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MINOR AIRCRAFT ENGINEERING



AEROSPACE ENGINEERING IS FRONT RUNNER IN THE DEVELOPMENT OF NEW HIGH TECH APPLICATIONS. THEORIES, ANALYSIS AND PRODUCTION METHODS, NEW MATERIALS AND PRODUCTS DEVELOPED IN AEROSPACE ARE LATER USED AND ADAPTED IN OTHER ENGINEERING FIELDS. CARBON FIBER REINFORCED MATERIAL IS SUCH AN EXAMPLE TO LOWER THE WEIGHT OF SPACE- AND AIRCRAFT.

WHAT IS A HTHT MINOR?

A HTHT-minor fits within the UT profile: High Tech, Human Touch. The minor is offered in English and accessible for both national and international students. The goal of the HTHT-minor is to illuminate specific societal themes for which the UT develops High Tech Human Touch solutions. These solutions are created by conducting high-quality research. Both the form and the content of the minors are High Tech Human Touch (multidisciplinary) and are profiling for the student.

The UT offers most HTHT-minors in a coherent package of 2 (30 EC). There are also HTHT minors of 15 EC that do not belong to a package. You can choose one of these minors and combine this with one minor of a package. If possible, you can even choose 2 minors from different packages.

MINOR INFORMATION

The central theme in this minor is the Conceptual Design of an Aircraft. In this design all knowledge gained during the lectures on Aircraft Technology, Aircraft Structures and Aerodynamics will be applied and integrated. The conceptual design will be done in groups of about 6 students. The design must be presented and defended for all other minor students and the team of lecturers being the board of the company that delivered the assignment and (demanding) requirements for the design. The minor Aircraft Engineering and the minor Aerospace Management & Operations together form the HTHT Package 'Aeronautical Engineering & Management'. The minor Aerospace Management & Operations addresses the utilization of aircraft and the industrial management processes in the development, use and maintenance of aircraft. In the minor Aerospace Management & Operations many technical aspects are taken as given which are treated in the minor Aircraft Engineering in more detail.

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Aircraft Engineering as a way to get acquainted with multidisciplinary design of large complex structures.

The minor Aircraft Engineering starts with an introduction on **Aircraft Technology** which gives a brief account of the history of aviation, the evolution of aircraft configurations, the principles of flight and the standard atmosphere. Subsequently, the aerodynamics of aircraft wings (lift, drag, pitching moment, stall, stability, critical Mach number, drag-divergence Mach number) is explained, with some emphasis on transonic transport aircraft.

In Aircraft Structures an overview of the structural parts, their designation and their function in the structure is presented. Subjects that determine the requirements in the design process that are treated in the course are the aerodynamic and structural (dynamic) loads, buckling, fatigue and flutter. The first airplanes were made of steel, wood and linen. Later aluminium became the most important material. Nowadays, two new materials become favourable namely composites and metal fibre laminates (Glare). Special attention will be paid to both new materials and Glare will be used to show what effort it takes before a new material is accepted in the aircraft industry.

In **Aerodynamics** the fundamentals of aircraft aerodynamics are treated with emphasis on the relation between the shape of aircraft configurations and its components as wings and fuselage, and the aerodynamic characteristics (lift, drag, pitching moment) of these configurations flying at subsonic, transonic or supersonic speed. Nowadays, computer simulations play an important role in aircraft design, even in the conceptual phase. Hence, also attention is paid to numerical methods that are used in the conceptual design (e.g. panel methods).

During the Kick Off of the assignment for the **Conceptual Design of an Aircraft** an overview will be given of the steps that are carried out in the conceptual design phase which results in a global design of a new aircraft. Further, groups are formed and the (challenging) requirements for the aircraft will be presented and explained. Response meetings will be organized at which the design teams can pose questions. In week 9 the reports have to be handed in and the project is finished with oral presentations in week 10. Due to the large amount of work and the short time the project group members have to distribute the workload and denominate specialists.

In this minor the students will learn

- the functions of the structural parts of an aircraft
- to analyse and explain the loads on an aircraft
- the causes/reasons of instabilities such as buckling, flutter, stall and fatigue
- to analyse the aerodynamics and the performance of an aircraft on global level
- to collaborate and operate in a design team
- to make a concept design of an aircraft

• to present and defend results of a design for a team of experts

Prior knowledge

Knowledge on Math B1,B2,D1 and D2 is a prerequisite. For theory see the book of Thomas 'Calculus, Early Transcendentals'. Especially chapters 13-16 are important. Knowledge on Fluid & Solid Mechanics is advantageous. Lecture notes will be available on request.

MORE INFORMATION

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For more information about this minor and for general information about minors: www.utwente.nl/minor