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Academic Programs in Statistics in the Philippines
by
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ABSTRACT

The first academic program offered in the Philippines was the Master of Arts in Statistics program of the Statistical Center, now the School of Statistics, of the University of the Philippines. This was instituted in 1954. At present, many schools nationwide offer undergraduate and graduate programs in statistics. Thus, after 50 years, Statistics in the Philippines has found recognition as a discipline in itself. Academic institutions produce the statistical manpower for government, business and industry, and the academe. Furthermore, they contribute research and training services in the country.

A survey of academic institutions that offer Statistics and Applied Mathematics/Statistics programs show encouraging statistics. However, there is still a need to attract more students, produce more graduates, enhance the academic programs, and provide more facilities. The paper shall present these statistics and give recommendations on how to enhance their academic programs, attract more students with potential, and produce more graduates.

I. The Birth of Statistics Education in the Philippines

The seed of higher level of education in Statistics in the Philippines was planted in 1952 when the first board of directors of the Philippine Statistical Association discussed the possibility of establishing an international statistical center in Manila under the dual sponsorship of the Philippine government and the United Nations (Lorenzo, 1953). This recommendation was a result of their observation that staff doing statistical work then did not have formal training in statistics. At that time, college education offered only three units of elementary statistics and there were no undergraduate and graduate programs in statistics in the Philippines.

In 1953, the Statistical Center was established under a bilateral agreement between the Philippine government and the United Nations. Its first academic program, Master of Arts in Statistics, was instituted in 1954. It was formally turned over to the University of the Philippines in 1963 and , in 1998, it was renamed the School of Statistics of the University of the Philippines in Diliman.

II. Current Academic Programs in Statistics

A study commissioned by the Technical Panel on Science and Mathematics of the Commission on Higher Education (CHED) listed eleven (11) schools offering academic programs in Statistics as of 1999 (Bonzo and Patungan, 2000). At present, eighteen (18) schools offer such programs. The following table, Table 1, lists them and the programs they offer: It should be noted that the list does not include schools that may have programs in applied mathematics which include statistics as a specialization but do not have formal statistics programs.

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Table 1. Schools Offering Programs in Statistics, 2004

Region	School	Academic Programs
NCR	School of Statistics, U.P. Diliman, Quezon City	B.S. Statistics Master of Statistics M.S. Statistics Ph.D. in Statistics
	Polytechnic University of the Philippines, Manila	Associate in Applied Statistics Bachelor in Applied Statistics Master of Arts in Statistics
	De La Salle University, Manila	B.S. Statistics
	Rizal Technological University, Mandaluyong	B.S. Statistics
Luzon	Institute of Statistics, U.P. Los Banos in Laguna	B.S. Statistics M.S. Statistics Ph.D. Statistics
	Central Luzon State University in Munoz, Nueva Ecija	B.S. Applied Statistics
	Benguet State University in La Trinidad, Benguet	B.S. Applied Statistics Master of Arts in Applied Statistics
	Batangas State University (formerly Pablo Borbon Memorial Institute of Technology), Batangas City	B.S. Statistics
	University of Northern Philippines, Vigan, Ilocos Sur	B.S. Mathematics/Statistics Master of Statistics
Visayas	U.P. Visayas in Miag-ao, Iloilo	B.S. Statistics
	Leyte State University in Baybay, Leyte	B.S. Statistics
	Leyte Institute of Technology in Tacloban City	B.S. Statistics
	Negros State College of Agriculture in Kabankalan, Negros Occidental	Statistics*
	Samar State Polytechnic College in Catbalogan, Western Samar	B.S. Applied Statistics
	Visayas State College of Agriculture, Baybay, Leyte	B.S. Statistics
Mindanao	Iligan Institute of Technology, Mindanao State University in Iligan	B.S. Statistics Master of Applied Statistics

		M.S. Statistics
	University of Southeastern Philippines in Davao City	B.S. Statistics
	Western Mindanao State University in Zamboanga City, Zamboanga del Norte	B.S. Statistics

