Mathematics at Xavier University

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Intellectual training under the auspices of the Society of Jesus has a long history, one that has been guided from the start by the principles of the *Ratio Studiorum* (*Plan of Studies*), which states that mathematics, the natural sciences, language and history are complementary instruments of intellectual development and are considered fundamental components of a general education. As background for higher studies the *Ratio* also stresses mental and moral philosophy.

At the turn of the twentieth century, St. Xavier College, located in downtown Cincinnati, still combined high school and college programs based upon the successful European model of higher education. Over the following decade, the high school and college programs separated, the college program emphasizing study of the classics and philosophy and theology through the Bachelor of Arts degree, the only degree offered at the time. However, in the 1915–1916 academic year, the Bachelor of Science degree was created, signaling a new period of modernization.

With the Morris Education Bill of 1914, teaching certificates issued by the State of Ohio could be awarded to graduates of approved college programs. It is likely for this reason that Departments of Study were created at the College in 1916. Students could now major and minor in certain disciplines, including mathematics. The major in mathematics required at least 18 semester credit hours – and the minor at least 10 – entailing the following curriculum: College Algebra (4 hr), Plane Trigonometry (4 hr), Analytic Plane Geometry (3 hr), Analytic Solid Geometry (3 hr), Differential Calculus (3 hr) and Integral Calculus (3 hr).

St. Xavier College moved from its site at Sixth Street and Sycamore Avenue in downtown Cincinnati to the Avondale Campus in 1919. By the end of the 1920s, the Department of Mathematics and Physics was established with Rev. Joseph Wilczewski, S.J., as its first director. St. Xavier College was renamed Xavier University in August 1930. Victor C. Stechschulte, S.J., who came to Xavier as Professor of Physics in February 1932, replaced Fr. Wilczewski as director of the Department of Mathematics and Physics and remained in this position until his death in 1955. With the 1938-1939 academic year, mathematics courses were classified into upper-division and lower division courses; Trigonometry, College Algebra and Analytic Geometry were now considered prerequisites for upper-division work. The major required Differential Calculus, Integral Calculus, Advanced Calculus, Differential Equations and a two-credit-hour course of directed reading and research. New electives were instituted in Theoretical Mechanics (cross-listed with Physics), Mathematical Statistics, and Theory of Equations. It is important to note that calculus had been and would continue to be an upper-division course until 1958.

The Graduate Division was established in the summer of 1946 offering programs in five departments: chemistry, classical languages, education, English and mathematics, to students, almost all of whom
were members of Roman Catholic religious orders. Mathematics had proposed ten courses under this graduate division. The program did not last long however; by 1950, it was dissolved.

During the late 1940s, the mathematics faculty consisted entirely of lay men. There are three individuals who had particularly long employment during this period. William Marcaccio arrived in 1934 and would teach mathematics until 1957. John O’Leary was hired to teach mechanical drawing in 1934. He would teach mathematics until 1956. Lastly, Robert Cissell taught mathematics from 1945 until his death in 1972. While the major program was unchanged through the 1950s, elective offerings in the undergraduate program were added, including a History of Mathematics course, Vector Analysis, Theory of Measurement and Errors, and an Introduction to Higher Algebra. Surveying was dropped from the curriculum at this time.

In 1954, the major required 29 hours, of which 20 were upper-division courses, and the program began to take on a more modern look. Elective courses in Algebra of Vectors and Matrices, Theory of Numbers, and Introduction to Complex Variables were added, and Projective Geometry was dropped.

Upon the death of Fr. Stechschulte in 1955, the Department of Mathematics and Physics split into two distinct entities and Fr. Raymond Allen assumed the chairmanship of the new Department of Mathematics. With a very small staff, Fr. Allen began the difficult process of modernizing the program and building the department. The year 1958 was significant. At the behest of Fr. Allen, Professor Paul Halmos of the University of Chicago convinced Paul L. O’Connor, S.J., then President of Xavier, to move forward with a completely revised mathematics major program to provide stronger preparation for graduate work in the subject. As a result, calculus became a lower division course sequence for the first time, intended for students in their first year. Courses in Abstract Algebra, Vector Spaces, Intermediate Analysis and Topology were now required. The result of this move was that a student now needed 29–41 hours to complete the revised major program.

Another event of great significance occurred when the research mathematician Mark Mahowald arrived in 1957. Fr. Allen took the bold leap of reinstituting the graduate program in mathematics in that year. Classes were held during the late afternoon, evening and on Saturday mornings in order to attract teachers and others with full time employment. A further benefit was that it became possible to develop faculty internally. In 1961, Fr. Allen was recalled by his superiors to the Detroit Province and assigned the similar task of building the mathematics department at John Carroll University in the Cleveland suburb of University Heights. William J. Larkin, III, who first came to Xavier in 1957, was appointed acting Chair for one year upon the departure of Allen and held the chairmanship thereafter until 1979.

From the 1960s and into the 1980s, Xavier and John Carroll Universities both hired many graduates of the Xavier masters program into their faculties (David Flaspohler, Richard Pulskamp, and David Trunnell at Xavier, and Robert Kolesar, Leo Schneider, and Carl Spitznagel at John Carroll). These same individuals sometimes themselves completed doctoral studies while simultaneously teaching full-time.

