

*A Survey of Courses Offered in Photogrammetry**

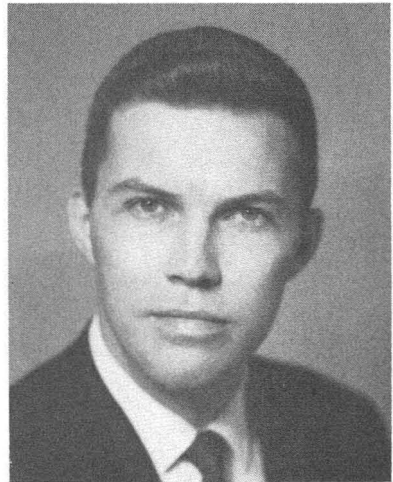
DEAN C. MERCHANT,
*Asst. Prof., Dept. of Civil Engineering, Syracuse Univ.,
Syracuse 10, N. Y.*

ABSTRACT: The A.S.P. Education Committee has recently conducted a poll of 213 educational institutions in the United States and Canada concerning courses and facilities available for teaching photogrammetry. The results of this investigation are presented in this paper.

DURING the past decade, a number of investigations have been made into the status of photogrammetry in the educational institutions of the United States and to some extent in Canada.^{1,2,3} The Education Committee of the American Society of Photogrammetry, in order to meet its responsibility of maintaining complete current records, has again polled educational institutions in the United States and Canada concerning aspects of education in photogrammetry. In addition to helping to meet this responsibility, the general results concerning the degree of activity in education provide some insight into the vigor of the photogrammetric industry as a whole.

For the purpose of this poll of educational institutions, a questionnaire was prepared covering essentially the questions used in the 1958 poll by Dr. John McEntyre.² It was hoped that in this manner, coupled with some slight modifications of Professor Brinker's¹ results of 1951, a picture of trends in course offerings might also be obtained. Additional questions were included with regard to photo interpretation and correspondence courses in photogrammetry.

The questionnaire was sent to 166 college institutions in the United States, 19 in Canada, and 28 accredited technical institutes in the United States. The mailing list was compiled from the information published by the Engineer's Council for Professional Development for the year 1961. The questionnaire was addressed to the Dean of the Engineering College with the request that information from other departments within their respective schools be included in their re-



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sponse. The same questions were asked of all institutions polled regardless of location or type. Even though the questionnaire was designed with college institutions in mind, it was sufficiently general to permit a satisfactory response from the technical type institutions.

Two follow up letters were sent to all institutions which earlier had not responded. As a result, of the 166 United States Colleges contacted, 156 returned the questionnaire. This was a 94% response. Of the Canadian institutions, 16 replied; this represented 84% of those contacted; and 23 technical institutions answered representing 82% of those contacted.

A detailed table has been compiled from

* Presented at March 24-30, 1963 ASP-ACSM Convention, Hotel Shoreham, Washington, D. C.

