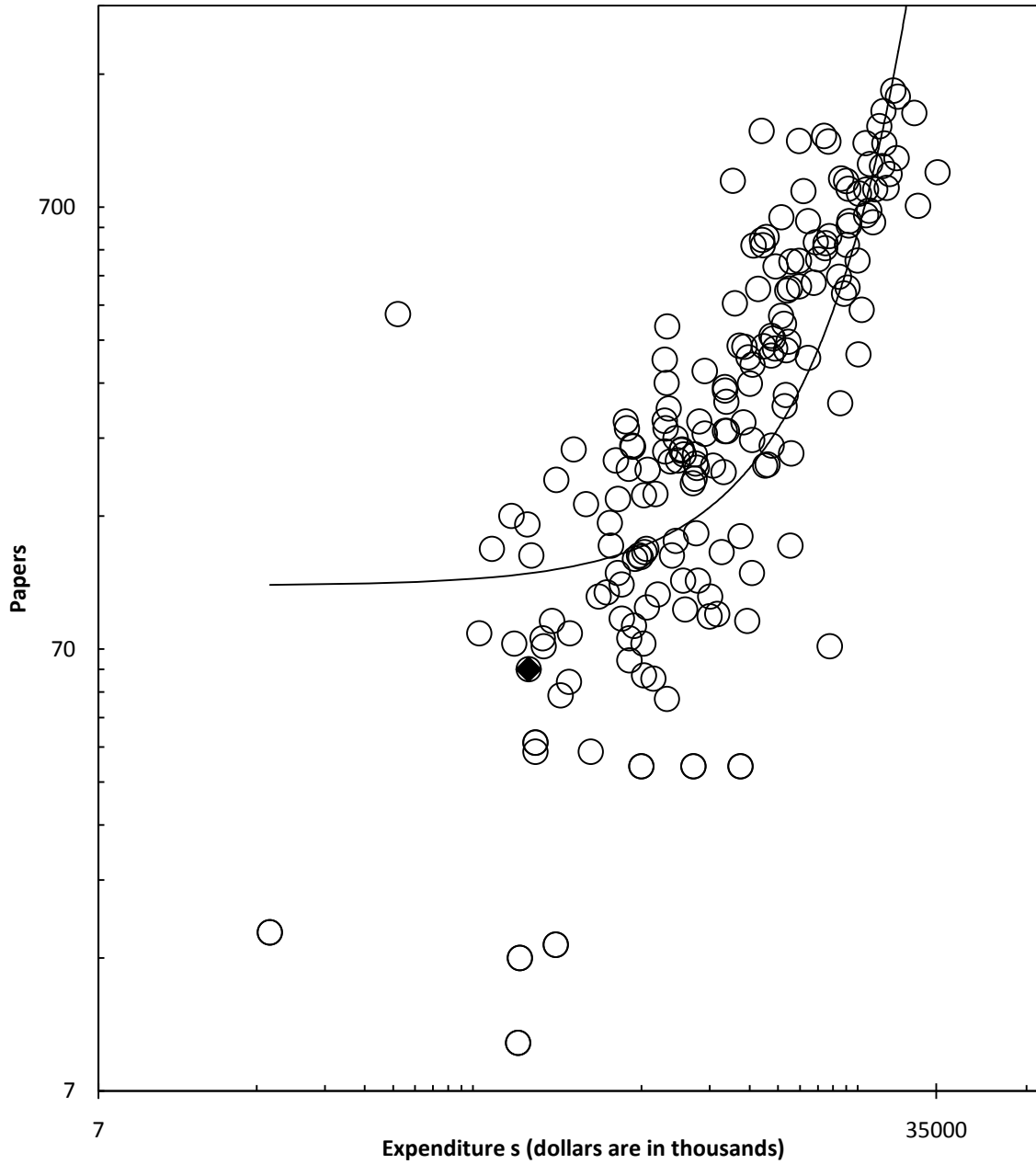


Figure 20 Total papers from 2000 and 2004 versus research expenditures. The sources used were the NSF website ⁴ and Michael Rivet's IQP ⁵. The exponential fit is $y = 97.28e^{0.0001x}$. The correlation coefficient is 0.5171.