Two events of importance for women at Xavier occurred in this period. Marcia Ruwe, who would later become a faculty member of the department and later Associate Dean of the College of Business Administration before moving to LeMoyne College in Syracuse, NY, as Dean of Faculty,
graduated with a B.S. in mathematics in 1962. Not only was she the first female graduate of the program, but she accomplished this seven years prior to the official admission of females to undergraduate day classes. The first full-time woman faculty member of the department, Kathleen Davidoff, was hired in 1966, staying until 1971.

The computer center at Xavier was created in 1965 with Larkin as director and James Delaney as supervisor. It was staffed by students and graduates of the mathematics program. The first computer in use there was an IBM 1620. On January 1, 1970, time-sharing computing became a reality with the installation of a General Electric 430. In 1973, two 1-hour required programming courses in BASIC were added to the major program to introduce students to programming skills.

By the mid-1970s enrollments declined in both graduate and undergraduate programs, as it did across the country, leading to the suspension of the graduate program in 1976. This drop in enrollments was due in part to the emergence of computer science as a popular major, instituted in Fall 1975. Mathematics and computer science were functionally separate programs with a Director of Computer Science Studies managing that program. James Delaney served as director from 1975 to 1983 and David Berry from 1983 to 1987.

The seventies ended with Raymond Collins assuming the Chair in 1979. David Flaspohler succeeded him in 1982, and David Trunnell in 1986. The position of Director of Computer Science Studies was eliminated in 1987 in preparation for a restructuring as the Department of Mathematics and Computer Science in the following year. At this time the staff of the department consisted of thirteen full time members with an additional member serving as a full time University administrator. This may seem a large contingent of mathematics instructors for a university whose student body only totaled about 5000, but Xavier’s substantial core curriculum required that every undergraduate complete six hours of mathematics, so the majority of the teaching carried out by the department serviced this core curriculum. Seven of the thirteen faculty members held doctorates, and six did not, of whom three held academic staff positions.

Beginning in the mid-1980s, hand-held calculators began to make inroads in mathematics teaching and learning, especially in the introductory analysis courses (College Algebra, Elementary Functions, Elements of Calculus) and in both introductory statistics courses taught in the department. By the turn of the millennium, they had become indispensable tools for the classroom.

During a period between the early eighties and the mid-nineties, across all disciplines of the university, the faculty underwent a period of increased professionalization. By the 1990s, it was no longer possible for a faculty member in this department to be hired into a tenure-track position without the credential of a Ph.D. This followed a trend at many mid-sized and, especially, religiously affiliated universities across the United States. The standard 12-hour teaching load per semester gave way to a 9-hr load so as to support faculty who were now expected to produce scholarship leading to publications in respected academic journals.

By 1990, it became clear that the major program needed even greater strengthening so as to improve the preparation of graduates for success in graduate work. In particular, too few upper-division courses were mandated. So in 1992 the upper-division courses deemed essential were made required and offered on an annual basis and all calculus courses were increased to four credit hours. This raised to 45 the number of hours in the mathematics major. Computing began to take
on a more significant role in instruction in the mathematics program when the computer science major experienced a dramatic period of growth across the country in the 1990s. With the awarding of a National Science Foundation grant in 1990, the university equipped a classroom in Alter Hall with a dozen PCs acquired to enhancing the teaching of calculus. In 1994, the mathematics program adopted the use of Maple as a standard computing environment for doing mathematical computation, graphics and symbolic manipulation in support of the curricular program.

Janice Walker became the first female Chair in 1992. In 1994, Gary Lewandowski, the first faculty member at Xavier University with a Ph.D. in computer science, joined the department. By the end of the decade, two additional faculty hires in computer science (Elizabeth Johnson, Michael Goldweber) served to considerably strengthen the undergraduate program in computer science.

James T. Snodgrass, III, succeeded Walker as Chair of the Department when she became Dean of the College of Arts & Sciences in 1999; Snodgrass later became Associate Dean of the College in 2006, and Lewandowski began his tenure as Chair. In 2001, as part of a university-wide academic program review, the department performed an extensive self-study. As a direct consequence of this evaluation, the mathematics faculty designed an innovative core course called Mathematical Perspectives in 2004 to introduce students to a perspective on mathematics as one of the liberal arts. The course invites instructors to develop a thematically coherent topic of interest to them that would provide students with easily accessible, but engaging mathematical ideas, but allows different sections of the course to offer different topics.

In 2006, in response to changes by the Ohio Department of Education, the mathematics curriculum for elementary and middle school licensure students was substantially revised. A three course sequence (MATH 110/111/112) for Elementary Education students was replaced by two sets of courses: MATH 201/202 for Early Childhood Education and MATH 211/212/213/214 for Middle School Education.

After some years of review and discussion, another revision of the major program was instituted in 2008, which removed Differential Equations as a required course, reduced to one semester the required coursework in Linear Algebra, and established a seminar course for students in their final three semesters to support work on a substantial senior project in mathematics, keeping in place the previous 45 credit-hour load. In 2009, a Statistics minor was established, and as this history is being written in 2010, a new major program in Actuarial Science is being designed to complement the traditional mathematics programs.

The first decade of the new millennium was marked by a significant change in the composition of the Department. During this period five senior members were lost—three to retirement and two to take positions in administration. Simultaneously, six new tenure-track members were hired. At this writing, mathematics is represented by a young and vibrant faculty, led by Elizabeth Johnson, who assumed the Chair of the Department in 2012.