

Amsterdam University of Applied Sciences
Bachelor's programme in Aviation

Light programme assessment

May 2021



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1. Introduction

This report describes the assessment of the existing professional (HBO) bachelor's programme in Aviation of the Amsterdam University of Applied Sciences (AUAS). Participation by the AUAS in the pilot *Institutional Accreditation* by the Ministry of Education, Culture and Science (OCW) allows its programmes to be reviewed according to a so-called *lighter educational review*. The AUAS successfully underwent the institutional audit in 2019, and as a result the educational programmes can be accredited according to the *lighter educational review*. Consequently, only standard 1 (intended learning outcomes) and standard 4 (achieved learning outcomes) of the NVAO framework are assessed.

1.1. Panel composition

Participation of AUAS in the pilot *Institutional Accreditation* results in the bachelor's programme in Aviation not being part of a review group. The virtual visit took place on 16 February 2021. In the first week of December 2020 the NVAO approved the composition of the panel. The following panel assessed the bachelor's programme in Aviation:

- Karina Visscher (chair), Board member Rijn IJssel Arnhem;
- Paul Horstink, Director Airframe Services & Deputy CTO at IBERIA;
- Björn Hassert, Aviation Expert;
- Tamara Pejovic, Senior Aviation Expert at EUROCONTROL, Brussels;
- Maurizio Tomasella, Lecturer Management Science at the University of Edinburgh Business School;
- Robert Walton, Associate professor at the Embry-Riddle Aeronautical University;
- Mia Jovetić, 3rd year student Aeronautical Engineering at Hogeschool Inholland.

The panel was supported by Meg Van Bogaert, who acted as (NVAO-certified) secretary. All panel members and the secretary have signed a declaration of independence and confidentiality. In this declaration they declare not to have had any business or personal ties with the institution in question, i.e. the Amsterdam University of Applied Sciences, for at least five years prior to the review. These declarations of independence and confidentiality are in the possession of the AUAS, which itself nominated the panel to the NVAO.

The panel chair has experience in chairing accreditations/ site visits according to the NVAO framework, so no (additional) training was required. Prior to the visit, the secretary and chair held a meeting with representatives of the Aviation programme. During this meeting, the developments in educational assessments and the changes in the current NVAO assessment framework (2018) were discussed, as well as the Institutional Accreditation Pilot with a lighter programme assessment (2019).

1.2. Working methods and process

In this report the panel describes its findings, considerations, conclusions and recommendations on the HBO bachelor's programme in Aviation. The report takes the NVAO's Assessment Framework for the Higher Education Accreditation System of the Netherlands for limited programme assessments (September 2018) as a starting point. It is furthermore in accordance with the *Nadere uitwerking beoordeling opleiding met lichtere opleidingsbeoordeling* (2019, in Dutch only).

Selection of graduation products

Part of the assessment of standard 4 (achieved learning outcomes) consists of the studying of fifteen graduation products of recent graduates. On behalf of the panel the secretary selected the graduation



products from a list of graduates in the years 2018-2019 and 2019-2020. In the selection, consideration was given to a variation in assessments (grades), programme variants and language of the graduation product.

Preparation and site visit

Prior to the site visit the secretary provided the panel with digital instructions, information about the NVAO assessment framework and information about the working methods. Several weeks prior to the site visit the Aviation programme provided a critical evaluation with appendices to the panel as well as the selected graduation products (including assessment forms). On 8 February 2021 a virtual preparatory panel meeting was organized. In this preparatory meeting, the panel members and secretary discussed the working methods and the preliminary findings of the panel on the documentation provided by the programme. The discussion of preliminary findings led to a request from the panel to the programme to provide additional information on several aspects to clarify the panel's view. In addition, the panel members formulated questions and topics for discussion that were shared (digitally) with each other in the week before the virtual visit. The secretary compiled these findings into one document that was distributed among the panel members. This document formed the basis for the questions and topics for discussion during the site visit.

Due to the COVID-19 pandemic it was decided to convert the physical site visit into a virtual visit which took place on 16 February 2021. The virtual visit was aimed at verifying and supplementing the findings from the written documents. During the virtual visit the panel talked to various people, including students, alumni representatives from the professional field, lecturers (examiners) and the programme management. No requests were received for the consultation hour. During the interviews the panel tried to limit itself to obtaining additional information on standards 1 and 4 of the NVAO framework in order to come to a weighted judgement on these standards. The panel used the final part of the virtual visit to discuss its findings and to reach a judgement. The day ended with an oral feedback presentation by the panel chair in which she presented the panel's preliminary findings and general observations to a large group of programme representatives. For the development meeting, the programme wants to invite the panel physically in Amsterdam. This meeting will therefore be scheduled by the programme as soon as the COVID-19 pandemic permits.

