1 August 2025

Attn: Ir Dr Wong Tit-shing
Donor of Wong Tit-shing student exchange scholarship 2024/25

Dear Ir Dr Wong,

My name is Ban Wenrui, and I am currently a second-year undergraduate student in the Department of Aeronautical and Aviation Engineering at The Hong Kong Polytechnic University. It is a profound honour to be selected as the recipient of this prestigious scholarship. I wish to extend my deepest gratitude to you for your generous endowment and for the invaluable recognition you have bestowed upon me by fully supporting my exchange studies at North Carolina State University, United States, during the second semester of the 2024/25 academic year in Hong Kong Polytechnic University (PolyU).

Your philanthropic support has not only alleviated the financial constraints my family and I faced in studying at North Carolina State University, pursuing more unique and higher level enrichment opportunities that more focus on the Western research community—including specialised workshops, research initiatives, collaborative projects, and annual seminars within my field of study on engineering, which are offered at the exchange university- ranked among the top 50 universities in the United States, but are not as frequently available to PolyU due to global uncertainties. These opportunities enabled me to explore new perspectives and immerse myself in the vibrant local culture of the United States, allow me to engage with world-leading ideas and technologies being researched and developed in the United States—opportunities that, as a Hong Kong student, rarely has, helping me to develop new ideas on project and research topic that more keen to global. I also have more ability to participate in local sports activities and historical tours, having the rare opportunity to experience and appreciate cultural differences is also another highlight brought by your funding support. Your support has truly made my exchange experience smooth and enriching.

I am deeply grateful for your unwavering support, recognition, and commitment to nurturing the potential of students at PolyU. Your generosity has significantly increased opportunities for students to broaden their global perspectives and develop their own insights. For me, this experience serves as a powerful catalyst for me to cultivate innovative ideas, strive for technological advancement, and achieve academic and professional distinction, ultimately contributing to transformative change within Hong Kong's engineering sector. Looking ahead, inspired by your confidence in my abilities and the opportunities you have provided, I am more motivated than ever to undertake impactful research that will benefit both the industry and the broader engineering community in Hong Kong. I aspire to initiate collaborative projects and research partnerships with my international network built through this opportunity.

Once again, I wish to convey my sincere appreciation to you, Ir Dr Wong, for your magnanimity and kind support in nurturing students at PolyU to develop a global outlook and expand their networks, which has enabled us to stand on a stronger stage in this era of globalisation. Thank you.