TABLE I
PROGRAMS WITH A MAJOR IN PHOTOGRAMMETRY

College Institutions, United States	Program Level & Department			Semester Hrs.* in Photogrammetry (Entire School)		Number of Students with Majors in Photogrammetry						Principal Photogrammetric Equipment Available			
	Undergrad.	Master's	Doctorate	Department	Undergrad. Level	Undergrad. & Graduate Levels	Currently			Granted Degree since 1958					
							Undergrad.	Master's	Doctorates	Undergrad.	Master's		Doctorates		
California, Univ. of (Berkeley)	x	x	x	CE	3	20		2				5			Multiplex (6 proj. & 3 proj.), 1 phototheodolite
Cornell Univ.	x	x	x	CE	6	12		2	3			7			Balplex (3 proj.), Wild A-7 with EK-3 Balplex
Georgia Inst. of Tech.	x	x		CE	12	12	2	1			3				Kelsh, Saltzman Enlarger
Georgia, Univ. of	x	x		Gg	12	20	8	4			16	5			Nistri Photocartograph—V
Illinois, Univ. of	x	x	x	CE	3	11	5	2	3		5	4			
Missouri School of Mines & Met.				CE	6	10						5			
Ohio State Univ.	x	x	x	GS	11	33		11	6			19	2		Multiplex, Kelsh, Wild A-7 with EK-3, Nistri TA-3, Zeiss & Balplex rectifiers, Wild RC-5 camera
Princeton Univ.		x	x	CE		3						1			Multiplex (3 proj.)
Purdue Univ.		x		CE	3	9						1			Kelsh
Syracuse Univ.		x		CE	6	33	5					3			Multiplex (3 proj.), Kelsh, Balplex, Wild-phototheodolite, Zeiss-phototheodolite, Wild C-12 camera, Wild P.U.G. II, Mann comparator 422C
Texas Univ.		x		CE	6	15									Multiplex, Balplex
Wisconsin, Univ. of	x	x	x	CE	3	12		1	1			2	1		Nistri Plotter
<i>Canadian</i>															
Laval Univ. (Quebec)	x	x		DS	15	27									Multiplex (3 proj.), S.E.G. IV, Saltzman enlarger
New Brunswick, Univ. of (Fredericton, N.B.)	x	x		CE	37	63	20	4				4			Kelsh, Balplex, Multiplex (9 proj.), Wild A-5, Wild phototheodolite, Wild C-12 camera
Toronto, Univ. of		x		AP	5	8	4					20	1		Multiplex (3 proj.), stereocomparator

KEY TO DEPARTMENTS

- AP—Applied Physics
- CE—Civil Engineering
- DS—Surveying
- Gg—Geography
- GS—Geodetic Sciences

* Hours reported in the quarter system have been converted to their equivalent semester hour values.

the questionnaire. This will become part of the records of the Society. It is the intention of the Committee that a similar survey be made by the Society at four-year intervals. In this way, a record of the growth of the educational facilities in photogrammetry will be made available. In turn, considerable insight with regard to the strength and growth of the profession may be obtained.

Of particular interest are the characteristics of the programs in those college institutions at which a student may major in photogrammetry. Table I contains data concerning these programs. Also included is a tabulation of the principal photogrammetric equipment available for student use at the respective institutions. More details are presented in the Appendix to this paper.

Even though somewhat aware of the dangers of attempting to compare results of separate studies, the Committee prepared a graph to

portray trends in course offerings over the last ten years. Since the report of McEntyre did not include Canadian institutions, the results of Brinker's study had to be modified to remove the Canadian influence. Further, Brinker's results were from engineering schools only, thereby restricting the comparisons to such schools. From the modified results of the three studies, a rather clear comparison could be made of required course, elective course, and partial course offerings for the dates of the respective polls. (See Figure 1)

The significant results of the current poll are that 15.4% of the engineering college institutions contacted in the United States have required courses in photogrammetry, as part of their civil engineering curriculum with an average of 2.4 semester hours per school. In addition, 32.7% offer a photogrammetry course as an option in a civil engineering cur-

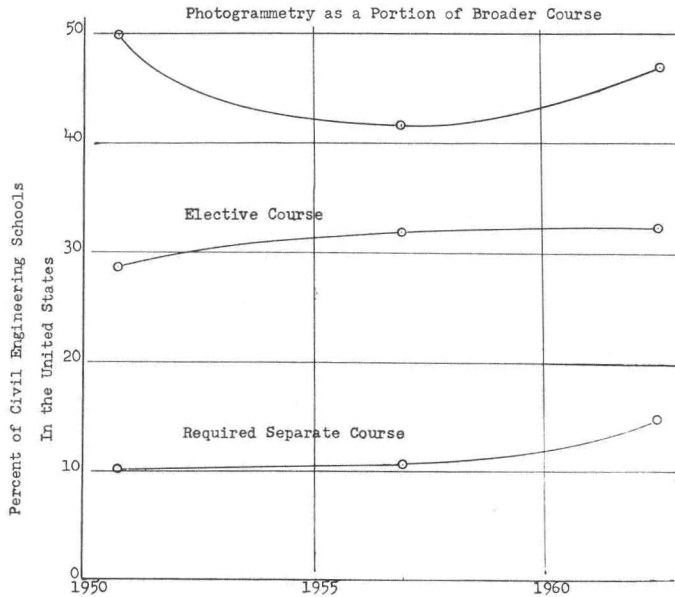


FIG. 1. Trends in photogrammetric education in United States engineering schools.

riculum with an average of 3.4 semester hours per school. Finally, 47.4% have photogrammetry as a portion of a broader course.