Definition of judgement standards

In accordance with the NVAO's Assessment framework for limited programme assessments, the panel used the decision rules as included in the protocol Assessment of programmes with lighter programme accreditation. The panel assessed each standard separately as either 'meets the standard', 'partially meets the standard' or 'does not meet the standard'.

Report

After the virtual visit, the secretary drafted a report based on the panel's findings and submitted it to the panel and an independent counter-reader for peer assessment. The report was verified and checked for compliance with the judgements. After processing the panel member's feedback, the draft report was sent to the programme to have it checked for factual irregularities. The ensuing comments were received on 16 April 2021, discussed with the panel chair and changes were implemented accordingly. The report was then finalised and sent to the programme and AUAS Board. The panel declares that the assessment of the programme has taken place independently and that it has reached a balanced and well-considered opinion based on the (oral and written) information provided.



2. Administrative data regarding the programme

Name institute	Amsterdam University of Applied Sciences
Status institute	Publicly funded
Result institutional audit	Positive (21 August 2019)
Name programme	Bachelor Aviation
Croho registration number	39225
Croho domain/sector	Engineering
Orientation and level	HBO Bachelor
Degree and title	Bachelor of Science (BSc)
Number of credits	240 EC
Specializations	Flight Operations Engineering, Maintenance Repair & Overhaul, Aviation Logistics, Security & Technology, Aviation Management (honours programme), Aviation Engineering (honours programme).
Location	Amsterdam
Variants	Full time
Language	Dutch in year 1, English thereafter
Date of programme assessment	16 February 2021 (virtual)





3. Summary

On 16 February 2021 the existing HBO bachelor's programme in Aviation of the Amsterdam University of Applied Science (AUAS) was reviewed by a panel of external experts. This four-year full-time programme leads to a bachelor's of science (BSc) degree. The AUAS participates in the Pilot Institutional Accreditation; the Aviation programme therefore is assessed according to the lighter programme assessment, meaning that the panel only assessed standards 1 and 4.

Standard 1: Intended learning outcomes

The programme **meets** the generic quality standard.

The Aviation programme educates comprehensively oriented professionals with an explicit focus on aspects related to the deployment and use of aircraft during its full life cycle. Simultaneously, it is concerned with carrying out flights. The programme prepares students for positions concerning the technology of an aircraft, logistics, aviation management or the execution of a flight. The Intended Learning Outcomes (ILOs) are derived from the national Engineering profile competences. Although these competences are general, they are worked out in detail and are relevant for a bachelor's programme in Aviation. The panel recommends to include programme specific aspects, explicitly sustainability and internationalization to the eight competences, making them elaborated coherently and more visibly as themes in the ILOs. To take the next step regarding sustainability and internationalization, the panel recommends the programme to clearly define its vision on these aspects and the relation to the programme. The connection to the professional field is extensive, both in a more formal sense (Advisory Board involved in definition of the ILOs) and informally (contact between lecturers and the professional field and the triangle research-education – professional field).

Standard 4: Achieved learning outcomes

The programme **meets** the generic quality standard.

The graduation products that the panel reviewed are of HBO-bachelor's level and reflect the professional qualifications of the graduates. A point for improvement is the assessment form, specifically the transparency and traceability of the assessments and consistency between the supervisors. Professional field representatives as well as alumni were particularly positive about the programme and the panel shares their view that graduates are well equipped to work as professionals in the aviation industry. The impact of COVID-19 is significant. Not only for the programme, but the aviation industry overall is hit hard. The panel notes that the programme - in cooperation with the industry - ensures that students can meet the ILOs. The panel recommends that the programme keep a close eye on the employability of graduates in the coming years, especially in view of further developments unfolding as a result of the COVID-19 pandemic.

Final assessment

The panel concludes that the programme **meets** the requirements on standard 1 and standard 4. Students, alumni and the professional field are enthusiastic about the bachelor's programme in Aviation and the panel encountered a programme that is working on its continuous development. The panel is confident that the recommendations in this report will be considered in the further development and strengthening of the programme. The panel assesses the programme as **positive**.





4. Bachelor's programme in Aviation

4.1. Introduction of the bachelor's programme in Aviation

The bachelor's programme in Aviation is part of the Aviation Academy of the Faculty of Technology at the Amsterdam University of Applied Sciences (AUAS). The Aviation Academy covers the entirety of teaching, applied research and collaboration with partners (professional field), focussing on sustainable operational readiness. Within the aviation industry the academy and programme have an explicit focus on the deployment of aircraft rather than its technical design and manufacturing. This focus is unique in Europe and there are only a few similar programmes available worldwide. The Aviation Academy was created to serve the European aviation industry. Its mission is to provide the current and next generation of professionals with the knowledge and skills they need to tackle the challenges facing the international aviation industry in the next five to fifteen years.