* Academic Program not specified

It is important to note that the curricular offerings are available nationwide. However, Ph.D. and Masteral offerings are concentrated in Luzon. Outside Luzon, only the Iligan Institute of Technology of Mindanao State University (MSU-IIT) offers a graduate degree(masteral level) in statistics. However, the CHED study mentioned earlier cites two Ph.D. programs in Mathematics that specialize in statistics. These are the Ph.D. in Mathematical Sciences of the Mindanao Polytechnic State College and the Ph.D. in Mathematics of MSU-IIT. Thus, although the Mindanao region has no Ph.D. Statistics offerings, there are Mathematics programs which focus on statistics. The Visayas region, therefore, needs more help in developing graduate level programs.

A historical review of the institution of academic programs in statistics offered by the University of the Philippines in Diliman, Los Banos and Visayas (UPD, UPLB, UPV); MSU-IIT; and the Polytechnic University of the Philippines (PUP) shows the following:

Year Instituted: 1954	M.A. in Statistics (now abolished) in UPD
1957	M.S. Statistics in UPD
1964	B. of Statistics in UPD
1967	B.S. Statistics in UPD
1968	Master of Statistics in UPD
1969	Ph.D. Statistics in UPD
1970	M.S. Experimental Statistics in UPLB
1972	B.S. Statistics in UPLB
1977	M.S. Statistics in UPLB
1979	Master in Applied Statistics in PUP
1980	B.S. Statistics in MSU-IIT
1985	Ph.D. Statistics in UPLB
1995	Master of Applied Statistics of MSU-IIT
2000	New Master in Applied Statistics in PUP
2001	B.S. Statistics in UPV
2004	M.S. Statistics in MSU-IIT

The School of Statistics academic programs started with the training of mainly government statisticians. The Institute of Statistics' programs developed from the Statistics Laboratory of the College of Agriculture of UPLB. The program of UPV was developed by its College of Arts and Sciences and the programs of MSU-IIT were developed by its College of Science. Alumni of the School of Statistics spearheaded these developments.

The Master of Applied Statistics(MAS) of PUP just like the first academic program of the School of Statistics also resulted from a bilateral agreement. The

MAS program was formalized in 1979 as an academic program of PUP through a memorandum of agreement between the Philippine National Statistics Office(PNSO) and PUP. This was done through the efforts of Dr. Tito A. Mijares, then the Executive Director of PNSO, who realized the need for those engaged in the practice of statistics to undergo further studies in statistical theory, methods and data analysis. The program was further enhanced in 2000(Africa and Ignacio, 2001).

III. Faculty

Profiling faculty of schools that offer academic programs in statistics yields the conclusion that there is still a dearth in the teaching workforce. The CHED study reported that, in 1999, all the schools in the survey had, on the average, thirteen (13) full-time faculty and three(3) part-time faculty. Furthermore, the faculty of eleven(11) schools that offer statistics programs had a workforce of twenty one(21) faculty with Ph.D. in Statistics, forty five(45) with Masteral degrees in Statistics, and twenty nine(29) with Bachelor's degrees in Statistics.

An ongoing study on scientific and technological human resources in the Philippine education sector being conducted by the U.P. Statistical Center Research Foundation, Inc., the research foundation of the U.P. School of Statistics, reported that the estimated number of faculty with Statistics degrees is significantly fewer than those with Mathematics degrees. Table 2 below presents the statistics.

Table 2. Number of Faculty in the Basic and Mathematical Sciences By Degree, Philippines, June 2001*

Degree	Number of Faculty
M. Actuarial Science	1
M.S./M.A. Applied Mathematics/Mathematics	507
D.S./Ph.D. Applied Mathematics/Mathematics/ Mathematical Science	81
M./M.S. Statistics/Applied Statistics	64
Ph.D. Statistics/Statistics and Research	17
M.A./M.S. General Science/M. Applied Science	9
M./M.S. Science(specialization not specified)	30
M. Science other sciences)	3
Ph.D. (other sciences)	1
Ph.D. in Science (specialization not specified)	3

*Source: Preliminary Report of Projection of Scientific and Technological Human Resources in the Philippine Education Sector, a U.P. Statistical Center Research Foundation, Inc. Project for CHED

A closer look at the profile of faculty of selected schools shows that, except for UPLB, majority of the faculty have masteral degree. The following table, Table 3, shows the distribution of faculty.