Of the Canadian Engineering College Institutions contacted, 50% have required courses in the civil engineering curriculum, with an average of 3.1 semester hours per school, 6% have elective courses in photogrammetry which are available in the civil engineering curriculum, while 50% offer courses of which photogrammetry is a portion.

The University of Southern California and Hartford State Technical Institute (Conn.) are the only schools contacted which show that photogrammetry is offered through a correspondence course. In both cases, the subject is treated as a portion of a broader course.

Three Technical Institutes in the United States indicated offers of specific course work in photogrammetry. Wentworth Institute of Boston reported the inclusion of photogrammetry in a geodetic surveying course.

Of all United States college institutions contacted, 32 have increased and 4 have decreased their course offerings in photogrammetry since 1958. The remainder of the responses indicate no change during that period.

In the institutions contacted in the United States, there are a total of 15 students enrolled in an undergraduate program leading to a degree with a major in photogrammetry, 28 enrolled at the master's level, and 13 cur-

rently working for the Ph.D. with a major in photogrammetry. In Canada, the corresponding numbers are 24, 4, and 0 respectively.

Since September, 1958, the schools in the United States which sent in reports have granted 24 bachelor's degrees, 52 master's degrees, and 3 doctor's degrees, all with majors in photogrammetry. In Canada, the results are 24 bachelor's degrees, 1 master's degree, with no higher degrees granted during that period. The totals to date of those granted degrees in the United States with a major in photogrammetry are 70 at the bachelor's level, 135 at the master's level, and 17 at the doctor's level.

It is concluded that educational activity in photogrammetry is gaining moderately in United States colleges. This should be encouraging. The subject of photogrammetry is in competition with the trend in engineering colleges toward increased emphasis on humanities and at the same time deemphasizing the general area of surveying and mapping.³

In Canada, educational strength in photogrammetry is indicated chiefly through the efforts of Laval University, the University of New Brunswick, and the University of Toronto.

There has been no significant change in course offerings by accredited technical institutions in photogrammetry since the poll of 1957.²