The aviation sector is characterised by continuous change, innovation and disruptive developments. One major disruption that effected the academy and the bachelor's programme in Aviation is the COVID-19 pandemic. The impact on the programme and students, as well as the measures taken by the programme to deal with the consequences of the pandemic, are predominantly related to standards 2 and 3 of the NVAO framework and not part of this assessment. Nevertheless, the panel discussed the impact of the pandemic on education, the measures taken, and how the programme intends to use the measures in a sustainable way in future education. Joint efforts by the programme management and industry result in sufficient internship and graduation positions for students.

A first general measure taken in March 2020 was the transition to online education and online assessment. For students doing internships and graduation research, individual solutions were found to continue the internship or research after the initial shock of the lockdown. For a number of students, this meant that they did more desk research than initially planned. The programme indicated that the Dutch aviation industry understands the importance of continuing to offer students opportunities. This means that - even a year after the outbreak of the pandemic - most students manage to find an internship or graduation assignment at an external organisation. To make this happen, the programme taps into its existing, extensive network. The effects of the pandemic are not only visible in the educational programme, also the aviation industry itself is hit hard. Both panel and the programme are convinced that the current students as the next generation of professionals in the industry are key in taking the opportunities that COVID-19 provides and to play a crucial role in the sustainable change of the industry after the crisis. This means not to return to unlimited growth, but keeping the flywheel going to continue on the path of making the initiated changes.

In 2019 the Aviation programme organised a midterm review (MTR). The findings and recommendations in the MTR report were used by the present panel to establish what developments have taken place in recent years. As a result of the MTR, the accreditation report of six years ago played a minor role in the current assessment of standards 1 and 4. In the 2014 report there were two main recommendations; the first was on internationalization and the second on a clear separation between the supervision and assessment of the graduation projects. The current panel establishes that the programme has sufficiently addressed both recommendations. More information is found under the relevant standards in this report.

During the virtual visit the panel observed that many positive developments are taking place. However, because of the informal way of working within the programme, things are not always reflected in the documents (in particular the graduation assessment forms). According to the panel, this professionalization of processes is a general, albeit fundamental, point of attention for the programme.



4.2. Assessment per standard – bachelor’s programme in Aviation

Standard 1: Intended learning outcomes

The intended learning outcomes tie in with the level and orientation of the programme; they are geared to the expectations of the professional field, the discipline, and international requirements.

Findings

Profile

The bachelor’s programme in Aviation educates comprehensively oriented professionals with an explicit focus on aspects related to the deployment and use of aircraft during its full life cycle, including maintenance and modifications. Simultaneously it is concerned with carrying out flights, including air traffic control, the turnaround process, and airport security. The professionals of the future must be able to move quickly to manage novel issues and areas requiring attention, stemming from a firm conceptual basis. The Aviation programme prepares students for a position concerning the technology of an aircraft (Aviation Engineering), the logistics at an airport or the execution of the flight (Aviation Operations). Moreover, the interrelationship between technology, operations, business model, and legislation is a unique feature of the programme. Although the profile is described in detail, to the panel it remains somewhat conceptual and abstract. According to the panel, all aspects mentioned are relevant to the aviation industry, but it wonders if it is sufficiently clear to students in which positions they will work after graduating. The guest lectures given by alumni are a nice initiative and provide students with an idea of their future possibilities. Considering the current crisis in the aviation industry and consequences for the labour market in the coming 5-8 years, the panel recommends the programme management to develop an approach to ensure that the current and future generation of students continue to get employment opportunities in the aviation industry. Close cooperation between industry partners, government and other stakeholders (airlines, airport operators, aviation service providers) might be needed to develop new approaches and ways of working to ensure sufficient employment for the current and future students in the aviation industry.

Sustainable operational readiness is considered the overarching theme to ensure that aviation is safe and compliant with international legislation and environmental and climate objectives for the upcoming years. Students are expected to not only focus on current situations, but are challenged to reflect on and initiate the developments of the future. Since the midterm-review (MTR), the sustainability feature has been developed and gradually implemented in the curriculum, for example in the sustainability graduation studio. The panel concludes that regarding sustainability, the Aviation programme indeed has made progress in the past two years. Sustainability aspects are visible and more explicitly integrated in the curriculum as well as in the mindset of lecturers and students. The panel was pleased to learn that the programme not only focuses on sustainability during and as a result of the COVID-19 pandemic, but considers sustainability to be crucial for the future of the aviation industry. To really embed this aspect in the profile, the panel recommends the programme to take the next step and to define a clear, tailor made vision on what sustainability encompasses for the programme. This vision should be shared with internal and external stakeholders.

Intended learning outcomes

The programme envisions to transform students into T-shaped professionals: a generalist with a specialization. The broad basis focuses on the world of aviation, the various aspects of being part of a chain and a diverse and broad variety of professional skills. From the interviews with students, alumni and the professional field it became clear that the programme provides students with a rich and diverse view on the process and content. Students are encouraged to show curiosity and eagerness to learn, but also to have an adaptive view, be flexible, and develop the ability to combine scientific complexity and practical aspects.



