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TEACHING GIFTED STUDENTS IN MATHEMATICS AN APPROACH OF WUHAN UNIVERSITY

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In modern times, the education of gifted students in mathematics has become a significant topic in the development of higher education. After carefully researching domestic and international trends in this field, we report the initiatives undertaken by School of Mathematics and Statistics, Wuhan University in teaching gifted students.

A Curriculum Reformulation. First, we have implemented a "14 + 8" curriculum reformulation to build a world-class undergraduate course system. We conducted an in-depth analysis of the current status of our previous undergraduate program, focusing on strengthening the depth and breadth of foundational theory, clarifying the targeted cultivation of gifted students, and identifying existing gaps with world-class universities. Drawing on the advanced experiences of top universities at home and abroad, particularly the undergraduate program standards School of Mathematical Sciences of Peking University, we made necessary adjustments to the 2025 undergraduate curriculum for our school. The main adjustments involve the consolidation of 14 major platform foundational courses and 8 core specialized compulsory courses.

Among these courses, we have consolidated core course teams and deepened our “1+3” course innovation model. In line with the curriculum adjustment requirements, the school actively promotes the innovative construction of the “1+3” course system. Here, “1” refers to major platform foundation courses, while “3” refers to three core course: Mathematical Analysis, Algebra, and Geometry and Topology. To ensure the high-quality development of the course system, the school has established dedicated core course teaching teams. Team leaders are responsible for developing standardized syllabi and bilingual (Chinese-English) course descriptions. During course delivery, the teaching teams regularly conduct teaching seminars, collective lesson planning, and other activities to continuously optimize teaching content and methods, thereby enhancing the quality and outcomes of core courses.

Beyond core courses, we are implementing the “4+15” specialized course system. Centered on our four undergraduate majors, we systematically promote the construction of these knowledge structures, focusing on 15 core courses to leverage their intelligent and data-driven advantages. Based on the characteristics of each major and adhering to outcome-oriented principles, we have adopted a top-down approach to refine the knowledge graph system for majors such as Mathematics and Applied Mathematics. Aligned with professional development and talent cultivation goals, we have scientifically refined and quantified graduation requirements, designed a core course system that meets the knowledge and competency requirements for graduation, and are gradually building a comprehensive framework for professional knowledge.

Our school places great emphasis on undergraduate teaching and has comprehensively promoted a “4+11” classified teaching model aligned with the objectives of the undergraduate talent cultivation program. The “4” refers to the four departments that form the core of our discipline construction: Applied Mathematics, Information and Computing Science, Probability and Statistics, and Pure Mathematics. The “11” refers to the teaching and research offices established under these departments to refine course management. Through scientific coordination, the four departments ensure the rational and efficient allocation of teaching and research resources across the 11 offices, thereby enhancing the quality of talent cultivation.

Stratified Teaching Methods. Our School offers tailored plans for various student profiles, such as the Sino-French Elite Class, Hongyi Class, and Ziqiang Class. Our university has collaborated extensively with over 30 French universities and research institutions in mathematics since the 1980s. We have successively established the Sino-French Mathematics Center, a Sino-French Mathematics Experimental Class, and a Sino-French DEA Doctoral Preparatory Program. In 2024, our School introduced the Sino-French Mathematics Elite Class. As an outstanding example of Sino-French educational cooperation, this class represents a significant milestone in our international collaborations. Through close cooperation between Chinese and French universities and educational committees, this initiative, centered on the joint

cultivation of top talents, has fostered deep integration in talent cultivation systems, course construction, and academic exchanges. Students not only acquire a solid foundation in high-level theoretical mathematics but also significantly improve their French language proficiency and cross-cultural skills, which enhances their international competitiveness. The Elite Class provides strong support for cultivating high-end international mathematical talents and serves as an exemplary model for such educational cooperation.

For instance, the first Ziqiang Class, which graduated in 2025, demonstrated excellent academic performance, with all students achieving GPAs above 3.50. This fully showcases the students' exceptional abilities and the effectiveness of our cultivation model. The vast majority qualified for recommendation for exemption from the postgraduate entrance exam, and many have pursued advanced studies at top institutions abroad.

"Mathematics+" Interdisciplinary Platform. For gifted students that are not focusing on pure mathematics, our school actively builds a new "Mathematics+" interdisciplinary platform. Through deep collaboration with related disciplines within the university, such as science and engineering, economics, and medicine, we promote the systematic cultivation of compound, high-level innovative talents. Our school has currently established extensive cooperation with disciplines and platforms including economics, finance, key laboratory of remote sensing, artificial intelligence, the institute of digital intelligence, and the school of computer science, forming a multi-level and diversified interdisciplinary cultivation framework. This mechanism effectively broadens students' disciplinary perspectives, promotes interdisciplinary integration and resource sharing, and provides strong support for cultivating high-quality, comprehensive talents in the new era.

The Climbing Project For Gifted Students. For gifted undergraduate students, we have established an undergraduate research platform and launched the "2+11" Climbing Plan to broaden academic horizons, strengthen research training, and promote the high-quality development of undergraduate education. The plan adopts a tiered and systematic approach based on two major directions: pure mathematics and applied mathematics.

In the pure mathematics direction, we have six teaching and research offices: Analysis, Geometry and Topology, Differential Equations, Algebra, Mathematical Physics, and Probability Theory. We focus on students with solid theoretical foundations and an aspiration to delve deeply into the field, providing systematic research training.

In the applied mathematics direction, we leverage resources from five teaching and research offices: Control Science, Complex Systems and Intelligent Optimization, Computational Mathematics, Data Science, and Statistics. We aim to cultivate students' ability to innovate by applying mathematical theories to real-world problems.

Centered on systematically enhancing undergraduates' scientific research and innovation capabilities, the plan aims to lay a solid foundation for outstanding talents pursuing academic careers and technological innovation.