The author wishes to give credit and

TABLE II

School	Programs with Either a Major or Minor in Photogrammetry		Hours Available in Photogrammetry to Undergraduates	Total Hours Available in Entire School	Courses in Photointerpretation Offered	Individual at School Most Directly Concerned with Photogrammetry
	Undergraduate Level	Graduate Level				
<i>U. S. College Institutions</i>						
Akron, Univ. of			2	2		Prof. D. R. Keller, C.E. Dept., Akron 4, Ohio
Alabama, Univ. of			3	6		Prof. L. A. Woodman, C.E. Dept., University, Ala.
Alaska, Univ. of			4	4	x	Prof. W. W. Mendenhall, C.E. Dept., College Alaska Yellow Springs, Ohio
Antioch College			3	5	x	Mr. P. E. Borgo, Eng. Ctr., Tempe, Ariz.
Arizona State Univ.			3	3		Prof. P. B. Newlin, Eng. College, Tucson, Ariz.
Arizona, Univ. of			3	3		Prof. W. G. G. Blakney, C.E. Dept., Auburn, Ala.
Auburn Univ.			5*	10*	x	Prof. G. Colder, C.E. Dept., Provo, Utah
Brigham Young Univ.			2	2		Prof. H. F. Soehngen, C.E. Dept., 333 Joy St., Brooklyn, N. Y.
Brooklyn, Polytechnic Inst.			2	12		Prof. R. J. Claus, C.E. Dept., Lewisburg, Pa.
Bucknell Univ.				3		Prof. F. H. Moffitt, C.E. Dept., Berkeley 4, Calif.
California, Univ. of	x		3	20	x	Prof. R. T. Howe, C.E. Dept., Cincinnati 21, Ohio
Cincinnati, Univ. of			1	1		Lt. Col. J. C. Key, C.E. Dept., Charleston, S. C.
Citadel, The			1	3		Prof. A. L. Straub, C.E. Dept., Potsdam, N. Y.
Clarkson College of Tech.			3	3		Prof. J. R. Rostrom, C.E. Dept., Clemson, S. C.
Clemson			3	3		Prof. C. Barney, Forestry College, Ft. Collins, Colo.
Colorado State Univ.			2*	2*	x	Prof. F. E. Swity, Basic Eng. Dept., Golden, Colo.
Colorado School of Mines			3	8		Prof. R. C. Rautenstrauss, C.E. Dept., Boulder, Colo.
Colorado, Univ. of			3	9	x	Prof. F. H. Wallace, C.E. Dept., New York 3
Cooper Union					x	Prof. A. J. McNair, School of Civ. Eng., Ithaca, N. Y.
Cornell Univ.	x	x	6	12	x	Prof. J. O. Eichler, C.E. Dept., Atlanta 13, Ga.
Georgia Institute of Tech.	x	x	16*	16*	x	Prof. M. Prunty, Jr., Geography Dept., Athens, Ga.
Georgia, Univ. of	x	x	16*	30*		Prof. L. S. Daniel, C.E. Dept., Honolulu, Hawaii
Hawaii, Univ. of			3	3		Mr. M. McDouglass, C.E. Dept., Washington 1, D. C.
Howard Univ.				1		Prof. M. W. Conitz, C.E. Dept., Moscow, Idaho
Idaho, Univ. of			5	7	x	Prof. H. M. Karara, C.E. Dept., Urbana, Ill.
Illinois, Univ. of	x	x	3	11	x	Prof. J. H. Senne, C.E. Dept., Ames, Iowa
Iowa State Univ.			6*	12*	x	Prof. J. G. McEntyre, C.E. Dept., Manhattan, Kan.
Kansas State Univ.		x	3	6	x	Prof. J. A. Dearing, C.E. Dept., Lexington, Ky.