Yours sincerely,

Ban Wenrui
Department of Aeronautical and Aviation Engineering

Wong Tit-shing Student Exchange Scholarship

Exchange Learning Report

Name: Ban Wenrui

Department: Aeronautical and Aviation Engineering

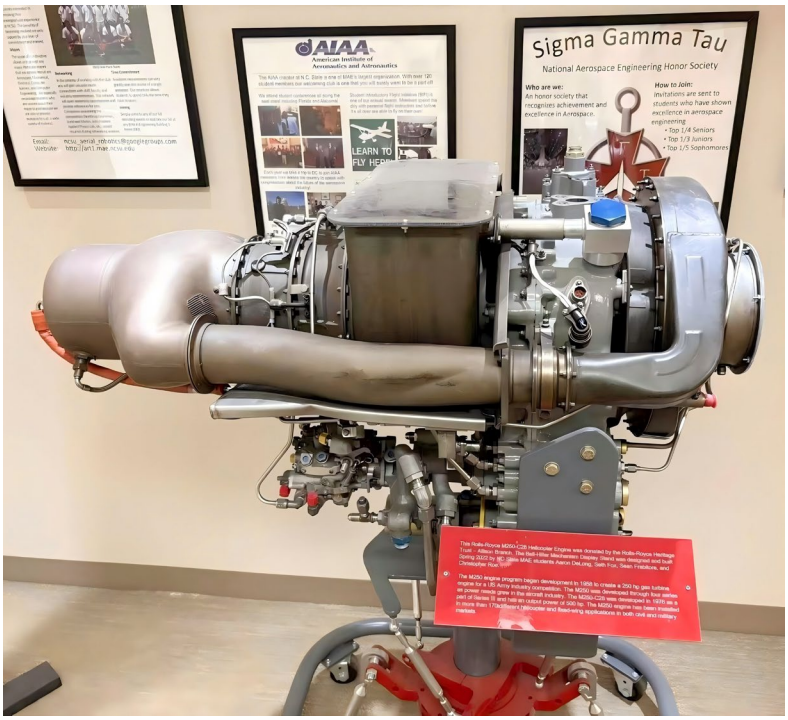
Country: United States

Host Institution: North Carolina State University

Exchange Period: 06-01-2025 to 01-06-2025

I. Learning experience on this trip

Participating in a semester-long exchange program as a Bachelor's student at North Carolina State University (NCSU) in the United States was truly an unforgettable and transformative journey. Studying at NCSU was an enriching experience, offering a wealth of hands-on research opportunities and abundant university resources to students actively engaged in their academic pursuits. During my exchange in the Department of Mechanical and Aerospace Engineering (MAE)—the largest in the state and among the most prestigious in the nation—I found myself at the epicentre of innovation and achievement. Walking through its halls, I was inspired by displays of photographs and artefacts celebrating the department's illustrious alumni, many of whom have made significant contributions to American aviation and the Air Force. These historical exhibits served not only as daily sources of motivation but also as catalysts for engaging discussions about the evolution of aerospace technology, instilling in me the belief that, as young engineers, making a meaningful impact on society is well within our reach.



The teaching resources at NC State are truly exceptional. I was particularly impressed by a professor who taught Computational Fluid Dynamics (CFD) and aerodynamics; he ingeniously folded a piece of paper into an aircraft wing model for me to take home, vividly illustrating the airflow over an aircraft wing. This creative approach transformed complex theories into tangible concepts, making them much easier to grasp. His dedication and meticulous approach to teaching ensured that every student's questions were addressed with patience, clarity, and creativity. I deeply appreciated his unwavering commitment to our learning. This experience not only allowed me to appreciate that learning can be creative, flexible, and engaging rather than monotonous, but also provided valuable insight into the importance of experiential learning. Beyond textbooks and lecture slides, knowledge can be acquired through hands-on activities, building prototypes, and exploring concepts in a more physical and interactive manner.

I also had the privilege of visiting the student laboratory, where I participated in a CFD analysis project involving wind tunnel experiments. This hands-on experience allowed me to examine airflow distribution across various structures—an opportunity rarely available in regular classes at PolyU. Such practical exposure not only deepened my understanding of theoretical concepts but also ignited my passion for experimental research, enhancing my overall learning experience.

Beyond my academic pursuits in the MAE department, I also engaged with the Department of Marine, Earth, and Atmospheric Sciences (MEA), which offered a uniquely enriching perspective for my growing interest in meteorology and atmospheric science. During my free time, I attended research group meetings where we delved into mesoscale weather phenomena in both the United States and globally. We examined global weather patterns using data and simulation models to represent water vapour distribution, the Madden-Julian Oscillation (MJO), and monsoon wind patterns, discussing our insights on mid- and long-term weather predictions at regional and global scales. We compared forecasts from various weather models, such as Tropical Tidbits and Windy, critically evaluating their limitations and differences. This comprehensive exploration of atmospheric dynamics and model limitations not only enhanced my understanding of weather prediction but also encouraged us to brainstorm innovative ideas for improving current methodologies.

The department also boasts a vibrant broadcasting club that trains students to deliver weather forecasts on camera. I was fortunate to participate in one of their workshops, where I learned how to design visually engaging backgrounds for weather broadcasts and create captivating PowerPoint presentations. The workshop also introduced us to the fundamentals of forecasting techniques based on current models and meteorological knowledge, ensuring we could provide accurate and reliable predictions. I am especially grateful to Warren Lewis, a PhD student in the MEA department, who generously devoted his time to mentoring me. He patiently explained how to interpret weather models, observe cloud formations, and predict upcoming weather phenomena using sound meteorological principles. Our connection extended beyond academics, as we continue to share resources and discuss fascinating weather events from around the world. This ongoing exchange has greatly enriched my background knowledge in meteorology, a subject seldom explored in depth at my home university.

From these experiences, I also learned that learning can be highly effective through peer discussion and by building a strong network with fellow enthusiasts in the field. Engaging in professional, first-hand discussions allows everyone to share their unique perspectives and insights, especially when analysing the latest developments and technologies. This collaborative environment helps to resolve doubts quickly and efficiently, as group members often possess diverse expertise and are eager to provide thoughtful explanations.

