

EDUCATIONAL ASSESSMENT
RESTRICTED PROCEDURE
Space Studies

The Master of Science in Space Studies
at the KU Leuven and the Ghent University

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vluhr



SECTION 1	GENERAL SECTION	5
Part I	Educational Assessment – Restricted procedure	
	Space Studies – KU Leuven and Ghent University	7
Part II	Score table	9
SECTION 2	REPORT OF THE STUDY PROGRAMME	13
	APPENDICES	25
Appendix I	Curriculum vitae of the members of the assessment panel	26
Appendix II	Time schedule of the site visit	28

SECTION 1

General section

PART I

Educational Assessment – Restricted procedure Space Studies – KU Leuven and Ghent University

1 Introduction

In 2012 the assessment panel 'Werktuigkunde – Elektrotechniek' visited the programmes in the domain of 'Werktuigkunde –Elektrotechniek'. The panel's conclusions were published on February 21, 2013 in the report 'De onderwijsvisitatie Werktuigkunde – Elektrotechniek. Een evaluatie van de kwaliteit van de academische opleidingen Werktuigkunde – Elektrotechniek aan de Vlaamse universiteiten'.

Based on this report the study programmes applied for an accreditation from the Dutch-Flemish Accreditation Organisation (NVAO). In accordance with the Decree on the Structure of the Higher Education in Flanders, the KU Leuven and Ghent University submitted a request for a limited accreditation. The Master of Science in Space Studies received a temporary accreditation from the Dutch-Flemish Accreditation Organisation (NVAO) until the end of the academic year 2015–2016 (i.e. October 1, 2016).

2 Restricted procedure

Before the expiration of this temporary accreditation, the study programme must apply for a renewed accreditation. This shortened accreditation procedure entails a self-evaluation report by the study programme, a site visit by an independent panel of expert peers, and the publication of the panel's findings in an assessment report. The resulting assessment report will then be used by the study programme to apply for accreditation by NVAO.

The re-assessment is restricted to the subjects that were evaluated as negative in the original quality assessment: Subject 2 'Curriculum, with underlying aspects 2.1; 2.7; and 2.8; Subject 4 'Services', with the underlying aspect 4.2; and Subject 6 'Results', with the underlying aspect 6.1.

3 Composition of the panel

The Space Studies assessment panel consisted of 4 members. The chairman was also a member of the previous assessment panel in 2012. The VLUHR ratified the composition of the assessment panel by decision of February 3, 2016.

The assessment panel was composed as follows:

- Chairman
 - **Prof. ir. René Van den Braembussche**, Honorary professor von Karman Institute, Belgium (member assessment panel 2012)
- Panel members
 - **Dr. Jennifer Kingston**, Lecturer in Space Systems, Cranfield University, UK
 - **Dr. Marco Ferrazzani**, Head of Legal Department, European Space Agency (ESA), France
 - **Mr. Luka Denies**, student Master of Science Aerospace Engineering, Delft University of Technology, The Netherlands

Patrick Van den Bosch, staff member of the Quality Assurance Unit of the VLUHR was the project manager and secretary of the panel.

The curricula vitae of the panel members are attached (see Appendix 1).

4 Task of the assessment panel

For this re-assessment, the Space Studies programme prepared a self-evaluation report. The VLUHR Quality Assurance Unit received this report on December 15, 2015 and distributed it to the panel members. Hence, the assessment panel had the opportunity to study the information in the self-evaluation report and to prepare the visit accurately.

The panel visited the programme on February 26, 2016. During the visit, the panel had meetings with programme management, students, graduates and teaching and supporting staff. The panel had also the opportunity to consult a representative set of study materials. The discussions were held in a very constructive way. The visit schedule is attached (see Appendix 2).

Finally, the panel presented his findings and conclusions on the assessed subjects and aspects in a draft report. This was done in accordance with the “VLIR / VLHORA Educational Assessment Visit Guide, 2008”. The draft was sent to the Space Studies programme under embargo for a response. The panel incorporated the reaction of the programme in its report insofar it agreed with the remarks.