Kentucky, Univ. of			3	3		Prof. V. A. Forss, Easton, Pa.
Lafayette College			1½	1½		Prof. J. R. Mays, C.E. Dept., Beaumont, Texas
Lamar State College of Tech.			3	3		Prof. J. T. Painter, C.E. Dept., Ruston, La.
Louisiana Polytech. Inst.			2	4		Prof. W. A. Wintz, Jr., C.E. Dept., Baton Rouge 3, La.
Louisiana State Univ.					x	Prof. H. E. Young, Forestry Dept., Orono, Maine
Maine, Univ. of			6	6	x	Prof. C. T. G. Looney, C.E. Dept., College Park, Md.
Maryland, Univ. of			3	3		Prof. C. L. Miller, C.E. Dept., Cambridge 39, Mass.
Massachusetts Inst. of Tech.		x	3	10		Prof. W. W. Boyer, C.E. Dept., Amherst, Mass.
Massachusetts, Univ. of			3	3		Prof. W. M. Hass, C.E. Dept., Houghton, Mich.
Michigan College of M. & T.		x	4*	4*	x	Dr. L. M. Sommers, Geography Dept., East Lansing, Mich.
Michigan State Univ.					x	Prof. R. M. Berry, C.E. Dept., Ann Arbor, Mich.
Michigan, Univ. of	x		2	6		Prof. J. E. Fant, C.E. Dept., Minneapolis, Minn.
Minnesota, Univ. of			6*	6*	x	Prof. E. Springer, C.E. Dept., State College, Miss.
Mississippi State Univ.			3	3		Prof. T. Gingles, C.E. Dept., University, Miss.
Mississippi, Univ. of			3	6	x	Prof. E. W. Carlton, C.E. Dept., Rollo, Mo.
Missouri, School of M. & M.		x	6	10		Prof. W. B. Hall, Geology Dept., Butte, Mont.
Montana School of Mines			3	6	x	Prof. A. R. Legault, C.E. Dept., Lincoln, Nebraska
Nebraska, Univ. of			3	2		Prof. P. R. Bruns, Forestry Dept., Durham, N. H.
New Hampshire, Univ. of			4	4	x	Prof. M. C. May, C.E. Dept., Albuquerque, New Mexico
New Mexico, Univ. of					x	Prof. E. Keosian, C.E. Dept., New York 31, N. Y.
New York, City College of				4	x	Prof. C. R. McCullough, C.E. Dept., Raleigh, N. C.
North Carolina State College			3	3		Prof. J. A. Oakley, C.E. Dept., Fargo, N. D.
North Dakota State Univ.			3*	3*		Dr. Wilson M. Laird, Geology Dept., Grand Forks, N. D.
North Dakota, Univ. of					x	Mr. G. C. Ward, C.E. Dept., Evanston, Ill.
Northwestern Univ.			3*	3*	x	Prof. L. D. Groves, C.E. Dept., Notre Dame, Ind.
Notre Dame, Univ. of			2	2	x	Prof. A. J. Brandenberger, Dept. of Geodetic Sciences
Ohio State Univ.	x	x	18*	50*	x	Prof. O. W. Mintzer, C.E. Dept., Columbus 10, Ohio
Ohio Univ.			3	3		Prof. C. L. Shermer, C.E. Dept., Athens, Ohio
Oklahoma, Univ. of			9	12	x	Prof. A. J. Meyers, School of Geology, Norman, Okla.
Oregon State Univ.			6*	6*	x	Prof. G. W. Holcourt, C.E. Dept., Corvallis, Ore.
Pennsylvania State Univ.			3	3	x	Prof. H. A. Weeden, C.E. Dept., University Park, Pa.