**Table 3. Regular Faculty of Selected Schools
By Highest Degree Earned, 2004**

Highest Degree Earned	UPD	UPLB	UPV*	MSU-IIT**	PUP-BS Stat***
Ph.D. Math/Stat	6	4	1	5	0
Ph.D. other specialization	0	1	0	0	2
M.S. Stat/Math	12	7	7****	8	2
B.S. Stat/Math	7	14	4	4	1
Total	25	26	12	17	5

*includes only faculty teaching in the Stat program

**includes faculty teaching in B.S. Statistics, Master of Applied Statistics, Ph.D. Math specializing in Mathematical Statistics

***two(2) are full-time and three(3) are part-time, 2003 data

****2 are on study leave

All of the 16 faculty of PUP in its MAS program in 2004 are part-time. Majority of these professors are from the National Statistics Office.

IV. Enrolment Trends

Nebres (1998) noted the lack of sufficient numbers of talented undergraduate students in the mathematical sciences. This lack in the undergraduate level will, consequently, translate to a lack of students in the graduate level. The CHED study also noted a decline in enrolment in undergraduate programs in statistics from 1996 to 1999. In 2001, estimated enrolment statistics show a lower level of enrolment in statistics at all levels compared with that in mathematics. The following table, Table 4, shows these estimates.

Table 4. Number of Enrolled in Undergraduate and Graduate Programs In the Basic and Mathematical Sciences* Philippines, June 2001

Program	Level		
	B.S.	M.S.	Ph.D.
Applied Mathematics/Mathematics	4845	617	98
Math Major in Computer Science	1725		
Math-Stat	1		
Statistics/Applied Statistics	1317	104	20
General/Applied Science	353	77	
Science(specialization not specified)	21		

*Source: Preliminary Report of Projection of Scientific and Technological Human Resources in the Philippine Education Sector, a U.P. Statistical Center Research Foundation, Inc. Project for CHED

Undergraduate enrolment in UPD shows some decline while those in UPLB, UPV and MSU-IIT are higher in 2004 compared to the previous year. The following tables, Table 5.1 and Table 5.2, show the statistics.

Table 5.1 Distribution of Enrolled Undergraduate Freshmen in Selected Schools, SY 1998-1999 to SY 2004-2005

School Year	Number of Enrolled Freshmen in the B.S. Statistics Program*				
	UPD	UPV	UPLB	MSU-IIT	PUP
1998-1999	124	program	30	37	52
1999-2000	110	not yet	28	44	60
2000-2001	115	offered	38	33	62
2001-2002	114	20	36	10	52
2002-2003	115	14	46	25	not available
2003-2004	106	12	42	21	not available
2004-2005	103	18	48	25	not available

*First semester only

Table 5.2 Distribution of Enrolled Undergraduate Students in Selected Schools, SY 1998-1999 to SY 2004-2005

School Year	Mean Enrolment per Semester in the B.S. Statistics Program			
	UPD	UPV	MSU-IIT	PUP
1998-1999	466	program	62	182
1999-2000	443	not yet	68	190
2000-2001	463	offered	56	172
2001-2002	477	19(1 st year only)	36	190
2002-2003	461	28.5(1 st and 2 nd yr)	51	not available
2003-2004	441	35.5(1 st to 3 rd yr)	50	not available
2004-2005	410*	52*	54*	not available

*First Semester only

UPLB statistics not available

Table 5.2 Distribution of Enrolled Undergraduate Students in Selected Schools, SY 1998-1999 to SY 2004-2005