PART II

Score table

Explanation of the scores of the aspects (four-point scale):

Excellent (E)	'best practice', an (international) example
Good (G)	the quality stands out above the basic quality
Satisfactory (S)	fulfils the demands with respect to the basic quality
Unsatisfactory (U)	does not fulfil the demands of the basic quality

Explanation of the scores of the subjects (two-point scale):

- + Satisfactory: fulfils the demands with respect to the generic quality;
there is no scale to indicate further excellence.
- Unsatisfactory: does not fulfil the demands of the generic quality.

The aspect 'Suitability for Study' scores 'OK' if the program meets the decree requirements regarding the study load expressed in credits.

Subject 1: Objectives	+
Subject 2: Curriculum	+
Aspect 2.1. Correspondence between aims and objectives and contents of the programme	S
Aspect 2.2. Requirements for academic orientation	S
Aspect 2.3. Consistency of the curriculum	S
Aspect 2.4. Suitability for Study	OK
Aspect 2.5. Work load	S
Aspect 2.6. Coherence of structure and contents	S
Aspect 2.7. Learning Assessment	S
Aspect 2.8. Master's thesis	G
Aspect 2.9. Admission requirements	S
Subject 3: Deployment of Staff	+
Subject 4: Services	+
Aspect 4.1. Facilities	S
Aspect 4.2. Tutoring	S
Subject 5: Internal Quality Assurance	+
Subject 6: Results	+
Aspect 6.1. Achieved Learning Outcomes	G
Aspect 6.2. Study Progress	S

The re-assessment is restricted to the aspects 2.1; 2.7; and 2.8 aspect 4.2; and aspect 6.1.

SECTION 2

Report of the study programme

KU LEUVEN AND GHENT UNIVERSITY

Space Studies

INTRODUCTION

The Master of Space Studies programme was initiated in the academic year 2009–2010 and was first visited in 2012. This assessment provided the programme management with a large amount of feedback resulting in a recovery plan. After evaluation of this recovery plan, NVAO decided to deliver a limited accreditation to the programme, valid until the end of the academic year 2015–2016.

The Master of Space Studies is an interuniversity collaboration programme between the universities of Ghent and Leuven. Two instances regulate this agreement: a Master of Space Studies Steering Committee, which oversees the general standing of the programme and its finances, nominates lecturers, and decides about involvement of other partners; a Master of Space Studies Programme Committee which decides on programmatic matters and falls under the responsibility of the Faculty Programme Committee of the Faculty of Science, KU Leuven.

The Master of Space Studies is conceived as an advanced programme for students having already obtained a master's degree in a field with links to the space sector. The objectives of the programme are:

- To gain insight in the specific interdisciplinary character of the space sector;
- To gain insight in the relative importance of the different aspects of space related activities;
- To prepare students to assume a responsible position in the space sector;
- To train students in project management in general;
- To provide a broad base to future actors in space policy, nationally and internationally.

As the self-evaluation report states, the Master of Space Studies is conceived in a way that students get a common background in space related issues in the first semester, emphasising and confirming the inter- and multidisciplinary character of space. After this mandatory programme, all students choose their own specialisation area, thus strengthening not only their deeper knowledge of main space related topics but enforcing their specialised knowledge and skills in one space related discipline. The specialisation in combination with the general background is what should provide the students with added value from the programme. Finally, the culmination of the students' knowledge, skills, and attitudes is oriented towards the independent, complex, and original research in the master's thesis.

SUBJECT 2 PROGRAMME

Facet 2.1 Correspondence between aims and objectives and contents of the programme

2012 Assessment

In the previous assessment, the panel stated that the contents of the programme do not offer students the opportunity to obtain the final qualifications that have been formulated. The panel assesses that the contents of course units of the modules Space Studies and Space Technology and Applications are on a sufficient technological level. The panel regrets that the content of some course units of the specialization module Space Law, Policy, Business and Management are from other programmes and are not specific to the space sector. The content of these course units is too general and does not contribute to the realization of the learning outcomes. The panel finds the *truncus communis* courses are not challenging at all. The content of the courses and the level of learning outcomes are strongly aligned with the foreknowledge and the intake of the heterogeneous student intake. Furthermore, the panel believed that the degree of integration of the different fields of study is very low.

Re-assessment

The panel assesses the correspondence between aims and objectives and contents of the programme as satisfactory.