Figure Twenty-one is a scatter plot showing research expenditures per faculty member per year versus the number of citations per faculty member per year. The linear fit is $y = 0.0003x + 21.904$. The correlation coefficient is 0.5156. As one can see from the graph, institutions with higher research expenditures per faculty member have more citations per faculty member. The amount of money a faculty member has is really important in determining his/her success; a faculty member with more money has more opportunities than a faculty member with less money. The sources for these numbers are the *American Chemical Society Directory of Graduate Research 2007*², *Peterson's Graduate Programs*¹, the American Chemical Society website³, and Michael Rivet's Interactive Qualifying Project report, *Ranking the PhD-Granting Chemistry Departments in the United States from 2000-2004*⁵.

Worcester Polytechnic Institute is denoted by a solid diamond. All other institutions are denoted by open circles. Worcester Polytechnic Institute, with an expenditures per faculty ratio of \$37,000 per year, had a citations per faculty member ratio of 30.25. Worcester Polytechnic Institute lies beneath the bottom end of the line. The majority of institutions had more citations per faculty than Worcester Polytechnic Institute. One way for Worcester Polytechnic Institute to have more citations per faculty member is to increase each faculty member's expenditures.

Expenditures/Faculty Against Citations/Faculty

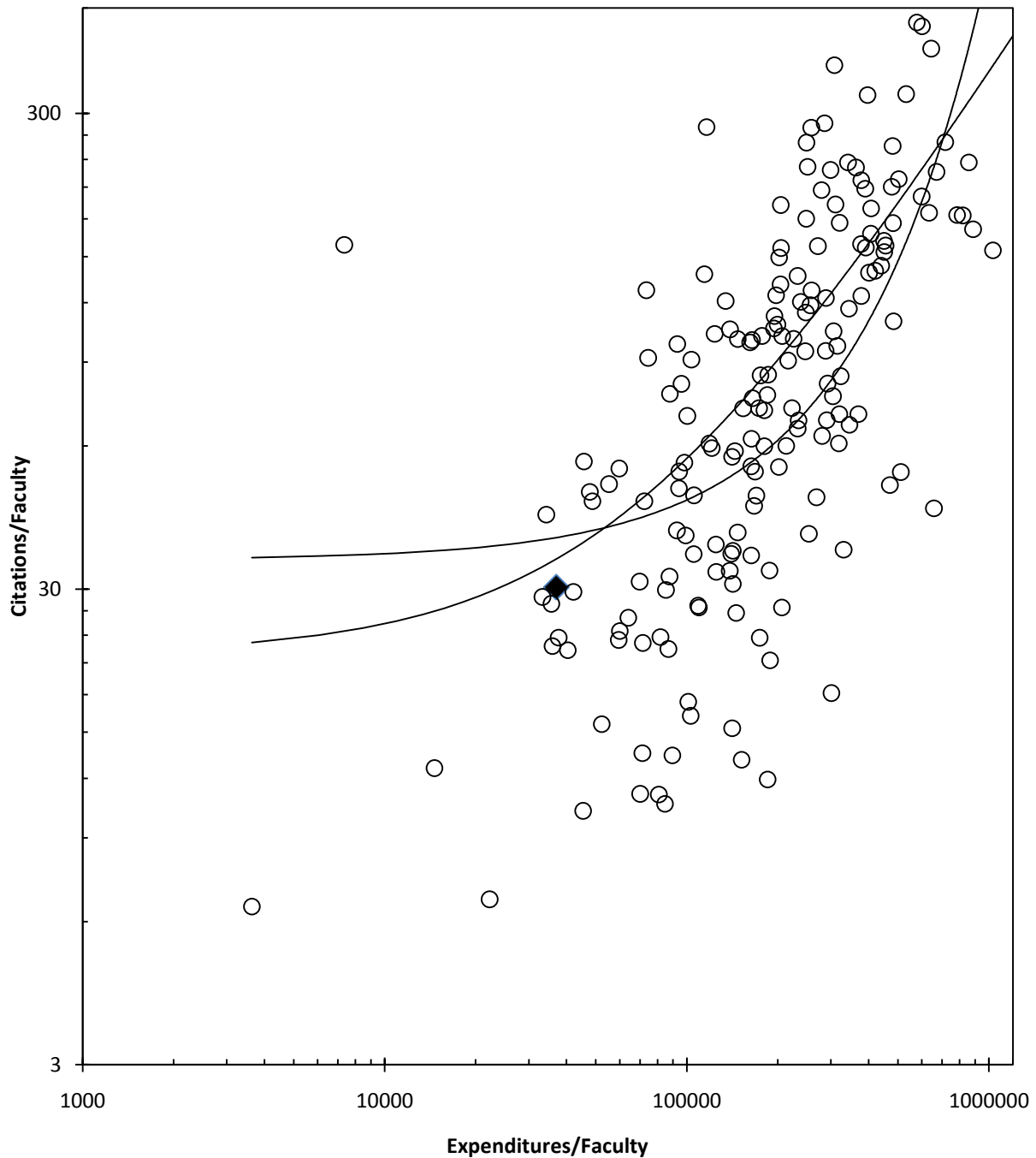