The programme profile and subsequent intended learning outcomes (ILOs) are derived from the national Engineering competence profile (Domain of HBO Engineering 4). This profile includes eight competences and was validated by the work field of all engineering programmes in the Netherlands. It subsequently meets the national and international standards in the field. The eight competences are: analysis, design, realization, control, management, advice, research and professionalization. In 2019 the competence levels were written out by the Aviation programme in the Body of Knowledge and Skills (BoKS) to make clear to all parties involved what can be expected of a student at each level. By connecting the learning goals of the modules to the national Engineering profile competences, the programme guarantees that it meets the international standards for higher professional education of bachelor's programmes in accordance with the Dublin Descriptors. From the interview the panel had with representatives of the professional field and alumni, it was convincingly argued that the competences are recognized and agreed with. The panel is of the opinion that the competences tie in with the requirements of industry and are of professional (HBO) bachelor's level.

Even though the competences from the Engineering profile are written out in detail for the Aviation programme, the panel is of the opinion that the competences do not fully reflect current developments of the aviation industry and the professional field. The panel suggests that the programme might consider to explicitly add a number of aspects from its profile to the competences, explicitly sustainability, and internationalization. Although these aspects are mentioned at several places in the ILO's, The panel believes that these important aspects are somewhat scattered and insufficiently prominent. By adding these aspects to the eight competences, they can be elaborated coherently and are more visibly as themes in the ILOs.

Finally, the panel draws attention to problem solving and problem structuring. These crucial aspects for the aviation industry are included in the curriculum, but according to the panel could be better reflected in the ILOs. The panel recommends the programme to go beyond more 'conventional' technical and managerial problem solving, for graduates to possess the ability, acquired during the programme, to tackle complex issues (often termed 'wicked problems') such as sustainability in aviation, or to fully appreciate and deal with the inherent complexity that comes with the international dimension of the aviation sector.

Relation to the professional field and research

From the virtual visit, the panel learned that the input of the professional field in the development of the ILOs was obtained by way of the Advisory Board. Although the panel did not meet with representatives of the Advisory Board, this board has been intensively involved in the validation of the ILOs and the profile. Regular meetings with the Advisory Board (approximately three times per year) ensure a continuing interaction between the programme and the professional field. At other levels, too, there is clearly a great deal of contact between the programme and the professional field. Lecturers indicated in the meeting with the panel that they regularly consult with industry and companies on the development of courses and the formulation of assignments. They also ask representatives of the professional field to give guest lectures and identify real life problems and projects. Finally, during the internships and graduation projects, there is regular contact about the wishes, demands and expectations of the professional field and the findings about the students' performance.

Research within the programme supports methodological ways of working with a view to strengthen the integrated approach and creating professional products. Students develop skills such as critical thinking, information management and research methods. The integration of research, education and the connection to the professional field and industry in the Aviation Academy ensures that these topics are also dealt with in an integrated way in the programme.

Internationalization

Aviation is a global industry in which internationalization is a given. The panel in 2014 was positive



about the plans of the programme to allow international students to enrol and recommended to stimulate students to go abroad. The Aviation Academy participates in international networks, has international (academic) partner, promotes international minors and internships of students, and is developing an entire English year 1 to broaden the scope of the bachelor. This is an English year 1 next to the Dutch year 1. The MTR-panel recommended to formulate an explicit vision on internationalization specifically for the educational programme. The current panel concludes that the programme is taking steps on the internationalization of the curriculum, such as international block assignments, attention for international content and cultural differences. The presence of international staff also provides an international perspective. At the same time, the relationship with industry is particularly strong and impressive at national level. The panel concludes that the recommended vision on internationalization for the programme is still not clearly defined. As already indicated, aviation is by definition an international industry and the panel encourages the programme to continue developing an international perspective in the bachelor's programme. However, the panel also asks the programme why it wants to become internationally renowned and advises to use the answer to this question to elaborate the vision on internationalization, to set specific goals and to measure the extent to which they are attained.

Considerations

The panel's assessment of this standard is: **meets the standard**. The panel notes that the Aviation programme has formulated ILOs that are general, but meet the formal frameworks and international requirements that can be set for a bachelor's programme in Aviation. The panel understands the choice of the programme to follow the national profile of Engineering programmes, although it would like to see the profile of the programme reflected more explicitly in the ILOs. The panel is thinking of problem solving, sustainability and internationalization. With regard to both sustainability and internationalization, the panel observes that the programme is developing and that these aspects are explicitly visible in the curriculum. To take the next step, the panel advises reflecting on the vision of the programme with regard to these aspects. Which definition of sustainability (and internationalisation) applies to the programme, and how is this structurally reflected in the programme and the profile? The connection to the professional field is impressive. Both with regard to the formulation of the profile and the ILOs (Advisory Board) and the way in which lecturers continuously seek contact with and input from the professional field, the relationship is outstanding.