The programme is reformed, based on the comments of previous assessment panel. The curriculum contains now Introductory Courses. These courses have been added to the original programme in order to meet the requirement that the multidisciplinary approach of the programme and the different profiles of incoming students should not negatively affect the academic level of the programme. At the same time, these courses contribute to alleviate the differences in starting conditions of the students, and as a consequence also their outflow profiles which were termed as 'too variable' by the previous assessment panel. The goal is to familiarize students with a diverse background with the methodology and paradigms of disciplines relevant for the space sector which they have not encountered during their previous master studies. This approach also enables to remove some basic notions from the 'Truncus Communis' courses that were redundant for students having already a background in the concerned disciplines. The panel considers that the new introductory courses are an appropriate step to address the greatly differing student backgrounds. This implementation also links well with the stated aims and objectives of the programme. Both students and staff indicated that the introductory courses have provided appropriate preparation for the more detailed courses, with the staff noting a positive change in the preparedness of students taking their courses.

Besides the Introductory Courses, the curriculum contains also a *Truncus Communis* (25 credits) with courses that are specially created for this programme. The lectures are exclusively open to Space Studies students, so as to allow and encourage lively discussions with the students, which enable the latter to position themselves with respect to the questions addressed in the programme. It is the panel's opinion that the revised *truncus communis* courses are well-chosen to encourage interdisciplinary discussion and collaboration between the students with different preknowledge. This also fits well with the stated aims and objectives, and assists in meeting the learning outcomes. Current students and alumni strongly noted the interdisciplinarity and multidisciplinary as a strength of the programme. The panel considers that it could be useful to include as an introduction in the *Truncus Communis*, one or a few lectures on 'Space Economy' to give students an updated panorama of the present status and evolutions of economies and policy factors shaping space activities and explaining the present trends of space business which are typical 'new economy' evolutions. All in all, students indicate that the level of the

common trunk courses is good and challenging for students from different backgrounds. The Introductory Courses and the revised Truncus Communis are an improvement as well in terms of achievements of the final qualifications as in terms of depth, which is appreciated by the panel.

In addition to the 'Truncus Communis', students follow specialised courses in one of the three specialisation domains or 'modules', for a total of (at least) 15 credits: 1. 'Space Law, Policy, Business and Management', 2. 'Space Sciences', 3. 'Space Technology and Applications'. The courses are organised in Leuven or in Ghent. The master's thesis (15 credits) completes the curriculum and involves an original research project carried out by the student under the academic responsibility of one or more teachers of the programme. The panel believes the reduction in ECTS of the specialisation to 15 credits (to allow for the Introductory Courses) is reasonable. It now has an equal weighting to the thesis and could effectively be considered also as a 'specialisation'. This gives an even split across the programme between the multidisciplinary (Introductory Courses & Truncus Communis) and the demonstration of advanced knowledge in a specific field (specialisation and thesis). Previously, there was a greater weighting to the second part (specialisation and thesis), which would not necessarily require a student to depart greatly from the experience of his initial master.

Several courses cover business and management in the module 'Space Law, Policy, Business and Management'. These courses are complementary and taught by different professors with substantively different approaches. Some of these courses are not space related. The students have to take at least 5 EC of courses directly related to space. This is mitigated by the fact that the programme director has to approve individual itineraries; students cannot take only the courses not related to space. The panel learned there is significant discussion between the staff and the individual students to assist them in selecting appropriate courses and helping them to achieve the programme objectives in a way better tailored to the needs and expectations.

Discussions with the students and organizers made clear that the split between the 3 specialisations are not strict which is applauded for a program that has multi-disciplinarity as an objective. This flexibility and the accessibility of the staff for such discussions was noted by students and alumni as a strength of the programme.

The ECTS files could have been more explicit and better reflect the detailed learning objectives and outcomes. It is understood by the panel that missing information is informally or orally provided to the students by the lecturers at the start of the course. However a more explicit definition could also be helpful to increase visibility and to attract more (foreign) students.