School Year	Mean Enrolment per Semester in the B.S. Statistics Program				
	UPD	UPV	UPLB	MSU-IIT	PUP
1998-1999	466	program	114	62	182
1999-2000	443	not yet	112	68	190
2000-2001	463	offered	128	56	172
2001-2002	477	19(1 st year only)	149	36	190
2002-2003	461	28.5(1 st and 2 nd yr)	182	51	not available
2003-2004	441	35.5(1 st to 3 rd yr)	193	50	not

		yr)			available
2004-2005	410*	52*	226*	54*	not available

*First Semester only

Enrolment in the graduate programs, on the other hand, seems to be different when comparing statistics of UPD and UPLB. UPD experienced increase in enrolment in the current school year. Current figures for UPLB are not available. However, available statistics seem to indicate some decline. Table 5.3 below shows the statistics.

Table 5.3 Distribution of Enrolled Graduate Students in Selected Schools, SY 1998-1999 to SY 2004-2005

School Year	Mean Enrolment per Semester in the Graduate Programs in Statistics						
	UPD			UPLB		MSU-IIT	
	M.S. Stat	Master of Stat	Ph.D. Stat	M.S. Stat	Ph.D. Stat	MAS	M.S. Stat
1998-1999	19	36	11	17	8	11	Program Offered In 2004
1999-2000	30	47	13	17	4	17	
2000-2001	29	63	16	15	3*	13	
2001-2002	35	177	14	13*	not available	13	
2002-2003	38	75	15	not available	not available	8	
2003-2004	61	86	16	not available	not available	8	
2004-2005	68*	110*	21*	not available	not available	10*	

*First Semester only

A closer look at the profile of graduate students of the School of Statistics in UPD, reveals that majority of enrolled students are working students from the private sector. The School now schedules graduate classes after 6 p.m. on weekdays as well as during Saturdays. This is one factor attributed to the increase in enrolment. Furthermore, there is now more recognition of the role of statistics in business and industry. This also contributes to the increase in enrolment. Another important factor in the increased enrolment is the availability of scholarships. The following scholarships were and are made available for graduate students in statistics in UPD:

List of Graduate Scholarships on Statistics

Name of Scholarship	Duration
BAS-AASS Master of Statistics Fellowship	June 1990 - 1992
UNDP-SESP (Statistical Education Support Project)	June 5, 1985 - December 31, 1990
ESEP(Engineering and Science Education Support Program)	Jan 1992 - 1997, extended up to 1999
PCASTRD (Philippine Center for Advanced Science and Technology Research and Development)	June 1989 to date
Reengineering the Philippine Statistical System-SRTC	June 2001 – 2005

Availability of scholarships has also been cited to increase enrolment in PUP's MAS program (Africa and Ignacio, 2001).

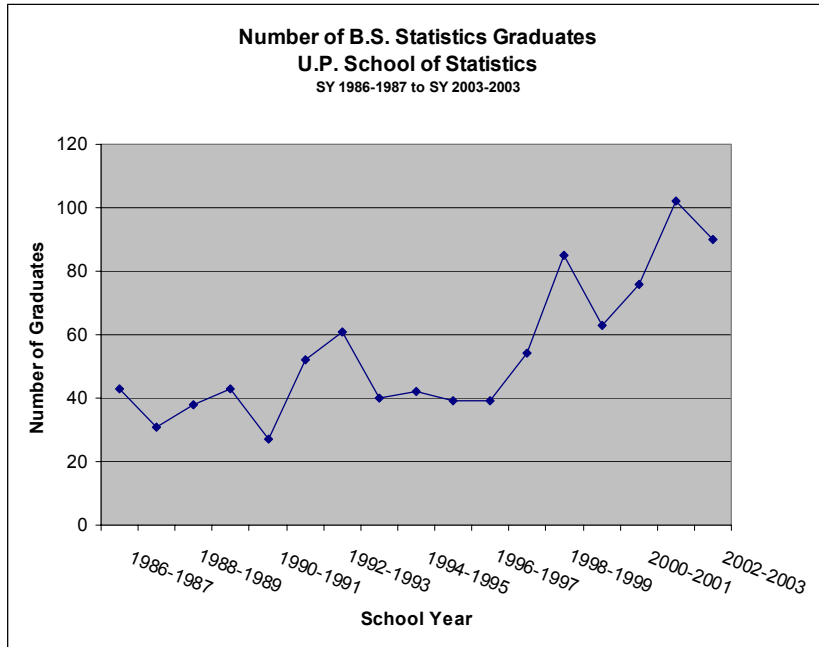
V. Graduation Trends

The School of Statistics has graduated the following number of students as of Summer 2004:

