Module description: Physics 3: Atmospheric Physics and Applied Meteorology

Module Code	t.BA.AVP.PHYMET-EN.19HS
ECTS Credits	4
Language of Instruction/Examination	English
Organizational Unit	ZAV
Module Coordinator	Julien Anet
Legal Framework	The module description is part of the legal basis in addition to the general academic regulations. It is binding. During the first week of the semester a written and communicated supplement can specify the module description in more detail.
Module Characteristic	Type 3c*** 2 lecture lessons per semester week each yearly starting-class + 2 lab lessons per semester week and class
Module Description	Students acquire an overview of applied atmospheric physics, with an explicit focus on meteorology. The aim of the course is to apply the basic laws of physics to meteorological problems and phenomena. Students will also be able to generate their own well-founded weather forecast.
Module Content	**Structure of the atmosphere** **Electromagnetics: Radiation budget, absorption & reflexion** **Weather observation with satellites & radar** **Thermodynamics 1: Humidity measurement techniques, Description and calculation of humidity** **Thermodynamics 2: Temperature gradient, Skew-T-log-p-diagram, Psychrometric chart** **Fluid mechanics 1: Wind systems, aproximations of geostrophic and gradient wind, thermal wind, friction** **Fluid mechanics 2: Pressure systems, global circulation, rossby waves, jetstream** **Local wind systems: Mountain- and valley wind systems, sea- and land breeze, european wind systems, turbulence, tropical cyclones and tornadoes** **Air masses & fronts: Warm- and cold fronts, occlusions, characteristics of different air masses** **Numerical models: System architecture, potential problems, types of models, use for the aviation sector** **Meteorological hazards: Icing, turbulence, thunderstorms, downbursts, visibility** **Aviation emissions: Emission chemistry, environmental aspects** **Anthropogenic climate change: Climate change over large time scales, future climate change, influence of human activity, influence of aviation activities**
Prerequisite Knowledge	Solid qualifications in natural sciences from the assessment year

Module description: Physics 3: Atmospheric Physics and Applied Meteorology

<table>
<tr><td rowspan="2">Learning Objectives (Competences)</td><td>Students...</td><td>Competencies</td><td>Taxonomies</td></tr>
<tr><td>You can tackle meteorological problems related to atmospheric physics in a targeted manner, carry out research and present your results to a professional audience</td><td>SE, F, M</td><td>K6</td></tr>
</table>

Students...	Competencies	Taxonomies
You can tackle meteorological problems related to atmospheric physics in a targeted manner, carry out research and present your results to a professional audience	SE, F, M	K6
You can derive, explain and calculate various meteorological processes using fundamental laws of physics	F, M, SE	K3, K4
You can confidently apply your newly acquired meteorological vocabulary in professional life	SO, M	K1, K2, K3
You can describe the structure of the atmosphere, the planetary circulation and the human influence on the atmosphere	F	K1, K2
You can name the most dangerous weather phenomena for the aviation industry and know which information sources are available	F, M	K4
Simple meteorological phenomena can be recognised, analysed and predicted using standard weather charts	M	K4, K5

Performance Assessment

End-of-module exam	Assessment	Length (min.)	Weighting	Form
written exam	Grade	90	80	acc. to module agreement

Performance assessment during the semester	Assessment	Length (min.)	Weighting	Form
written exam	Grade	45	20	acc. to module agreement

Classroom Attendance Requirement

None

Learning material

- PowerPoint-Slides
- Anet, J. (2021). An introduction in atmospheric sciences for aeronautical engineers. 1 Edition. Winterthur: ZHAW. ISBN 1234567891002.
- Papers, which will be uploaded on Moodle

Comments

The details concerning all tests and grades are explained on the course page on Moodle.
PHYMET covers the general content of ICAO-syllabus 050 (METEOROLOGY)