It is the programme's aim that graduates 'have the skills to commence participation in complex space projects in multi-disciplinary and/or multinational settings in the framework of institutions, agencies or industry [...]'. Discussions with the different stakeholders and an alumni survey have shown that this learning objective is only touched to a limited extent in the programme. To improve this situation, it is recommended to add (more) group assignments or projects where the students have to cooperate.

All in all, the programme responds to the objectives that have been put forward with respect to the intended level and orientation and with respect to the domain-specific requirements. The courses are in line with what is of interest to space activities. The contents of the programme offers students the opportunity to obtain the qualifications that have been formulated.

Aspect 2.7 Learning Assessment

2012 assessment

The previous panel found that the programme uses various evaluation methods. The panel was of the opinion that the examinations were not oriented to the realization of the learning outcomes. The content of the examination questions of some course units of the module Space Law, Policy, Business and Management, shows no relation with the specific domain of the space sector and hence does not focus on the realization of the learning objectives. The examination of the scientific and engineering course units of the module space science of the module space technology and applications in general, are of sufficient level. However, the panel has, with regard to these modules, come across a number of examination assignments with a too low level of technical-scientific profundity. The panel has found that the programme assesses students on the basis of their foreknowledge and background. As all students receive the same diploma, the panel finds this unacceptable.

2016 re-assessment

The panel assess the learning assessment as satisfactory.

The programme management has taken structural measures to remediate the situation which was criticized in the previous assessment. The programme has made a few adjustments: The introduction of 'introductory courses' to diminish the differences in the background necessary for the 'truncus communis' courses; the merging of 'truncus communis' courses in order to foster coordination of evaluation procedures, and insuring that for each course a teacher familiar with academic evaluation policy is involved; regular discussions within the examination committee and the setting up of a global evaluation policy plan. The panel also learned that lecturers of the programme were offered a course by education specialists from the university to improve their assessment and better link the assessment to the learning goals of their course. The panel is satisfied that the programme has taken measures to assure a more uniform evaluation, which is now independent of the previous student background and at master level.

The evaluation format is to some extent a choice of the examiner, but the Programme Committee verifies that an harmonic equilibrium between different modes is reached and that all formats allow evaluation of the specific learning outcomes of the course. The most frequently used evaluation forms are an oral exam and a paper associated with or without a public presentation. The panel is satisfied with the wide array of assessment methods that are used. Cross-checks of exam questions are made by other staff members in similar academic areas, to ensure quality and appropriateness of the assessments. The panel recommends the programme to formalize these cross-checks on a regular basis. Where there are unexpected results or patterns of results, this is discussed by the programme staff. Students noted that the marks they achieved in the different courses seem to follow an expected pattern i.e. they did better in the areas that matched their backgrounds, indicating that there was not a bias favoring students who were unfamiliar in a subject and that all students were being assessed on an equal basis.

Most lecturers remark that they state the learning goals and assessment methods during the first lecture. Although this is a good practice, it would be commendable to make this information available online, also to prospective students or students still defining their course list. As indicated in aspect 2.1., several of the ECTS files are too succinct. However, students indicate that they know how they will be assessed, that they can ask for feedback on their work and that they are aware of the existence of formal procedures for appeal. Students mentioned that an administrative person is available for the organization of the exams and to solve eventual conflicts in the planning.

The panel noticed there is only a possibility for repeat exams in August and September. The panel asks to investigate the possibility to organize a repeat exam during the 9 month course so that foreign students do not need to come back to the university for the repeat exams in August and September.

The panel concludes that the evaluation is now transparent, in line with the learning objectives and on master level.

Aspect 2.8 Master's Thesis

2012 assessment

The master's thesis is allotted for 15 credits, which complies with the Flemish regulations. The panel studied a number of master's theses and concluded that they portray a variable academic quality. Some of them are of good quality and express the use of an academic method and a profound research attitude. Some other master's theses, which are passed, are of a low level. The master's theses are, according to the panel, too much conceived as a literature study. The panel finds that the courses should pay more attention to the development of knowledge and skills in the space related domain. This methodology should, in its turn, be transferred to the master's theses.

2016 re-assessment

The panel assess the master's thesis as good.