Figure 21 Expenditures per faculty member per year versus citations per faculty member per year WPI is denoted by a solid diamond. The sources used were Michael Rivet's IQP⁵, the 2007 ACS², and the NSF website³. The exponential fit is $y = 34.58e^{3E-06x}$. Its correlation coefficient is 0.4183. The linear fit is $y = 0.0003x + 21.904$. Its correlation coefficient is 0.5156.

Figure Twenty-two is a scatter plot showing research expenditures per faculty member per year versus the total number of papers per faculty member per year. The exponential fit is $y = 7.006e^{2E-06x}$. The correlation coefficient is 0.342. As one can see from the graph, institutions with higher research expenditures per faculty member have more papers per faculty member. Once again, the amount of money a faculty member has is really important in determining his/her success. Having more money allows faculty members to do more in general, leading to more papers per faculty member. The sources for these numbers are the *American Chemical Society Directory of Graduate Research 2007*², *Peterson's Graduate Programs*¹, the American Chemical Society website³, and Michael Rivet's Interactive Qualifying Project report, *Ranking the PhD-Granting Chemistry Departments in the United States from 2000-2004*⁵.

Worcester Polytechnic Institute is denoted by a solid diamond. All other institutions are denoted by open circles. Worcester Polytechnic Institute, with an expenditures per faculty ratio of \$37,000, had a papers per faculty ratio of 5.25. Worcester Polytechnic Institute lies beneath the bottom end of the fit. Worcester Polytechnic Institute performed disappointingly. Almost all other institutions had more papers per faculty member than Worcester Polytechnic Institute. Once again, it is a good idea to increase each faculty members expenditures if Worcester Polytechnic Institute wants to be more successful.

