Goursat, Édouard Jean-Baptiste | Encyclopedia.com

(*b*. Lanzac, Lot, France, 21 May 1858; *d*. Paris, France, 25 November 1936)

mathematics.

Goursat completed his elementary and secondary studies at the *collège* of Brive-la-Gaillarde and after only one preparatory year at the Lycée Henri IV in Paris was admitted in 1876 to the École Normale Supérleure. There he began a lifelong association with Émile Picard, whom he credited with being instrumental in his choice of a career. Claude Bouquet, Charles Briot, Jean Darboux, and Charles Hermite were among the faculty who provided inspiration and style to Goursat who received his D.Sc. in 1881. "Hermite," Goursat said in 1935, "is the first who revealed to me the artistic side of mathematics."

Goursat was devoted throughout his academic career to research, teaching, and the training of future mathematics teachers. In 1879 he was appointed lecturer at the University of Paris, a post he held until 1881, when he was appointed to the Faculty of Sciences of Toulouse. He returned to the École Normale Supérieure in 1885 and remained there until 1897, when he was appointed professor of analysis at the University of Paris. He held this post until he reached the age of mandatory retirement, at which time he became an honorary professor. Simultaneously he was tutor in analysis at the École Polytechnique (1896–1930) and at the École Normale Supérieure, St.-Cloud (1900–1929).

Gourst received numerous honors, including the Grand Prix des Sciences Mathématiques (1886) for "Études des surfaces qui admettent tous les plans de symétrie d'un polyèdre régulier." He was awarded the Prix Poncelet in 1889 and the Prix Petit d'Ormoy in 1891. In 1919 he was elected to the Academy of Sciences. Goursat was also a chevalier of the Legion of Honor and president of the Mathematical Society of France. In 1936 an issue of the *Journal de mathématiques pures et appliquées* was dedicated to him on the occasion of the fiftieth anniversary of his becoming a teacher.

Goursat was a leading analyst of his day. At the University of Paris the "Goursat course" and "Goursat certificate" became synonyms for his course in analysis and its successful completion. One of his earliest works removed the redundant requirement of the continuity of the derivative in Augustin Cauchy's integral theorem. The theorem, now known as the Cauchy-Goursat theorem, states that if a function $f(z)$ is analytic inside and on a simple closed contour C, then

Goursat's papers on the theory of linear differential equations and their rational transformations, as well as his studies on hypergeometric series, Kummer's equation, and the reduction of Abelian integrals, form, in the words of Picard, "a remarkable ensemble of works evolving naturally one from the other." Goursat introduced the notion of orthogonal kernels and semiorthogonals in connection with Erik Fredholm's work on integral equations. He made original contributions to almost every important area of analysis of his time. His *Cours d'analyse mathématique*, long a classic text in France, contained much material that was original at the time of publication.

Goursat brought warmth to his teaching and the same dedication that he applied to his research. He more than fulfilled the prediction of Darboux, who wrote in 1879: "Student [Goursat] whose development was extremely rapid, excellent mathematician, sure to become as superior a teacher as Appell and Picard." Former students and colleagues alike praised his clarity, precision, orderly teaching, and devotion to his students. His personal warmth and effectiveness are perhaps best summed up in the encomium of a former student and later collaborator, Gaston Julia: "… in the name of all those who received... not only the treasures of your science, but also the treasures of your heart, let me express... our faithful gratitude,... having received from you the nourishment of the soul, the bread of science and the example of virtue."

BIBLIOGRAPHY

I. Original Works. Goursat's doctoral thesis was "Sur l'équation différentielle linéaire qui adment pour intégrate la série hypergéometrique," in *Annales scientifiques de l'École normale superieure*, **10** , supp. (1881). 3–142. The Cauchy-Goursat theorem first appeared under the title "Démonstration du théorème de Cauchy," in *Acta mathematica*, **4** (1884), 197–200. This article is reproduced under the same title in *Bihang till K. Svenska vetenskapsakademiens handlingar*, **9** , no. 5 (1884), and essentially the same material appeared under the title "Sur la définition générale des functions analytiques, d'après Cauchy," in *Transactions of the American Mathematical Society*, **1** (1900), 14–16. "Études des surfaces qui admettent tous les plans de symétrie d'un polyèdre régulieer" was published in *Annales scientifiques de l'École normale supérieure*, **4** (1887), 161–200, 241–312, 317–340.

Goursat's best-known work is *Cours d'analyse matique*, 2 vols. (Paris, 1902–1905; 2nd ed., 3 vols., 1910–1913); Earle Raymond Hedrick provided the English trans. of vol. I: *A Course in Mathematical Analysis* (Boston, 1904) and, with Otto Dunkel, of vol. II (Boston, 1917).

Other major works include *leçons sur L'intégration des équations aux dérivées partielles du premier ordre*, Carlo Bourlet, ed. (Paris, 1891), trans. into German with a preface by Sophus Lie (1893), and a 2nd ed., rev. and enl. by J. Hermann (Paris, 1921); *Le probléme de Backlund (Paris, 1925); and Leçons sur les séries hypergéométriques et sur quelques fonctions qui s'y rattachent* (Paris, 1936).

Notice sur les travaux scientifiques de M. Édouard Goursat (Paris, 1900), the best single source on Goursat's work up to that year, contains discussions by Goursat of his work in various branches of analysis, listed by topic. The bibliography (104 titles) is listed journal of publication. The variety of topics and the level of their discussion clearly demonstrate Goursat's breadth and depth of accomplishments.

II. Secondary Literature. The notice on Goursat, in *Larousse mensuel*, no. 151 (Sept. 1919), p. 894, in honor of his election to the Academy of Sciences, is a good survey of Goursat's research contributions to that year.

Jubilé scientifique de M. Édouard Goursat (Paris, 1936) is a collection of speeches delivered to Goursat on 20 Nov. 1935 by former students, colleagues, and associates on the occasion of his fiftieth teaching anniversary. His responses to each address are included. This small vol. consists of encomiums relating to his mathematical and teaching accomplishments. The address of Gaston Julia, with its allusions to Kipling's *Jungle Book*, is particularly delightful, All of the quotations used in the body of this notice were translated from this source.

Henry S. Tropp