Standard 2: Teaching-learning environment

The curriculum, the teaching-learning environment and the quality of the teaching staff enable the incoming students to achieve the intended learning outcomes.

Not applicable in relation to the "lighter programme assessment", see chapter 1.

Standard 3: Assessment

The programme has an adequate system of student assessment in place.

Not applicable in relation to the "lighter programme assessment", see chapter 1.



Standard 4: Achieved learning outcomes

The programme demonstrates that the intended learning outcomes are achieved.

Findings

Graduation project and products

By completing the thesis assignment, the student shows that he/she realized the ILOs. This final assignment is carried out at a company or is related to a research project of the Aviation Academy. Students are prepared in the internship (year 3) and the scenarios (modules, year 4) to work on professional authenticity issues and to deliver professional products depending on the client's needs in the final thesis project. In the critical evaluation it is stated that the research concerns a relevant and current problem in a specific part of the work field. The solution must have a scope of five to fifteen years into the future. The product delivered by the student should be innovative and feasible for implementation.

To assess the achievement of the ILOs, the panel studied the graduation products and the performance of graduates in the professional field. Prior to the virtual visit the panel studied the graduation products of fifteen graduates. While the products were of different quality, they all met or exceeded the minimum requirements for a graduating student in this programme. Overall, the panel considered the grades to be justified and within reason.

The products show a variety in topics, with differences between products both in terms of complexity and the level of detail at which the topic is discussed. Furthermore, the panel observed different structures, ranging from a methodical and clear development of arguments that resulted in higher grades, to a less structured and poorly communicated collection of sections which rightly received a lower mark. The higher quality products showed a better quality and/or depth of analysis and modelling. The panel particularly was critical about the quality of one product which was graded with a 6. The research topic and final conclusions were unclear but since the panel has no insight into the background of the project and the quality of the supervision, it is of the opinion that the thesis was of sufficient level to receive a passing grade. Finally, the panel noticed that several graduation projects were not directly connected to the aviation industry, for example a project on swap-bikes. Although this is not a problem in itself and students are able to show the achievement of the ILOs, the panel wonders to what extent the programme wants the connection to aviation to be visible in the product. Concluding, after reviewing fifteen final products, the panel has no doubt that all students fulfilled the ILOs and are capable of entering the aviation workforce.

Quality assurance of the graduation process

Although the guidance and assessment process of graduation is not included in Standard 4, the panel at length discussed the assessment forms and in particular the transparency and verifiability of the assessments during the virtual visit. The panel concludes that there is a lot of variety in the way the assessment forms are filled out. A good, transparent and valid assessment system is a prerequisite for demonstrating that students meet the ILOs. The panel is of the opinion that the Aviation programme should further improve and professionalize this system.

Performance of graduates

Students, alumni and work field representatives were all positive about the way the programme prepares students for a position in the professional field; specifically in aviation industry, but with a broad base that allows them to also be deployed in other sectors. Graduates inform the panel that an important aspect they learned is that aviation should be approached as a chain and their specialization is both influenced by and impacting other aspects in this chain. Students and graduates are described by the professional field as curious, adaptive, and able to apply knowledge.



Alumni are regularly involved in the programme. This was formalized in spring 2020 with the introduction of an active alumni programme in which alumni support each other and students in their development as professionals. Alumni are invited to give guest lectures but also to act as coaches of current students to help them with career opportunities.

The panel concludes that graduates do well on the labour market and are highly valued by the professional field. The connection and interaction between education, research and the professional field is very well developed and is a powerful aspect of the programme in preparing students for their careers.

Considerations

The panel's assessment of this standard is: **meets the standard**. Based on the sample of graduation products, the panel concludes that the level of graduates meets the requirements for a higher education bachelor's programme in Aviation. The panel mentions points of attention to enhance the assurance of the assessment and has confidence in the actions already taken by the programme. In this respect, the panel finds the traceability of the assessment and consistency between assessors very important. The positive feedback from the professional field and alumni indicates that the programme is delivering graduates who are well equipped to work as starting professionals at higher vocational education level.

4.3. Final assessment

The panel encountered an ambitious programme in an open atmosphere and with committed faculty, students and external stakeholders. Students and alumni are very positive about the programme and graduates are appreciated by the professional field. The professional field representatives recognise the ILOs and consider them accurate and important for the aviation industry. The most important point of attention is the implementation of a transparent and consistent assessment process of the graduation products. The panel is confident that the programme will continue with the actions already initiated. The programme shows developments with regard to problem solving, sustainability and internationalization. In this report, the panel advises to take the next step regarding these aspects. By formalizing working methods and arrangements, the panel expects that the programme will be able to present an even better and more consistent picture. The assessment of the panel on both standards is 'meets the standard'. The panel will therefore give a positive advice to the NVAO.