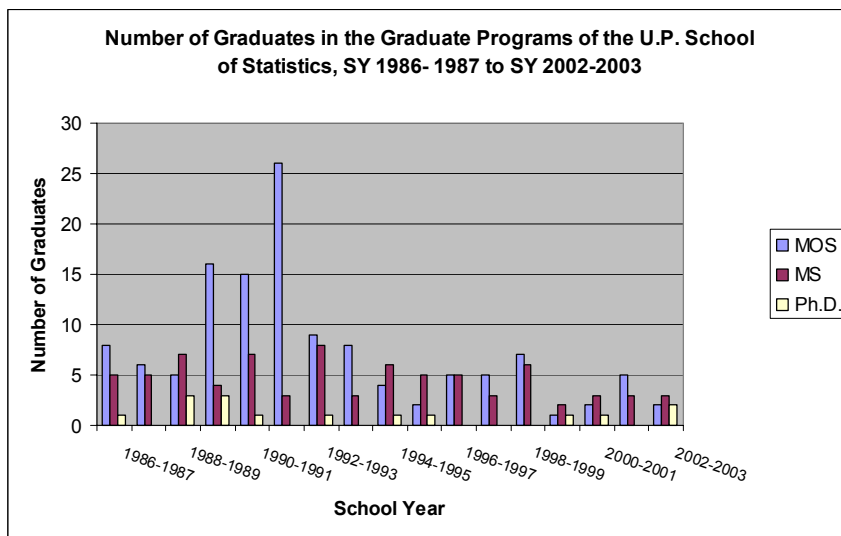
Academic Program	Number of Graduates
Bachelor of Statistics*	92
Certificate in Statistics*	8
Diploma in Statistics*	50
B.S. Statistics	2198
MOS	183
MS	127
Ph.D.	16

*Not Offered Anymore

On the average, the number of graduates in the undergraduate programs from UPD and UPLB are 54 and 26 per year, resp, from SY 1986-1987 to SY 2002-2003. However, the number of graduates has been fluctuating for UPD with a generally increasing trend. UPLB, however, seems to have declined in the recent years. This may be a function of enrolment data. The following chart shows the U.P. School of Statistics graduation trend for the undergraduate program:



The number of graduates in the graduate programs, however, seems to have stabilized at a lower level in the recent years for UPD and UPLB. PUP experienced increases in the number of graduates from the MAS program in the recent years and this is attributed to the offering of the comprehensive exam mode over thesis for graduation (Africa and Ignacio, 2001). Another factor attributed to better graduation rate is the availability of scholarships and fellowships for the students. This was mentioned by Africa and Ignacio (2001) and this has been the experience by the School of Statistics. The high level of graduation from the MOS program in the late 80s and early 90s is due to the BAS-AAPP fellowship. The chart below shows graduation levels from the School of Statistics' graduate programs:



The table below, Table 6, shows graduation statistics.