Expenditures/Faculty Against Papers/Faculty

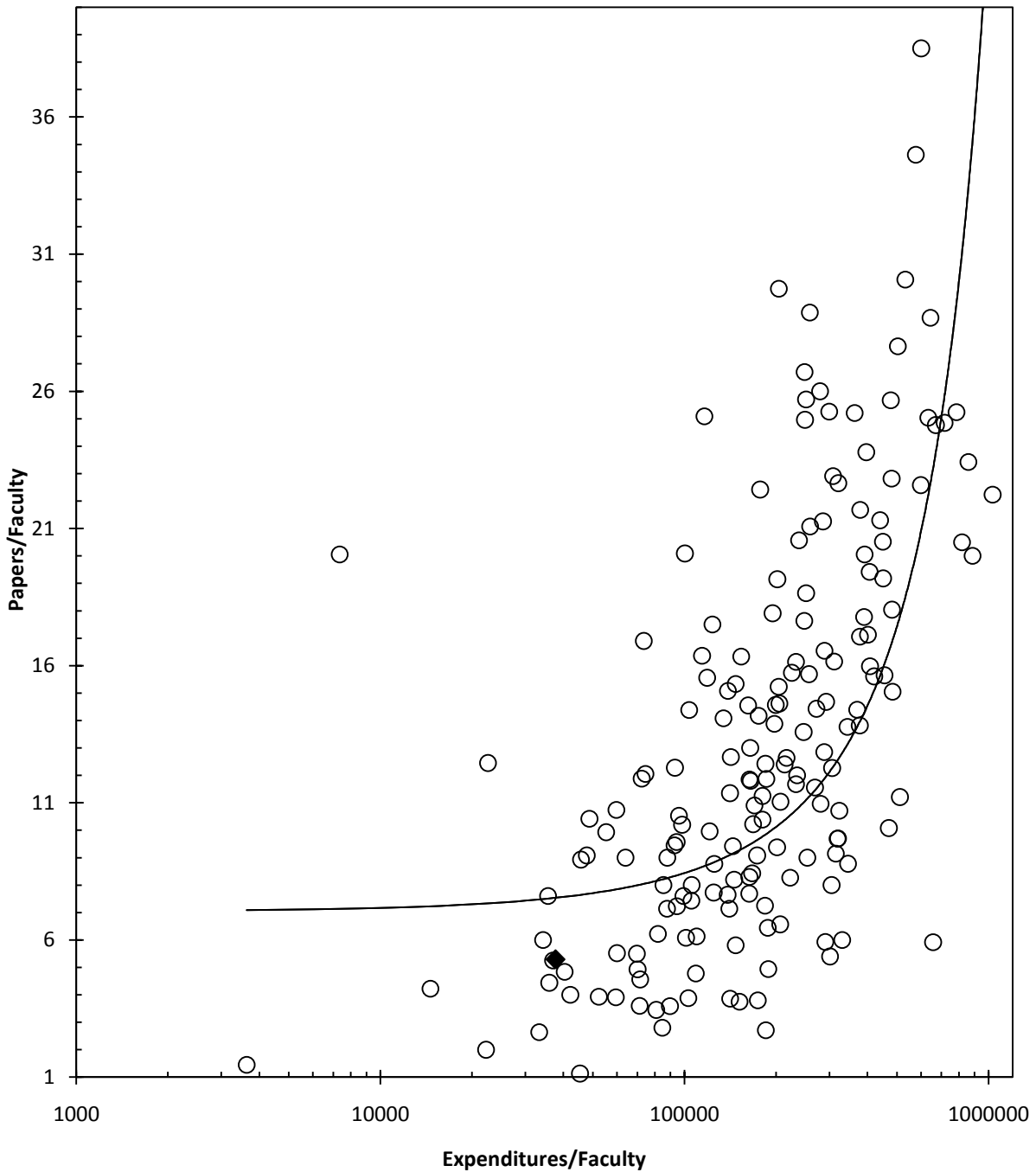


Figure 22 Expenditures per faculty member per year versus papers per faculty member per year. WPI is denoted by a solid diamond. The sources used were Michael Rivet's IQP⁵, 2007 ACS², and the NSF website⁴. The exponential fit is $y = 7.006e^{2E-06x}$. The correlation coefficient is 0.342.

Discussion:

Worcester Polytechnic Institute chemistry Doctoral department could definitely improve some of its resources. However, what institution could not use improvement? No institution is perfect; all institutions are always striving to improve in some way or another. Looking at all of the scatter plots, Worcester Polytechnic Institute lies under the linear fits in 10 of them.

Worcester Polytechnic Institute lies above the linear fits in 6 of the scatter plots. Worcester Polytechnic Institute's chemistry Doctoral department is definitely not ranked number one, nor even is it in the top ten. Rivet rated Worcester Polytechnic Institute number 169 for total citations in 2000-2004. Also, Rivet rated Worcester Polytechnic Institute number 180 for total papers in 2000-2004. However, Worcester Polytechnic Institute, with its low performance level, did not do horrendously, as it is not in the bottom ten.

Looking at the scatter plots, the majority of institutions fell under the linear fit whenever Worcester Polytechnic Institute did. Also, almost every time Worcester Polytechnic Institute fell under the linear fit, it fell close to it. There are more institutions on Worcester Polytechnic Institute's lower level, as opposed to not on its higher level. This also tells us that Worcester Polytechnic Institute is not the only institution that needs to improve. Once again, no institution is perfect! Worcester Polytechnic Institute also fell close to the linear fit when it lied above it. Worcester Polytechnic performed adequately in certain parts of the project.

There are ways in which Worcester Polytechnic Institute could improve. For example, Worcester Polytechnic Institute could gain more chemistry graduate students if it hires more chemistry faculty members; institutions with bigger programs can enroll more graduate students than institutions with smaller programs. Worcester Polytechnic Institute is likely to grant more Doctoral degrees if it hires more chemistry faculty and gains more chemistry graduate students.

Worcester Polytechnic Institute is also likely to have more fellowships and higher stipends for research assistantships if it enrolls more chemistry graduate students. Also, Worcester Polytechnic Institute is likely to publish more papers and receive more citations if it obtains more research money. Finally, Worcester Polytechnic Institute will have more citations per faculty member if it obtains more research expenditures per faculty member.

Worcester Polytechnic Institute's chemistry Doctoral department resources need improvement. Worcester Polytechnic Institute's resources have determined its spot on the charts. Unfortunately, I would say that Worcester Polytechnic Institute has a relatively poor chemistry Doctoral department. However, with improvement, Worcester Polytechnic Institute can push its way up the rank of top institutions. I speculate that with time, Worcester Polytechnic Institute's chemistry Doctoral department will rise on the charts.