The programme management decided to set some changes in the thesis procedure. Besides a timely definition of the projects there was a need for regular sessions where students report on their progress and where feedback is given by staff members with different backgrounds. Such a session has first been organised during the academic year 2011–2012, and this approach has been intensified since. Currently, three intermediate reporting and feedback sessions are planned every year. These sessions are in the first place organised to streamline the project of the student and to add the interdisciplinary flavor to it. They also serve for the supervisor to gauge the standing of the candidate in a broader framework, and the (future) members of the jury to gauge how the work is carried out and evolves.

The evaluation of the thesis is based on the work done during the year, on the final manuscript produced, and on the final presentation. Three readers, including the supervisor and two experts, belonging to different research groups, evaluate the written work. The oral presentations of all theses are grouped into one or more sessions, and the evaluation of the presentation is made by the full multidisciplinary group of space experts present. It is the panel's opinion that the three-reader approach to examination is appropriate. It this gives a balance between assessment by those familiar and those unfamiliar with the project and the student.

The panel read several theses. The theses are of a high quality, especially when compared to the amount of credits attributed to it. The theses are of master level and are consistent with the stated learning outcomes and aims of the course. Their length and depth is sufficient.

The master's thesis is a valuable work that can be better recognized. It can be encouraged that the content covers several of the multidisciplinary aspects that actually are useful in space activities. While the panel recognizes this was done in some theses, it is recommended that multidisciplinary becomes a factor of evaluation and reward, to encourage students making the effort to cover issues beyond their chosen specialization. The best theses can also be recognized

and rewarded by making them public on the master website, to enhance visibility of both the graduate and of the quality of the master, or as element of awareness of the programme.

The panel finds it laudable that the programme is very flexible in connecting students to a wide variety of thesis topics. The possibility to perform the thesis with an external partner is appreciated by the students. Although, this could be done in a more structural way. In addition, the panel noted that the process to obtain a thesis topic has improved and accelerated with respect to previous years.

The panel concludes that in the current theses students show analytical capacity and independent problem-solving capacity at academic level. The theses reflects the student's critical-reflecting attitude and research orientation.

CONCLUSION SUBJECT 2: PROGRAMME

Given the positive score on aspect 2.1., 2.7. and 2.8 and above argumentation, and given the positive scores on the other aspects in the 2012 report, the panel comes to a positive decision on subject level for the Master of Science in Space Studies.

SUBJECT 4 SERVICES

Aspect 4.2 Tutoring

2012 assessment

Students can consult the Study Advice Service, psychologists and experts on education matters. The panel stated that the student support and guidance specific to the programme was not well managed. The targets of the programme and the learning contents of the courses are insufficiently communicated to potential students. The panel regrets that during the study programme the students get little support. The students mentioned several planning and organization problems, which were dealt with rather slow.

2016 re-assessment

The panel assess tutoring as satisfactory.

Students entering the Master of Space Studies already have a master's degree and hence many of the general services offered by the university are of limited relevance for them. On the other hand, the specificity of the programme raises a certain number of issues that need dedicated attention. A basic one is the travel imposed by the interuniversitary character of the programme. For practical reasons the 'truncus communis' courses during the first semester all take place in Leuven, and care is taken to group the lectures, instead of organising them on remote campuses, so that student travel remains reasonable; the specialised courses are organised at the location of the teacher. In general, student mobility issues are not a serious obstacle for the programme.

The new administrative support staff that was hired after the previous assessment greatly improved the support to the students. The panel noted there was no evidence of administrative or logistical problems encountered by the students. The panel learned that due to the small number of students, it is possible to have close contacts between the lecturers and the students.

While students and graduates seem satisfied of the services received, information on courses content and individual tutoring is not easily accessible or visible. This would be beneficial to the

visibility and attractiveness of the master. Information to students must be further improved, in particular for non KU Leuven students in terms of programme content. Although prospective students receive detailed information on request, it is nevertheless recommended to provide more information on the general website, especially to help international students in deciding whether to enroll in the programme.

There is an impressive list of alumni that have found a job in the space sector. Communicating this list in public would be an asset in marketing the programme. The formation of the Alumni Association may also be able to help with this, as it could allow tracking of graduate destinations, and perhaps the sharing of information between alumni and current or prospective students regarding employment possibilities.