Another highlight of my time in the MEA department was the opportunity to participate in a workshop utilising the university's own weather station, located atop the department building. As an exchange student, I joined a hands-on project to construct a mini weather balloon (radiosonde) using a plastic cup and Raspberry Pi, enabling us to conduct upper-air observations and collect valuable atmospheric data. This device, capable of reaching the upper boundary layer of the troposphere, provided critical information such as air pressure, temperature, and boundary layer height—data essential for estimating water vapour uplift and the formation of cumulonimbus clouds responsible for heavy rainfall. I am deeply thankful to Professor Camilo Rey-Sanchez, who organised a workshop where we used Google Earth to track our radiosonde's movement and analysed data such as pressure, relative humidity, and temperature to calculate key atmospheric

values like upper-level wind shear, which is crucial for predicting tornado formation. He also guided us in uploading our results to the university's weather station website, NC ECONet, offering invaluable insight into the practical work of professional meteorologists. This opportunity allowed me to gain familiarity with new technological platforms for data collection and research, further deepening my expertise in the field I am passionate about.

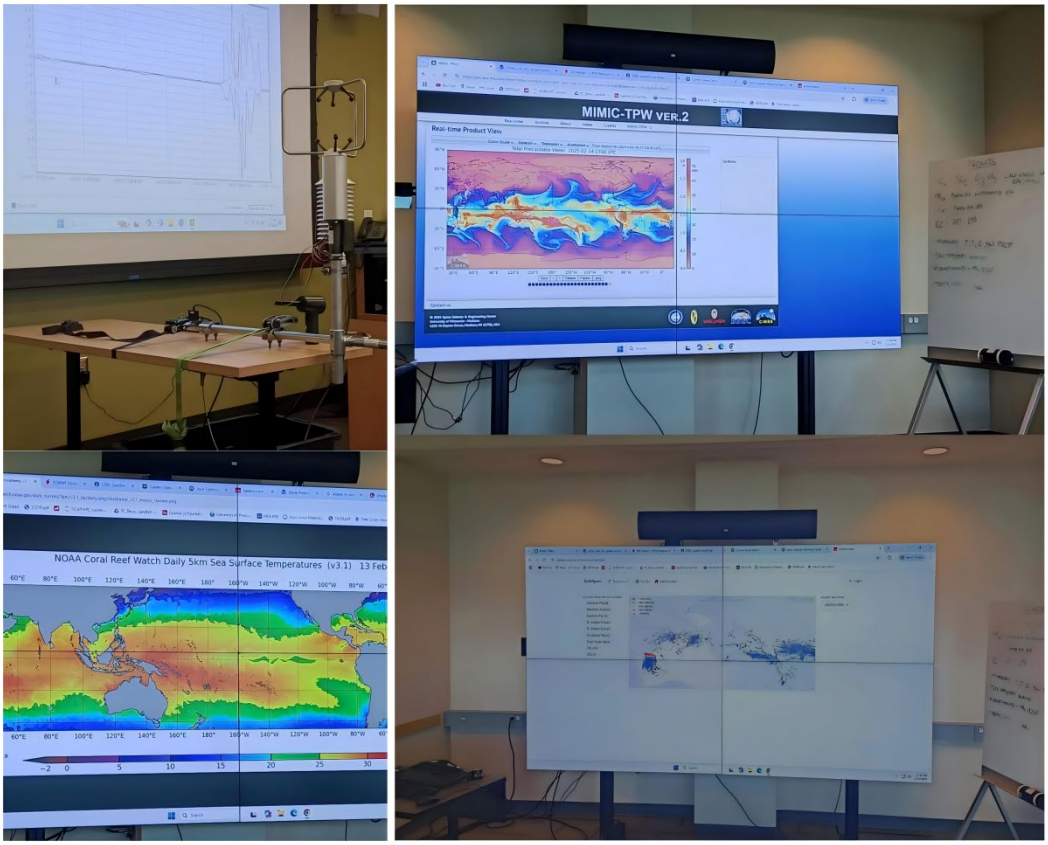
II. Career aspiration

My visit to North Carolina State University further broadened my horizons, allowing me to immerse myself in the dynamic local culture of the United States and engage with pioneering ideas and cutting-edge technologies from the western culture. These invaluable opportunities, which are seldom accessible to students from Hong Kong, have inspired me to pursue research topics and projects with a more global perspective. This experience has underscored the importance of innovation and adaptability in shaping a meaningful and impactful career.