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<u>University</u>	<u>Number of Fellowships Granted 2007-2008</u>
University of Akron	1
University of Alabama	3
University of Alabama-Birmingham	10
University of Arkansas	10
Boston University	6
Brandeis University	23
Bowling Green State University	5
Brigham Young University	11
University of California-Santa Barbara	19
University of Chicago	12
University of Cincinnati	15
Clarkson University	4
Clemson University	1
Colorado State University	41
University of Colorado-Boulder	88
Cornell University	30
University of Connecticut	70
University of Delaware	14
Duke University	1
Georgia State University	4
University of Illinois at Urbana-Champaign	99
Illinois Institute of Technology	3
Indiana University-Purdue University at Indianapolis	3
University of Iowa	12
Kent State University	1
University of Kentucky	23
Lehigh University	3
Louisiana State University	24
Loyola University (Chicago)	5
University of Maryland-College Park	16
University of Massachusetts-Amherst	8
Massachusetts Institute of Technology	33
University of Miami (Florida)	3
University of Michigan	10
University of New Mexico	5
New Mexico State University	2
University of North Texas	2
University of Notre Dame	5
University of Oklahoma	4

University of Pittsburgh	4
Rensselaer Polytechnic Institute	1
University of South Carolina	6
State University of New York at Binghamton	8
University of Texas-Arlington	4
University of the Sciences in Philadelphia	3
Wake Forest University	3
Washington State University	3
Wayne State University	4
University of Wisconsin-Madison	1
Worcester Polytechnic Institute	1

**Average Amount of Teaching Assistantships
Granted per year, 2007-2008**

University	
Boston University	\$17,500
Bowling Green State University	\$14,115
Brigham Young University	\$20,000
Clarkson University	\$20,150
Clark University	\$19,825
Clemson University	\$21,000
Cleveland State University	\$14,000
Colorado State University	\$14,554
Duquesne University	\$20,000
Florida Institute of Technology	\$10,950
Florida State University	\$19,000
Georgia State University	\$19,000
Illinois Institute of Technology	\$15,500
Indiana University-Purdue University Indianapolis	\$17,440
Iowa State University of Science and Technology	\$22,921
The Johns Hopkins University	\$23,333
Kansas State University	\$11,945
Lehigh University	\$20,000
Louisiana State University	\$21,746
Loyola University Chicago	\$18,000
Massachusetts Institute of Technology	\$26,986
Michigan Technological University	\$9,542
Mississippi State University	\$14,908
Missouri University of Science and Technology	\$1,814
Oklahoma State University	\$16,749
Old Dominion University	\$18,000
Rensselaer Polytechnic Institute	\$21,500
Saint Louis University	\$15,500
Southern Methodist University	\$15,000
State University of New York at Binghamton	\$17,000
Texas A&M University	\$18,600
Texas Tech University	\$16,065
University at Albany, State University of New York	\$21,000
The University of Alabama	\$21,036
The University of Alabama at Birmingham	\$18,700
The University of Arizona	\$17,800
University of California, Riverside	\$16,500

University of California, San Francisco	\$7,171
University of California, Santa Barbara	\$20,814
University of Chicago	\$27,438
University of Cincinnati	\$15,777
University of Denver	\$15,900
University of Florida	\$21,123
University of Hawaii at Manoa	\$14,517
University of Houston	\$13,700
University of Kentucky	\$8,060
University of Maine	\$14,500
University of Massachusetts Amherst	\$12,057
University of Miami	\$20,000
University of Michigan	\$23,500
University of Missouri-Kansas City	\$18,944
University of Missouri-St. Louis	\$13,125
University of Nevada	\$11,000
University of New Mexico	\$13,891
University of North Dakota	\$9,800
University of Northern Colorado	\$8,264
University of North Texas	\$17,390
University of Notre Dame	\$22,133
University of Oklahoma	\$15,812
University of Pittsburgh	\$21,726
University of South Carolina	\$20,300
The University of South Dakota	\$11,000
University of Southern California	\$24,760
The University of Texas at Arlington	\$19,000
The University of Texas at Dallas	\$13,519
The University of Texas at San Antonio	\$11,926
The University of Toledo	\$14,800
University of Utah	\$21,000
University of Wyoming	\$21,500
Wake Forest University	\$20,000
Washington State University	\$13,056
Wayne State University	\$18,354
West Virginia University	\$16,500
Worcester Polytechnic Institute	\$15,500