Table 6. Distribution of Graduates of Selected Schools by Academic Program SY 1986 -1987 to SY 2003-2004

School Year	UPD				UPLB			PUP	MSU-IIT	
	B.S.	MOS	MS	Ph.D.	B.S.	MS	Ph.D.	MAS	B.S.	MAS
1986-1987	43	8	5	1	54	8	program started in 1985	1		
1987-1988	31	6	5	0	44	5		1	2	program started in 1995
1988-1989	38	5	7	3	32	4		0	4	
1989-1990	43	16	4	3	22	9		1	2	
1990-1991	27	15	7	1	26	3		0	3	
1991-1992	52	26	3	0	36	2	2	0	1	
1992-1993	61	9	8	1	43	4	1	1	2	
1993-1994	40	8	3	0	26	2	1	0	4	
1994-1995	42	4	6	1	14	1	1	1	7	
1995-1996	39	2	5	1	25	2	1	0	4	
1996-1997	39	5	5	0	24	1	1	0	5	
1997-1998	54	5	3	0	16	2	1	0	2	
1998-1999	85	7	6	0	23	4	2	10	8	
1999-2000	63	1	2	1	15	0	0	7	6	
2000-2001	76	2	3	1	15	1	0	not available	5	5
2001-2002	102	5	3	0	11	4	2	not available	6	0
2002-2003	90	2	3	2	11	1	0	not available	6	2
2003-2004	97	6	3	0				not available	12	0

VI. Research and Extension Activities

Research being done by faculty and students of the schools offering statistics has been varied and useful. They range from theoretical to applied and encompass work in many areas. These areas include mathematical statistics, biostatistics, sampling, multivariate statistics, categorical data analysis, econometrics, time series analysis . They use varied data from different other disciplines.

Extension services include training for both government and private sector as well as consulting services within the schools. Graduate programs now include statistical consulting. The graduate programs of the School of Statistics and the new MAS of PUP are examples.

VII. Computing Laboratories

Computing laboratories housing updated hardware and software are available in a number of schools and faculty and students have the use of internet for research. The CHED study mentioned specifically the UP system schools with statistics programs and MSU-IIT. Other schools need more support for these facilities.

VIII. Recommendations to Enhance Statistics Education

Nebres(1998) mentioned that the impression one gets from available literature is that the need of industry has not been met by academic programs in statistics. The following recommendations were enumerated to address this need:

- undergraduate and graduate programs should focus on the needs of industry
- undergraduate and graduate programs in statistics should be developed
- CHED should encourage joint programs in math and other disciplines
- develop linkage between academe and industry

Mijares(1998) as a supplement to Nebres(1998) wrote that the following may be done in the discipline of statistics:

- promote statistical culture in scientific undertakings by continuing the National Convention in Statistics
- establish linkages and reach out to other professional societies and institutions
- ensure broad individual and institutional memberships in the Philippine Statistical Association
- encourage more colleges/universities to offer statistical courses
- statistical departments to establish linkages with other departments and promote joint research activities

The recommendations above should indeed be pursued. It should be noted that since 1998 more schools have offered statistics programs nationwide. The previous National Convention on Statistics was well-attended. The next Convention scheduled in October 2004 is expected to have the same reception by the statistics community and those interested in the applications of statistics.

Linkages are important in further developing statistics education and this is recognized by the INSTAT of UPLB and the School of Statistics of UPD. The second joint student-faculty of these two institutions was held in September 25. It is recommended that this collaboration be extended to include other schools offering statistics academic programs.

The Philippine Statistical Association(PSA) continues to nurture the development of statistics in the country. It has provided academe with venues to interact with the Philippine statistical system. It has contributed much to the advocacy of statistics and has lobbied for the maintenance of statistics

scholarships and fellowships. It is noteworthy that the PSA is currently assessing its role and has started to reach out more to the private sector. All these activities point to the importance of linkages.

The Statistical Research and Training Center has actively supported academe through its collaboration with academe in sponsoring lectures of resource persons.

The statistical community should develop linkage with other disciplines-the social sciences, the medical sciences, business and finance, economics, mathematics.

The academe should establish more collaboration among themselves. Collaboration could include co-advising for students to increase graduation rate. Research can then thrive more.

Institutions offering statistics programs should continue to communicate to funding institutions the need for statistics fellowships and scholarships. Schools should regularly contact its alumni who can provide not just financial support but also more networking and feedback on the current needs of employers. With the proper linkages in place and thriving, higher level of statistics education in the Philippines shall indeed be *higher level*.

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