* Indicates credits in a quarter system—all others are in terms of a semester system.

TABLE II—Continued

School	Programs with Either Major or Minor in Photogrammetry		Hours Available in Photogrammetry to Undergraduates	Total Hours Available in Entire School	Courses in Photointerpretation Offered	Individual at School Most Directly Concerned with Photogrammetry
	Undergraduate Level	Graduate Level				
<i>U. S. College Institutions</i>						
Pittsburgh, Univ. of		x		3	x	Prof. J. M. Nutt, C.E. Dept., Pittsburgh 13, Pa. Prof. S. B. Irish, C.E. Dept., Princeton, N. J. Prof. S. A. Veres, C.E. Dept., W. Lafayette, Ind. Prof. G. R. Shaw, C.E. Dept., Troy, N. Y. Prof. K. Moulthrop, C.E. Dept., Kingston, R. I. Prof. S. Sailor, C.E. Dept., New Brunswick, N. J. St. Louis 8, Mo. Prof. L. Bushnell, C.E. Dept., San Jose, Calif. Prof. Earl D. Dake, C.E. Dept., Rapid City, S. D. Prof. W. P. Wallace, C.E. Dept., Lafayette, La. Prof. A. D. Howard, Geology Dept., Stanford, Calif. Prof. D. C. Merchant, C.E. Dept., Syracuse 10, N. Y. Prof. H. B. Aikin, C.E. Dept., Knoxville 16, Tenn. Prof. S. R. Wright, C.E. Dept., College Station, Texas Prof. R. D. Turpin, C.E. Dept., Austin 12, Texas Lt. Col. R. G. Taylor, Econ. & Geog. Dept., USAF Academy, Colo. Prof. W. A. Tingey, C.E. Dept., Logan, Utah Prof. C. G. Bryner, C.E. Dept., Salt Lake City 12, Utah Prof. W. J. McNichol, C.E. Dept., Villanova, Pa. Prof. S. W. Dobyns, C.E. Dept., Lexington, Va. Prof. H. L. Kinnier, C.E. Dept., Charlottesville, Va. Prof. N. C. Burbank, Jr., C.E. Dept., St. Louis 30, Mo. Prof. J. E. Colcord, C.E. Dept., Seattle 5, Wash. Prof. J. C. Partyka, C.E. Dept., Detroit 2, Mich. Prof. W. H. Baker, C.E. Dept., Morgantown, W. Va. Prof. E. C. Wagner, C.E. Dept., Madison, Wis. Mr. R. L. Champlin, C.E. Dept., Univ. Sta., Laramie, Wyoming Prof. R. P. Vreeland, 15 Prospect St., New Haven, Conn.
Princeton Univ.		x		9	x	
Purdue Univ.			3	6		
Rensselaer Polyt. Inst.			3	3		
Rhode Island, Univ. of			5	5	x	
Rutgers Univ.				3	x	
St. Louis Univ.			3	3		
San Jose State College						
South Dakota School of M & T						
Southwestern Louisiana, Univ. of						
Stanford Univ.				5*	x	
Syracuse Univ.		x	6	33	x	
Tennessee, Univ. of			1½*	1½*	x	
Texas A & M, College of			3	3		
Texas, Univ. of	x	x	6	15	x	
U. S. Air Force Academy					x	
Utah State Univ.	x		7*	10*	x	
Utah, Univ. of		x	3*		x	
Villanova Univ.			3	3		
Virginia Military Inst.			2	2		
Virginia Polyt. Inst.			6*	12*	x	
Washington Univ. (St. Louis)			2	2		
Washington, Univ. of		x	8*	11*	x	
Wayne State Univ.			4*	4*		
West Virginia Univ.			3	3	x	
Wisconsin, Univ. of	x	x	3	12	x	
Wyoming, Univ. of					x	
Yale Univ.			3	3		
<i>Canadian College Institutions</i>						
Assumption Univ.			2	2		
Laval Univ.	x	x	15	27	x	
McGill Univ.			5	5	x	
McMaster Univ.			2	2		
Univ. of British Columbia			3*	3*	x	
Univ. of Manitoba					x	
Univ. of New Brunswick	x	x	37	63	x	
Univ. of Saskatchewan					x	
Univ. of Sherbrooke			1	1		
Univ. of Toronto	x	x	5	8	x	
Univ. of Western Ontario					x	
<i>U. S. Technical Institutes</i>						
Oregon Technical Institute			2*	2*		
Sacramento City College			3	3		
Southern Tech. Inst.			2*	2*		

* Indicates credits in a quarter system—all others are in terms of a semester system.

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*A New Approach to Surveying Education**

J. E. COLCORD,

*Assoc. Prof. of Civil Engineering,
Univ. of Washington, Seattle 5, Wash.*

THERE is continued interest in surveying education if recent articles in the professional journals are true indicators. This interest has ranged from the number of hours available in the curricula, also what is wrong or right with our teaching, and furthermore where surveying education should be taught. One of the best résumés of this total problem was presented in abstract to the 22nd Annual Meeting of the ACSM by Professor K. S. Curtis of Purdue in his paper entitled, "The Case of the Missing Curriculum."

The author prepared this paper for this ASP meeting only because there is now a working plan under his direction to assist in solving the serious problem of the best possible instruction in this subject area under current curricula.

One of the deficiencies attributable directly to the decline in quality of the surveying offering in the 1940's is the lack of solid theoretical background material available to the instructor who now finds himself placed in charge of instruction in this area. There is a current trend toward resurgent strength in the graduate area as shown in the offerings at The Ohio State University, Cornell, University of Illinois, Purdue, and other forward-looking schools. However, these programs require a supply of good, interested students with sufficient background to begin true graduate work in Geometronics. Thus, it is obvious that there is need for competent and informed instruction in the undergraduate



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offerings whether it be given in Forestry, Geology, Civil Engineering, or in a separate department of Surveying. For this reason the University of Washington, in cooperation with the National Science Foundation, is offering an eight weeks Summer Institute in Geometronics for college teachers of Surveying and Photogrammetry.

The Institute objectives are obvious—that is to *advance the theoretical training of teachers* who are specializing in teaching of surveying and photogrammetry so that they will be familiar with the current research and the

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