University	Ph.D. degrees granted, 2005-2006
University of Akron	N/A
University of Alabama	11
University of Alabama-Birmingham	1
University of Alaska-Fairbanks	4
University of Arizona	10
Arizona State University	8
University of Arkansas	11
Auburn University	6
Baylor University	9
Boston College	5
Boston University	9
Bowling Green State University	12
Brandeis University	6
Brown University	8
Bryn Mawr College	2
University at Buffalo, The State University of New York	25
Brigham Young University	12
California Institute of Technology	31
University of California-Berkeley	63
University of California-Davis	35
University of California-Irvine	31
University of California-Los Angeles	38
University of California-Riverside	15
University of California-San Diego	26
University of California-Santa Barbara	10
University of California-Santa Cruz	10
Carnegie Mellon University	9
Case Western Reserve University	13
University of Central Florida	4
University of Chicago	36
University of Cincinnati	11
City University of New York (CUNY)	18
Clark Atlanta University	0
Clark University	4
Clarkson University	0
Clemson University	10

Cleveland State University	5
Colorado School of Mines	5
Colorado State University	11
University of Colorado-Boulder	22
Columbia University	31
University of Connecticut	17
Cornell University	27
Dartmouth College	10
University of Delaware	16
University of Denver	1
Drexel University	4
Duke University	19
Duquesne University	7
Emory University	18
University of Florida	43
Florida Atlantic University	6
Florida Institute of Technology	3
Florida International University	8
Florida State University	12
George Washington University	2
Georgetown University	N/A
University of Georgia	14
Georgia Institute of Technology	32
Georgia State University	5
Harvard University	32
University of Hawaii-Manoa	1
University of Houston	21
Howard University	3
University of Idaho	6
University of Illinois at Urbana-Champaign	59
University of Illinois-Chicago	16
Illinois Institute of Technology	2
Indiana University	12
Indiana University-Purdue University at Indianapolis	2
University of Iowa	10
Iowa State University	26
Jackson State University	0
Johns Hopkins University	17
University of Kansas	8
Kansas State University	7
Kent State University	5

University of Kentucky	13
Lehigh University	4
Louisiana State University	13
University of Louisville	5
Loyola University (Chicago)	7
University of Maine	2
Marquette University	8
University of Maryland-Baltimore County	6
University of Maryland-College Park	N/A
University of Massachusetts-Amherst	22
University of Massachusetts-Lowell	8
Massachusetts Institute of Technology	45
University of Memphis	4
University of Miami (Florida)	N/A
Miami University (Ohio)	7
University of Michigan	37
Michigan State University	41
Michigan Technological University	4
University of Minnesota	34
University of Mississippi	3
Mississippi State University	3
University of Missouri-Columbia	15
University of Missouri-Kansas City	6
Missouri University of Science and Engineering	8
University of Missouri-St. Louis	4
University of Montana	7
Montana State University-Bozeman	5
University of Nebraska	6
University of Nevada-Reno	4
University of New Hampshire	3
New Jersey Institute of Technology	N/A
University of New Mexico	N/A
New Mexico Institute of Mining and Technology	2
New Mexico State University	6
University of New Orleans	6
University of North Carolina-Chapel Hill	37
North Carolina State University	11
University of North Dakota	1
North Dakota State University	4
University of North Texas	7
Northeastern University	13

University of Northern Colorado	1
Northern Illinois University	6
Northwestern University	32
University of Notre Dame	8
New York University (NYU)	6
Oakland University	3
Ohio University	7
Ohio State University	N/A
University of Oklahoma	N/A
Oklahoma State University	8
Old Dominion University	0
University of Oregon	16
Oregon State University	9
University of the Pacific	2
Pennsylvania State University	39
University of Pennsylvania	N/A
University of Pittsburgh	27
Polytechnic University	4
Portland State University	3
Princeton University	22
Purdue University	N/A
Rensselaer Polytechnic Institute	N/A
University of Rhode Island	3
Rice University	14
University of Rochester	7
Rutgers University (New Brunswick and Newark Campus)	12
San Diego State University	N/A
Seton Hall University	6
University of South Carolina	16
South Dakota State University	4
University of South Florida	18
University of Southern California	24
Southern Illinois University (Carbondale)	N/A
Southern Methodist University	0
University of South Dakota	0
University of Southern Mississippi	1
Stanford University	29
Stevens Institute of Technology	2
State University of New York at Albany	2
State University of New York at Binghamton	8

