The Hong Kong University of Science and Technology

[Course Title]: Gas Turbines and Jet Propulsion

[Course Code]: MECH3660

[No. of Credits]: 3

[Any pre-/co-requisites]: (MATH2111 OR MATH2350 OR MATH2351) AND MECH3640

Name: [Instructor(s) Name]: Xin Zhang

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Course Description

[Briefly describe the course content, key topics or themes, objectives, methods of instruction, e.g., lectures, discussions, projects].

This course covers the principles of jet propulsion and gas turbine engines, including engine types, performance analysis, and component designs for compressors, combustors, and turbines. It introduces modern advancements in electric propulsion (E-propulsion), drone and eVTOL (electric Vertical Take-Off and Landing) systems, propeller/rotor design, and environmental considerations such as noise and emissions. A hands-on laboratory component involves designing, manufacturing, and testing propeller/rotor blade performance. The course emphasizes practical applications, including case studies on engine certification and dynamic scaling. Intended for science and engineering students in their third year of study or above, with a focus on preparing students for careers in aerospace propulsion, including emerging electric and unmanned aerial vehicle technologies.

Assessments:

[List specific assessed tasks, exams, quizzes, their weightage]

Assessment Task	Contribution to Overall Course grade (%)
Mid-Term	20%
In-course essay	0%
Project Assignment	30%
Final examination	50%

Required Texts and Materials

[List required textbooks, readings, and any other materials]

1. “Jet Propulsion” by Nicholas Cumpsty and Andrew Heyes, 3rd ed., Cambridge University Press, 2015
2. Lecture notes prepared by the instructor (including supplemental materials on electric propulsion, drones, and eVTOLs)
3. Additional recommended readings:
   a) "Physics of Electric Propulsion" by Robert G. Jahn, Dover Publications, 2006 reprint of 1968 classic (for fundamental principles of electric propulsion;

b) "Electrical Machines: Fundamentals of Electromechanical Energy Conversion" by Jacek F. Gieras, CRC Press, 2016;
c) "Fundamentals of Electric Aircraft" by Pascal Thalin et al., SAE International, revised edition 2023 (for practical electric aircraft systems);
d) "Handbook of Unmanned Aerial Vehicles" edited by Kimon P. Valavanis and George J. Vachtsevanos, Springer, 2015 (comprehensive for drone and UAV propulsion systems; Electronic version available at: https://link.springer.com/book/10.1007/978-90-481-9707-1)

[Optional] Additional Resources

[List any additional resources, such as online platforms, library resources, etc.]:

CYT1001 aerospace engineering laboratory for project assignment work and assessment.