4.4. Recommendations

The panel recommends to:

- Include aspects such as sustainability, internationalization and problem solving explicitly in ILOs;
- Formulate a definition and vision for sustainability and internationalization in relation to the bachelor's programme in Aviation;
- Professionalize the system of assessment of the graduation projects, especially the consistency and transparency of the assessment forms, as well as enhancing the auditability of the business process behind the assessment.



5. Appendices





5.1. Programme site visit

Due to the COVID-19 pandemic the site visit was converted from an onsite meeting to a virtual meeting.

Monday 8 February 2021

14.00 – 15.30	Preparatory meeting panel
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Tuesday 16 February 2021

<i>Time</i>	<i>Meeting</i>
10.30 -10.55	Panel – final preparations
10.55 – 11.00	Welcome by the programme manager
11.00 – 12.00	Meeting with students, alumni and professional field
12.00 – 12.15	Panel meeting
12.15 – 13.00	Lunch panel
13.00 – 13.45	Meeting with lecturers (in two parallel sessions)
13.45 – 14.00	Break and panel meeting
14.00 – 15.00	Meeting with programme management
15.00 – 16.15	Panel meeting – assessment
16.15 – 16.45	Oral feedback by chair



5.2. Intended learning outcomes – competences

Analysis

The analysis of an engineering or operational Aviation question or issue comprises the identification of the problem or customer need, the consideration and balancing of possible design strategies or proposed solutions, and the explicit charting out of the requirements, objectives and parameters.

In this process, a whole range of methods are used, including desk research, mathematical analyses, process analyses, computer models and simulations, and experiments. Parameters relating to economics, engineering, logistics, safety, security, environment, society, sustainability, etc. are also considered.

	Level 1	Level 2	Level 3
Indicator	The student analyses a problem presented by the supervisor, under supervision.	The student analyses a fairly complex problem, simulated or (partially) framed, if necessary, under supervision.	The student autonomously analyses (or supervises the analyses of team members of) a complex issue presented by a client or business community.
	The student demonstrates this by...	The student demonstrates this by...	The student demonstrates this by...
A	selecting relevant sources in respect to the question or issue: using internal documents and (scientific) literature.	selecting all relevant aspects in respect to the question or issue: taking into account the internal strategic, tactical and operational level.	selecting all relevant aspects in respect to the question or issue: taking into account the internal strategic, tactical and operational level, as well as the mutual influences between the parties in the Aviation chain;
B	identify the possible influences on technical, operational, business, regulatory, safety and environmental aspects.	specifying the possible influences on technical, operational, business, regulatory, safety and environmental aspects.	specifying the possible influences on technical, operational, business, regulatory, safety and environmental aspects in qualitative or quantitative terms;
C	formulating the problem definition, (research) question and dividing it into sub-questions or objectives.	formulating a clear definition of the problem, objectives and assignment, based on the wishes of the client.	formulating a clear problem outline, objective and assignment by cutting through to the underlying question, and reformulating and demarcating it as such so that the client can identify with it;
D	drawing up a list of requirements in consultation with the supervisor for which the solution must satisfy, taking into account the most relevant legislation for Aviation.	documenting a clear program of requirements in such a way that it meets the clients' needs, taking into account the most relevant legislation for Aviation.	documenting a clear and complete program of requirements (technical and non-technical); specifically taking into account the complete and current legislative framework for Aviation;
E	using models and simulations created by others in order to gain insight in performance and/or interdependencies.	modelling or simulating a product, process or service with instructions to gain insight in performance and/or interdependencies.	independently modelling or simulating a product, process or service to gain insight in performance and/or interdependencies.



Design

The design of a solution to be realised may be for a technological innovation, or a new or improved process or method, whereby the Aviation specialist has a sense of the impact of this solution on the operational process, safety, security, environment, reliability, sustainability and business.

The Aviation specialist makes use of a structured methodological approach. The solution to be realised is based on the program of requirements and forms a complete and correct fulfilment of all requirements imposed.

	Level 1	Level 2	Level 3
	The student demonstrates this by...	The student demonstrates this by...	The student demonstrates this by...
A	elaborate concept solutions based on the requirements imposed, taking into account the specified laws and regulations.	elaborating and selecting a concept solution on the basis of the requirements imposed, taking into account the specified laws and regulations.	elaborating and selecting a concept solution on the basis of the requirements imposed, thereby specifically guaranteeing regulatory compliance;
B	producing designs according to the generated solutions, including visualisations with diagrams and / or drawings.	producing designs according to the selected solution, including visualisations with diagrams and /or drawings.	producing more detailed designs according to the selected concept solution, including visualisations with (industry standard) schematics and/or (technical) drawings;
C	Arguing which aspects should be taken into account when checking the feasibility of the solution;	taking into account the technical and operational feasibility of the solution; checking the direct impact of the solution on (parts of) technical systems and / or operational processes;	taking into account the technical and operational feasibility and testability of the solution; checking the impact of the solution on other (parts of) technical systems and/or operational processes;
D	verifying solutions according to the schedule of requirements; analysing the quality through peer and/or lecturer judgment;	verifying the solution according to the schedule of requirements; analysing the quality of the solution through simulation, practical testing, or expert judgement;	verifying the solution according to the schedule of requirements; analysing the quality of the solution in practice through simulation, practical testing, or expert judgement;
E	prepare the documentation for the product, service or process according to the given format.	prepare the documentation for the product, service or process according to the programme specific standards.	drawing up the documentation for the product, service or process in accordance to company and legislative standards.



