DESCRIPTION OF OPTIONAL MODULES

This document provides a brief content description of optional modules to help you to select your choices. **Please note, the modules listed here are not necessarily all available on your programme.** Please refer to your Programme Specification or Module Choice Form for information about the options available to you.

New modules (2024/25 versions) will not be shown on the Module Catalogue until early August. However, you can view the previous 2023/24 versions of the Module Specifications at:

Carbon
- Cycle impacts, constraints on optimum GT cycle efficiency.
- Advanced cycles - intercooling, water injection, industrial cycles.
- Advanced Design - integrated system design and component efficiency.
- Advanced Materials - enabling higher temperature cycle with reduced cooling.
- Cooling: Theory & Technology. Cooling cost and cycle benefit.
- Carbon Economy: offset, trading and taxation.
- Hybridisation and electrification of aircraft.

Emissions
- Combustion Theory - combustion basics, emissions.
- Cleaner combustion design and technology.
- Aircraft Operation / Engine Optimisation.
- Gas Turbine Alternatives - all electric aircraft.
- Alternative Fuels. Sulphur. Power density.

Noise
- Background, airport environment and definitions.
- Installation - powerplant-airframe integration issues.
- Open rotor and jet mixing - carbon cost & public perception.

Module Title: Autonomous Vehicles **AERO/AUTO**	**Module Code:** 24TTD106 **Module Leader:** Dr Jun Yang	**Pre-requisites:** TTB202 **Exam/CW split:** 100% CW

Aims:
This module aims to provide an introductory overview on fundamental technologies in autonomous vehicles and to familiarise the students with common vehicle control methods, sensor fusion techniques, path planning/following algorithms and example driving-assistance functions.
Contents:
INTRODUCTION TO AUTONOMOUS GROUND VEHICLE SYSTEMS
- Recent developments
- System integration (sensors, actuators, communications etc).

VEHICLE DYNAMICS, CONTROL AND SIMULATION
- Modelling vehicle dynamics and their environment
- Classical and state feedback control
- Computer based design and simulation in MATLAB/Simulink

AUTONOMOUS VEHICLE PATH PLANNING/FOLLOWING
- Path planning principles
- Path following algorithms

SENSOR FUSION AND SITUATION AWARENESS
- Kalman filtering methods
- Vehicle localisation (position and orientation)
- External environment sensing (object detection, tracking and mapping).

AUTONOMOUS FUNCTIONS
- Case studies on driving-assistance functions.

Module Title: Experimental Fluid Mechanics **AERO/AUTO**	**Module Code:** 24TTD014 **Module Leader:** Dr Dan Butcher	**Pre-requisites:** TTB101, TTB039 **Exam/CW split:** 100% CW

Aims:
The aim of this module is for the student to be able to discuss the application of various experimental methods used to measure, characterise and analyse fluid flows.
Contents:
- Motivation, Planning and Design of Experiments.

- Error Analysis and Measurement Uncertainty.
- Analysis and Presentation of Results.
- Conventional Pressure Probes.
- Hot-Wire Anemometry.
- Wind Tunnel Methods - Balance Measurements, Surface Pressure Measurements and Flow Visualisation.
- Point Laser Based Flow Measurements.
- Planar Laser Based Flow Measurements.
- Aerothermal (Heat Transfer) Measurements.

The theory, application and use of each of the measurement techniques will be presented and illustrated with the use of relevant case studies. These will form the basis of experimental demonstrations and coursework assessments.

Module Title: **Advanced Reliability, Availability and Maintainability** **AERO/AUTO**	**Module Code:** 24TTD100 **Module Leader:** Prof Lisa Jackson	**Pre-requisites:** None **Exam/CW split:** 100% CW

Aims:

The aim of this module is to give students an understanding of reliability and availability concepts and their interaction, modelling systems with dependencies, phased mission, and maintainability issues.

Contents:

Definition of key reliability, availability and maintainability terms, including dependency and where this arises in practice, Markov methods, Monte Carlo simulation and petri net modelling, definition and analysis of