State University of New York at Stony Brook	19
SUNY – College of Environment Science and Forestry	5
Syracuse University	6
Temple University	5
University of Tennessee-Knoxville	14
Tennessee Technological University	1
Texas A&M University	31
Texas Christian University	2
Texas Tech University	9
University of Texas-Arlington	4
University of Texas-Austin	29
University of Texas-Dallas	10
University of Toledo	2
Tufts University	7
Tulane University	1
University of the Sciences in Philadelphia	N/A
University of Utah	14
Utah State University	5
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University of Vermont	5
University of Virginia	15
Virginia Commonwealth University	3
Virginia Polytechnic Institute and State University	22
Wake Forest University	4
University of Washington	37
Washington State University	5
Washington University (St. Louis)	12
Wayne State University	15
Wesleyan University	2
West Virginia University	4
Western Michigan University	2
Wichita State University	5
University of Wisconsin-Madison	N/A
University of Wisconsin-Milwaukee	4
Worcester Polytechnic Institute	2
University of Wyoming	7
Yale University	14

University	Ph.D. degrees granted in 2007
University of Akron	9
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University of Alabama-Birmingham	1
University of Arizona	10
University of Arkansas	4
Auburn University	6
Baylor University	7
Boston College	6
Boston University	14
Bowling Green State University	6
Brandeis University	8
Brigham Young University	10
California Institute of Technology	29
University of California-Irvine	30
University of California-Los Angeles	26
University of California-Riverside	16
University of California-Santa Barbara	22
University of California-Santa Cruz	10
Case Western Reserve University	15
University of Chicago	23
University of Cincinnati	11
Clark Atlanta University	3
Clark University	3
Clemson University	12
Cleveland State University	5
Colorado School of Mines	5
Colorado State University	17
University of Colorado-Boulder	23
Columbia University	20
University of Connecticut	11
Cornell University	27
Dartmouth College	9
University of Delaware	21
University of Denver	2
Duke University	16

Duquesne University	6
University of Florida	34
Florida Institute of Technology	2
Florida International University	4
Florida State University	26
University of Georgia	22
Georgia State University	12
University of Houston	14
University of Idaho	5
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Indiana University	10
University of Iowa	18
Iowa State University	28
University of Kansas	16
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University of Kentucky	15
Lehigh University	6
Louisiana State University	25
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University of Maine	3
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Michigan Technological University	2
University of Mississippi	4
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University of Missouri-St. Louis	2
Montana State University-Bozeman	9
University of Nevada-Reno	6
University of New Hampshire	4
New Jersey Institute of Technology	4
University of New Mexico	9
New Mexico State University	3
University of New Orleans	7
University of North Dakota	1
University of North Texas	1
Northern Illinois University	3
University of Notre Dame	17

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Oakland University	1
Ohio State University	25
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University of Oregon	17
Oregon State University	8
University of Pittsburgh	34
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San Diego State University	4
University of South Carolina	17
University of South Florida	9
University of Southern California	16
Southern Illinois University (Carbondale)	7
University of Southern Mississippi	1
State University of New York at Binghamton	16
Syracuse University	7
Texas A&M University	31
Texas Tech University	7
University of Texas-Arlington	3
University of Texas-Dallas	7
University of Toledo	4
Tufts University	7
University of the Sciences in Philadelphia	2
University of Utah	21
Vanderbilt University	16
University of Vermont	7
University of Virginia	19
Virginia Commonwealth University	8
Wake Forest University	4
Washington State University	5
Wayne State University	21
Wesleyan University	2
West Virginia University	5
University of Wisconsin-Milwaukee	6
Worcester Polytechnic Institute	2
University of Wyoming	6

University	Number of Faculty
University of Akron	28
University of Alabama	21
University of Alabama-Birmingham	16
University of Alaska-Fairbanks	15
University of Arizona	32
Arizona State University	44
University of Arkansas	20
Auburn University	26
Baylor University	22
Boston College	21
Boston University	24
Bowling Green State University	15
Brandeis University	22
Brown University	19
Bryn Mawr College	6
University at Buffalo, The State University of New York	33
Brigham Young University	38
California Institute of Technology	29
University of California-Berkeley	49
University of California-Davis	38
University of California-Irvine	38
University of California-Los Angeles	26
University of California-Riverside	25
University of California-San Diego	57
University of California-Santa Barbara	38
University of California-Santa Cruz	28
Carnegie Mellon University	22
Case Western Reserve University	20
University of Central Florida	25
University of Chicago	16
University of Cincinnati	33
City University of New York (CUNY)	107
Clark Atlanta University	13
Clark University	8
Clarkson University	10
Clemson University	34
Cleveland State University	14
Colorado School of Mines	28
Colorado State University	30