Realisation

For the realisation and delivery of a product, service or process that meets the requirements set, the Aviation specialist must develop practical skills to solve aviation issues through research and experiments. These skills include knowledge of material use and limitations, computer simulation models, aviation engineering processes, machines, literature and relevant and reliable sources.

The Aviation specialist is also capable of recognising the (often non-technical) impact of his activities, with respect to ethics, the social environment and sustainability.

	Level 1	Level 2
	The student demonstrates this by...	The student demonstrates this by...
A	making appropriate use of prescribed standards and materials, acquired processes and imposed norms.	making suitable use of materials, processes, norms and standards; and assembling components into a complete product, service or process;
B	verifying the product, service or process with regard to the requirements imposed;	verifying and validating the product, service or process with respect to the requirements imposed;
C	informing all internal stakeholders about relevant changes in a timely and effective manner;	informing all internal and external stakeholders about relevant changes in a timely and effective manner;
D	taking into account sustainable regular operations and the most critical safety risk as a consequence of the realisation.	using 'sustainable operational readiness' as part of the mental framework: taking into account any possible operational disruptions, and safety risks as a consequence of the realisation;
E	documenting the realisation process; timeline, project plan and/or implementation plan.	documenting the realisation process; updating relevant handbooks, manuals, workplace instructions.

Control

The Aviation specialist ensures that a product, service or process operates ideally in its application, context or working environment, considering aspects of compliance to law and regulations, safety, security, sustainability, technical and economic lifetime.

	Level 1	Level 2
	The student demonstrates this by...	The student demonstrates this by...
A	introducing, testing and integrating and commissioning a new product, service or process under supervision to optimize current operational performance;	autonomously introducing, testing, integrating and commissioning a new product, service or process to optimize current operational performance;
B	Conducting risk assessment of operational processes and defining related mitigating measures.	ensuring continuity of operation by anticipating (expected) changes in legislation, mitigation of and recovery from operational disruptions, and creation of an adequate (operational) planning;
C	verify the performances of a product, service or process to meet the quality and safety criteria laid down in given guidelines.	demonstrating the ability to assess the performance of a product, service or process according to quality and safety criteria;
D	providing feedback in response to a given set of circumstances and/or performance of a product, service or process;	providing feedback in response to changing circumstances and/or performance of a product, service or process;
E	<i>participate in open communication in order to ensure that potential errors quickly come to the forefront and can be corrected;</i>	contributing to a just culture; facilitating open communication in order to ensure that potential errors quickly come to the forefront and can be corrected; eliminating any safety and security risks.



Management

The Aviation specialist manages organisational and operational processes and the related staff with a view towards achieving the objectives of the business unit or project, of which the specialist is in charge, taking into account the external environment.

	Level 1	Level 2
	The student demonstrates this by...	The student demonstrates this by...
A	organising a (sub)project: drawing up project plans and documentation, quantifying risks and organising resources (human and material);	organising a (sub)project: quantifying time and money, assessing and quantifying risks, drawing up project plans and documentation and organising resources (human and material);
B	monitoring and re-adjusting activities in terms of time, quality, information and organisation;	monitoring and re-adjusting activities in terms of time, money, quality, information and organisation;
C	task and process-oriented communication to all direct stakeholders to take common and conflicting interests into consideration;	task and process-oriented communication to all internal and external stakeholders using a complete overview of the Aviation chain to take common and conflicting interests into consideration;
D	communication and cooperation leading or functioning in a team with others in a multicultural environment, and fulfilling the requirements imposed by participation in a simulated working environment.	communication and cooperation with others in a multicultural, international and/or multidisciplinary environment, and fulfilling the requirements imposed by participation in a working environment.

Advice

The Aviation specialist offers underpinned advice on the design, improvement or application of products, processes and methods based on a thorough understanding of the restrictions, relationships and dependencies in the Aviation business. Distinctive for the Aviation specialist is the ability to think ahead and proactively focus on operational readiness and sustainability aspects.