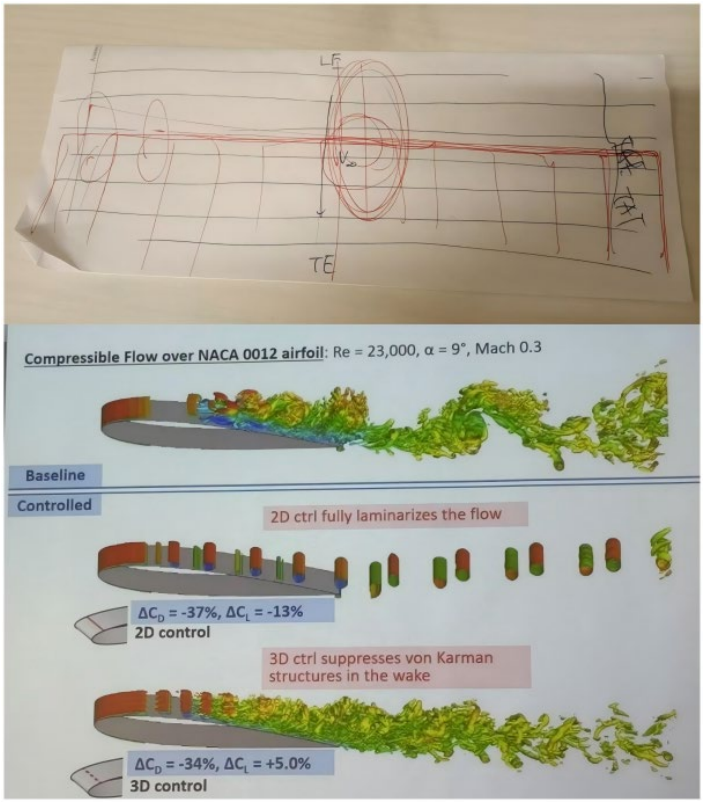
Moreover, this journey has reinforced my confidence in my chosen career path, which is dedicated to advancing air traffic, maritime, and vehicular safety on an international scale. In an era of increasing globalisation, the demand for safer, more efficient, and sustainable modes of transportation has accelerated in a substantial manner, as clearly mentioned in many workshops I attend in my field of engineering. I am now more motivated than ever to contribute to the development of sophisticated numerical models and sustainable fuels that can address severe weather phenomena, optimise traffic management, and prioritise safety, cost-effectiveness, and emissions reduction—critical issues that resonate globally.

Through this transformative trip, I have further realised that the field of engineering—particularly under the burgeoning influence of artificial intelligence (AI) and computational modelling—still has considerable progress to make. During my daily weather model analyses at MEA, I observed that current AI models predominantly rely on numerical data, often at the expense of integrating the fundamental physical principles of atmospheric science. This tendency to overlook essential scientific knowledge has made me acutely aware that, in future research endeavours and project development, it is imperative to rigorously assess whether newly

constructed models conform to the established laws of physics before they are disseminated. Such meticulous scrutiny will undoubtedly enhance the accuracy, reliability, and scientific integrity of these models.



Additionally, through the MAE CFD wind tunnel analysis and the insightful perspectives shared by the lecturers, I came to understand the importance of adaptability and innovation in shaping a successful engineering career. For example, by analysing the varying flow strengths at different locations on an airfoil using CFD data, we can optimise lift by modifying the airfoil's shape to generate more beneficial vortices. This experience reinforced the necessity of thinking creatively and flexibly; we cannot rely solely on the knowledge acquired in college. Lifelong learning is essential, and we must continually reflect on how established equations and scientific laws can be leveraged to inspire novel ideas.



Similarly, in project work and market research, it is crucial to identify and explore underdeveloped areas rather than merely seeking incremental improvements in already established domains. This proactive and innovative mindset is vital not only in the field of aerodynamics but also across all engineering disciplines. As an engineering student, I recognise that cultivating such a forward-thinking approach is key to distinguishing oneself and making meaningful contributions to the advancement of the profession.