The panel concludes that the provision of information and the student support and guidance has improved to an acceptable threshold level. Information to future students and effective integration are factors to enlarge the basis for the future development of the programme.

CONCLUSION SUBJECT 4: SERVICES

Given the positive score on aspect 4.2. and above argumentation, and given the positive score on the other aspect in the 2012 report, the panel comes to a positive decision on subject level for the Master of Science in Space Studies.

SUBJECT 6 RESULTS

Aspect 6.1 Achieved Learning Outcomes

2012 Assessment

The panel stated that the education process does not guarantee that all the students reach the objectives and the learning outcomes at an acceptable level. The heterogeneous student inflow puts the level of the programme under pressure. The learning outcomes and the contents of the courses are adapted to the background and the level of the individual student. The programme has a differentiated evaluation policy. The panel finds this inadmissible, as all students of the programme get the same degree. It is the panel's opinion that it should be ensured that all students obtain the same learning outcomes. The panel has furthermore observed that the generic competences are of a too low level and too general in their content. Also the panel has doubts whether that the students of humanities can reach the technological competences on an academic level.

2016 re-assessment

The panel assess the achieved learning outcomes as good.

The quality of the master's thesis has improved significantly. The programme has master's theses which are worth publication. It is also noted by the panel that students of this master programme have been regularly winning (external) prizes for their thesis work.

The student's awareness of employment possibilities is stated to be currently lacking. The panel believes that on-going involvement of representatives from potential employers would assist in highlighting the market need from industry and identify the likely career routes for graduates of the course. It would also enhance the assurance that the course syllabus continues to be aligned with the needs of the industry. A special effort should be added to collect a survey and

professional feedback to inform students on the space job market in Europe. The panel suggests in this regard that alumni could be invited to give some guest seminars on their career paths after the programme, as examples.

Alumni of the programme have ended up in a wide variety of employers in the space sector. The panel learned from the alumni that the programme prepared them well to take on work in the space field. The alumni commented very favorably that the programme had taken them where they wanted in their careers, and that they had made good use of the learning achieved during their time on the Master. The number of alumni working in the space sector is impressive and should be used in the marketing of the course.

It is recommended that the programme management commits to further marketing of the programme towards an international audience. This will enrich the programme, as international students may bring in different points of view, consistent with the interdisciplinarity and multidisciplinary objectives. Once they become master's graduates and go into a space career, they will promote awareness and may bring back professional support for the programme. Beyond space agencies, also industry and space services have requirements and could define profiles for recruitments that can be collected and given as perspectives of the Master. It would be useful to get an employer perspective on whether they see any "gaps" in the education of alumni they have recruited, and if they found it clear to understand what were the specific skills and expertise coming from the programme.

The panel concludes that the qualification and level achieved are very good. Even more considering the variety of domains covered.

CONCLUSION SUBJECT 6: RESULTS

Given the positive score on aspect 6.1. and above argumentation, and given the positive score on the other aspect in the 2012 report, the panel comes to a positive decision on subject level for the Master of Science in Space Studies.

INTEGRAL JUDGMENTS OF THE PANEL

Given the positive scores on the re-assessed subjects 2: programme, 4: Services, 6: Results, and given the other positive scores in the 2012 assessment report, the panel decides that the Master of Science in Space Studies fulfils the demands with respect to the generic quality. Subsequently, the panel comes to a positive decision on the Master of Science in Space Studies.

APPENDICES

APPENDIX I

Curriculum vitae

Rene Van den Braembussche

Rene Van den Braembussche holds a master degree in Mechanical Engineering from the KU Leuven (1968) and a research master from the von Karman Institute (1969) where he spent his whole career in the department “Turbomachines and Propulsion”. First as assistant professor (1973), associate professor (1979), professor (1986) and since 2000 ordinary professor. From 1995 to 2003 he was responsible for the “Lecture Series Program” at the von Karman Institute. He was “professore a contratto” at the university of Genua (1987) and from 1987 to 2003 visiting professor at the Vrije Universiteit Brussel teaching part of the course “turbomachines” and was visiting professor at the Chinese Academy of Sciences in Beijing (2012).