	Level 1	Level 2
	The student demonstrates this by...	The student demonstrates this by...
A	asking questions to clarify the client's needs in the context of the assignment and incorporate feedback from the supervisor (in the client's role).	understanding the needs of the (internal or external) customer, clarifying the needs of the client in context of the Aviation chain;
B	translating, under supervision, the customer requirements into technically & economically viable solutions suitable for the Aviation context in compliance with regulations.	translating the customer requirements into technically & economically viable solutions suitable for the Aviation context in compliance with regulations and in consultation with relevant parties;
C	Supporting, under supervision, his/her advice with solid arguments, and convincing lecturers (in the role of clients) of these arguments;	Substantiating his/her advice with solid arguments, and independently convincing the client of these arguments; taking into account the related requirements and constraints.
D	adequately asking and giving feedback to maintain relationships with group members.	Adequately asking and giving feedback to maintain relationships with internal and external stakeholders.



Research

The Aviation specialist has a critical stance and an investigative attitude. He uses the appropriate methods and techniques for gathering and assessing information, in doing applied research. This research is aimed at adding value for the aviation industry.

Examples of such methodology are literature review and study, the analysis and modelling of the problem, designing and executing experiments, and interpreting data and computer simulations, which requires consulting data sets, standards and safety norms.

	Level 1	Level 2
	The student demonstrates this by...	The student demonstrates this by...
A	drawing up the research question and formulate the objectives and sub questions based on a given problem description.	Independently or autonomously ² drawing up the research question and objectives for a specific study on the basis of the underlying question, problem or opportunity;
B	selecting (scientific) literature, (inter)national standards, rules and regulations, and other information sources for acquiring further knowledge of the question from provided sources.	independently selecting and reviewing (scientific) literature, (inter)national standards, rules and regulations, and other information sources for acquiring further in-depth knowledge of the question, thereby demonstrating the ability to validate the reliability of the various information sources;
C	Following recommended research method(s); planning and executing research activities;	selecting appropriate research method(s); planning and executing research activities;
D	summarising, structuring and interpreting the results	summarising, structuring and interpreting the results and drawing conclusions in relation to the study question;
E	reporting and presenting these results	reporting and presenting these results according to the standards applicable in the professional field;
F	reflecting on the selected approach	critically reflecting on the selected approach and issuing recommendations for potential further study.



Professionalisation

The Aviation specialist is acquiring and maintaining the skills needed to be able to effectively implement his/her knowledge, skills and attitudes. These skills may be relevant in a broader setting. Among other things, this encompasses having an international orientation and a perspective on new developments, social norms and ethical dilemmas.

This includes following and interpreting current and future developments in the field, actively pursuing life-long learning. This competence is implemented in combination with the other competences to ensure well-developed research abilities and a reflective and critical attitude.

	Level 1	Level 2	Level 3
	The student demonstrates this by...	The student demonstrates this by...	The student demonstrates this by...
A	learning to reflect on (personal) learning outcomes	choosing a personal learning outcome and strategy independently, and using the result to reflect on the learning outcome;	defining and executing a personal learning outcome and strategy independently, and using the result to reflect on the learning outcome;
B	learning about various approaches in a range of professional situations;	adopting a flexible approach in a range of professional situations	adopting a flexible approach in a range of professional situations; being open to working in a multidisciplinary context;
C	analysing professional and ethical dilemmas	analysing professional and ethical dilemmas taking into account the (inter)national Aviation framework of accepted standards and values;	making sound considerations and decisions when faced with professional and ethical dilemmas taking into account the (inter)national legislative framework of accepted standards and values;
D	receiving feedback on own behaviour and content;	offering and receiving feedback with respect to both behaviour and content;	asking for, offering and receiving constructive feedback with respect to both behaviour and content; reflecting on learning purposes and overall connections
E	reflect on his/her own actions, thoughts and outcomes;	deeply reflecting on his/her own actions, thoughts, feedback and outcomes resulting in an action plan;	deeply reflecting on his/her own actions, thoughts, feedback and outcomes providing evidence on actions taken;
F	using a range of communication forms and tools in order to effectively communicate in English (or Dutch if applicable); language use and structure	using a range of communication forms and tools in order to effectively communicate in English (or Dutch if applicable); using sound argumentation in the research and professional products presented	using a range of communication forms and tools in order to effectively communicate in English (or Dutch if applicable); attuned to professional jargon and knowledge
G	being interested, aware and able to discuss on current changes based upon developments and events in the Aviation Sector	being able to react on current changes based upon developments and events in the Aviation Sector	being able to react on current changes based upon developments and events in the Aviation Sector and with any future changes in the industry as well.



5.3. Studied documents

Prior to the site visit, the panel studied fifteen graduation products of the bachelor's programme in Aviation. Upon request the secretary can provide information on the theses.

In addition to the critical evaluation (including appendices) the panel studied, among other things, the following documents:

Programme documents

- Educational profile
- Aviation competences and levels
- HBO profile Engineering
- Profile descriptions
- Learning lines in mind-maps
- The Midterm review report
- Information on the Aviation Academy and Internationalization
- Aviation Academy view on Sustainability
- Information on the bachelor Aviation in Corona-times