In contrast to life in Hong Kong, I noticed that many of my peers in the host country tend to pursue careers aligned with their personal passions and interests. There is a pronounced emphasis on work-life balance, with many students I met valuing ample free time to explore the outdoors and participate in recreational activities. From my interactions and shared experiences with classmates, I observed that despite the pressures of their academic and professional commitments, they consistently prioritise relaxation, physical exercise, and sufficient rest. It may be the side effect of the good weather in North Carolina towards students living there. For them, a career is not merely a means of financial support, but a personal journey toward fulfilment, happiness, and self-actualisation, clearly shown in the views of local students in the Southern States in the United States.

III. Views on other culture

North Carolina is renowned for its vibrant sports culture, particularly its enthusiasm for basketball and soccer. The NCSU Wolfpack soccer team, which competes in annual matches against other universities in the state, provided me with an exhilarating opportunity to cheer

alongside local students and fully immerse myself in the spirited campus community and its dynamic outdoor culture. Each month, the university's outbound department organised tours for exchange students, enabling us to visit museums and explore the city, thereby deepening our understanding of American culture. These experiences allowed me to appreciate the Western values of openness and adventure, where outdoor activities such as hiking and engaging with the natural environment are integral aspects of life, especially in the Southern United States.

Moreover, the culture of relaxation, as well as the vibrant bar and club scene, was another highlight of my time in the United States. On weekends, I was invited by local friends to visit bars around the college, providing ample opportunities for relaxation and socialisation. These gatherings fostered new friendships and connections, and gave me a deeper appreciation for the Western approach to social interaction, which often values brief, casual meetings and a greater sense of personal privacy.

The campus itself exuded an atmosphere of learning and generosity. Free book corners were established for students and professors to donate and exchange books, and I was delighted to discover several classic texts to bring home for further study. The university library, significantly larger and more thoughtfully designed than that of PolyU, offered an exceptional environment for study, research, and collaborative brainstorming. This experience gave me a taste of the Western educational ethos, where learning is viewed as an open, collaborative, and enjoyable pursuit. Educators in the United States tend to foster creativity and encourage students to develop their own unique abilities and perspectives, rather than focusing solely on grades and rankings. This nurturing approach stands in contrast to the more competitive and exam-oriented culture prevalent in Hong Kong and other Eastern countries, where creativity and individuality can sometimes be overshadowed. The culture of care and support for students' educational journeys in the United States left a profound impression on me, highlighting the importance of fostering creativity, confidence, and personal growth in higher education.

IV. Detailed study schedule in the exchange-out institution

Class Timetable in North Carolina State University for the exchange semester	
Academic Week 1 to Week 14 (Week 7 spring break)	**Subjects taken:** Calculus III – 4credits MEA315 – 4 credits MEA312 – 4 credits MEA215 – 4 credits Thermal-Fluid Sciences- 3credits Aerodynamics I – 3credits
Monday	• 13:50-14:45 Calculus III • 15:00-17:45 MEA315 -- Mathematics Methods in Atmospheric Sciences (lab session) • 18:00-19:15 Thermal-Fluid Sciences
Tuesday	• 8:30- 9:45: MEA315 -- Mathematics Methods in Atmospheric Sciences • 10:15-11:30 MEA312 – Intro to Atomo Thermo • 13:30-14:45 MEA215 - Introduction to Atmospheric Sciences • 16:30-17:25 Calculus III Tutorial

Wednesday	• 09:30- 12:20 MEA215 - Introduction to Atmospheric Sciences (lab session) • 13:50-14:45 Calculus III • 15:00- 17:30 Aerodynamics I • 18:00-19:15 Thermal-Fluid Sciences
Thursday	• 8:30- 9:45: MEA315 -- Mathematics Methods in Atmospheric Sciences • 10:15-11:30 MEA312 – Intro to Atomo Thermo • 13:30-14:45 MEA215 - Introduction to Atmospheric Sciences • 16:30-17:25 Calculus III Tutorial
Friday	• 09:30 – 12:20 MEA312 - Intro to Atomo Thermo (lab session) • 13:50-14:45 Calculus III