University of Colorado-Boulder	42
Columbia University	28
University of Connecticut	32
Cornell University	38
Dartmouth College	14
University of Delaware	31
University of Denver	13
Drexel University	18
Duke University	19
Duquesne University	19
Emory University	20
University of Florida	54
Florida Atlantic University	20
Florida Institute of Technology	14
Florida International University	30
Florida State University	35
George Washington University	12
Georgetown University	16
University of Georgia	15
Georgia Institute of Technology	39
Georgia State University	21
Harvard University	22
University of Hawaii-Manoa	10
University of Houston	23
Howard University	24
University of Idaho	15
University of Illinois at Urbana-Champaign	39
University of Illinois-Chicago	19
Illinois Institute of Technology	12
Indiana University	30
Indiana University-Purdue University at Indianapolis	19
University of Iowa	27
Iowa State University	29
Jackson State University	23
Johns Hopkins University	20
University of Kansas	27
Kansas State University	15
Kent State University	24
University of Kentucky	28
Lehigh University	17
Louisiana State University	31

University of Louisville	24
Loyola University (Chicago)	23
University of Maine	13
Marquette University	14
University of Maryland-Baltimore County	24
University of Maryland-College Park	52
University of Massachusetts-Amherst	37
University of Massachusetts-Lowell	15
Massachusetts Institute of Technology	32
University of Memphis	15
University of Miami (Florida)	10
Miami University (Ohio)	29
University of Michigan	35
Michigan State University	36
Michigan Technological University	16
University of Minnesota	39
University of Mississippi	18
Mississippi State University	17
University of Missouri-Columbia	18
University of Missouri-Kansas City	15
Missouri University of Science and Engineering	19
University of Missouri-St. Louis	22
University of Montana	21
Montana State University-Bozeman	19
University of Nebraska	25
University of Nevada-Reno	18
University of New Hampshire	14
New Jersey Institute of Technology	20
University of New Mexico	13
New Mexico Institute of Mining and Technology	10
New Mexico State University	24
University of New Orleans	20
University of North Carolina-Chapel Hill	42
North Carolina State University	69
University of North Dakota	14
North Dakota State University	15
University of North Texas	19
Northeastern University	25
University of Northern Colorado	11
Northern Illinois University	18
Northwestern University	34

University of Notre Dame	61
New York University (NYU)	26
Oakland University	20
Ohio University	17
Ohio State University	40
University of Oklahoma	27
Oklahoma State University	11
Old Dominion University	16
University of Oregon	23
Oregon State University	18
University of the Pacific	11
Pennsylvania State University	28
University of Pennsylvania	37
University of Pittsburgh	29
Polytechnic University	20
Portland State University	16
Princeton University	25
Purdue University	19
Rensselaer Polytechnic Institute	58
University of Rhode Island	17
Rice University	21
University of Rochester	20
Rutgers University (New Brunswick and Newark Campus)	56
San Diego State University	25
Seton Hall University	11
University of South Carolina	27
South Dakota State University	13
University of South Florida	30
University of Southern California	27
Southern Illinois University (Carbondale)	19
Southern Methodist University	12
University of South Dakota	10
University of Southern Mississippi	18
Stanford University	22
Stevens Institute of Technology	10
State University of New York at Albany	17
State University of New York at Binghamton	16
State University of New York at Stony Brook	32
SUNY – College of Environment Science and Forestry	16
Syracuse University	23

Temple University	18
University of Tennessee-Knoxville	28
Tennessee Technological University	18
Texas A&M University	47
Texas Christian University	11
Texas Tech University	27
University of Texas-Arlington	17
University of Texas-Austin	60
University of Texas-Dallas	15
University of Toledo	20
Tufts University	12
Tulane University	13
University of the Sciences in Philadelphia	19
University of Utah	30
Utah State University	20
Vanderbilt University	24
University of Vermont	12
University of Virginia	25
Virginia Commonwealth University	20
Virginia Polytechnic Institute and State University	37
Wake Forest University	5
University of Washington	71
Washington State University	20
Washington University (St. Louis)	27
Wayne State University	31
Wesleyan University	13
West Virginia University	24
Western Michigan University	20
Wichita State University	11
University of Wisconsin-Madison	42
University of Wisconsin-Milwaukee	19
Worcester Polytechnic Institute	15
University of Wyoming	17
Yale University	26