He is the author of numerous publications in archival journals and invited speaker at many conferences. His research focuses on radial compressors in particular on computer aided engineering and flow stability. He is Fellow of the American Society of Mechanical Engineers and Associate Editor of the ASME Journal of Turbomachinery. He was member of the ASME Turbomachinery en Educational committee and International Committee member of the Japanese Gasturbine Society.

In 1986 he was laureate of the bi-annual FNRS-FWO “Iwan Akerman” award and from 1996 until 1998 member of “Carrier Technical Review Board on Aerodynamic Research”, in Syracuse, USA. Since his retirement in 2008 he is Honorary Professor of the von Karman Institute, where he was responsible for the accreditation of the von Karman Institute MaM program and still teaching one course.

Jenny Kingston

Jenny Kingston obtained her Engineering Doctorate in small satellite design from Cranfield University in 2003. She is a specialist in space systems engineering and mission design, with experience in a number of AIT campaigns, and since 2006 has also provided technical consultancy to a space insurance underwriter on launch and in-orbit risks. She was a project engineer on the Icarus1 de-orbit payload, and technical manager for the Cranfield Icarus3 payload delivered in 2015. She is also the manager for the Cranfield De-Orbit Mechanism on the ESA ESEO satellite. Since 2011 she has been Course Director of the MSc in Astronautics and Space Engineering, a programme accredited by the Royal Aeronautical Society, and is a Fellow of the Higher Education Academy of the UK, holding a PGCert in Learning, Teaching & Assessment in Higher Education. On the Master she teaches modules on space systems engineering and spacecraft thermal analysis, and supervises and assesses numerous MSc thesis projects. She is supervisor of several PhD

students and has acted as Internal and External Examiner for a number of PhD assessments in Cranfield and other UK universities.

Marco Ferrazzani

Marco Ferrazzani has been the Legal Counsel and Head of the Legal Services Department at the European Space Agency (ESA) since 2010. In this capacity, he provides legal advice on questions of both public and private law to the Agency and to its Council of Member States in order to achieve the objectives laid out in the ESA Convention. Dr. Ferrazzani has represented ESA at a number of international conferences and at the UNCOPUOS Legal Subcommittee. He is frequently invited as a guest lecturer at universities and policy institutions, and has regularly published articles in several law and policy books and journals. Dr. Ferrazzani sits on the Board of Directors of the International Institute of Space Law (IISL), and is a Board member of the European Centre for Space Law (ECSL). He is also a member of the Société française pour le droit international and the International Institute of Common Goods Research.

Before joining ESA, Dr. Ferrazzani worked as an attorney in the Milan offices of Baker & McKenzie, representing clients in the fields of corporate law, international transactions, foreign investments and litigation. A graduate cum laude in law from the University of Naples, Italy, Dr. Ferrazzani received his university's prize for best doctoral thesis for his research on international and comparative law. Thereafter, he undertook postgraduate study in the United States at Georgetown University and Harvard Law School, as well as at the University of Salzburg, Austria focusing on international and comparative law.

Luka Denies

Luka Denies is a recent graduate from the faculty of aerospace engineering at Delft University of Technology. He obtained his BSc in aerospace engineering cum laude in 2012. During his studies, he performed an internship at OHB System in Bremen as part of the propulsion department. In 2015 he obtained his MSc degree in aerospace engineering cum laude, specialising in the track of space engineering. His thesis work was on regenerative cooling analysis of oxygen/methane rocket engines.

Luka was active in various quality control and student participation groups at the faculty of aerospace engineering. He was part of the Board of Studies of the faculty from 2012 to 2014, was elected to the Faculty Student Council in 2011 and was a student member of the Education Management Team for a brief period in 2015. In 2012–2013, he was the commissioner of educational affairs at the study society VSV 'Leonardo da Vinci', organising part of the quality control cycle to provide student feedback to lecturers.

APPENDIX II

Visit Schedule

Thursday February 25 2016

09:00–9:45	internal consultation
09:45–10:45	programme management
10:45–11:00	internal consultation
11:00–12:15	students and graduates
12:15–13:15	consulting documents + lunch
13:15–14:15	teaching staff + supporting staff
14:15–15:15	consultation hour + internal consultation
15:15–15:45	programme management
15:45–17:00	final consideration
17:00	oral reports