MASTER'S PROGRAMME

GEO-INFORMATION SCIENCE AND EARTH OBSERVATION

FACULTY OF GEO-INFORMATION SCIENCE AND EARTH OBSERVATION

UNIVERSITY OF TWENTE

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REPORT ON THE MASTER'S PROGRAMME GEO-INFORMATION SCIENCE AND EARTH OBSERVATION OF THE UNIVERSITY OF TWENTE

This report takes the NVAO's Assessment Framework for the Higher Education Accreditation System of the Netherlands for limited programme assessments as a starting point (September 2018).

ADMINISTRATIVE DATA REGARDING THE PROGRAMME

Master's programme Geo-information Science and Earth Observation

Name of the programme:	M Geoinformation Science and Earth Observation (M.Sc.)*
CROHO number:	75014
Level of the programme:	Master's (post-initial)
Orientation of the programme:	academic
Number of credits:	120 EC
Specialisations:	- Applied Remote Sensing for Earth Science - Geoinformatics - Geo-information Management for Land Administration - Natural Hazards and Disaster Risk Reduction - Natural Resources Management - Urban Planning and Management - Water Resources and Environmental Management - Free Specialisation
Location(s):	Enschede (main location) Locations Joint Education Programmes (JEPs): - Xi'an (China) / Enschede (Netherlands) - Beijing (China) / Enschede (Netherlands) - Dehradun (India) / Enschede (Netherlands) - Tehran (Iran) / Enschede (Netherlands)
Mode of study:	Full-time
Language of instruction:	English
Programme specific details:	Internationalisation (distinctive feature)
Joint Education Programmes:	- Geo-information Science and Earth Observation, double degree with Chang 'An University (CAU), Xi'an (China) - Geo-information Science and Earth Observation, double degree with Capital Normal University (CNU), Beijing (China) - Geo-information Science and Earth Observation for Geoinformatics (specialisation), single degree with Indian Institute for Remote Sensing (IIRS), Dehradun (India) - Geo-information Science and Earth Observation for Geoinformatics (specialisation), double degree with Khajeh Nasir Toosi University of Technology (KNTU), Tehran (Iran)
Submission deadline NVAO:	30 October 2021, extension of submission date 1 November 2020 due to legislation WHW art. 5.16 lid 4

* The programme management requested the panel to support a small name change, explained in more detail on page 12, to align the programme name according to both common spelling and to the other Master's programme names of the University of Twente.

The visit of the assessment panel Faculty of Geo-Information Science and Earth Observation (ITC, derived from the former institute's name International Training Centre for Aerial Survey) of the University of Twente took place on 29 and 30 September 2020.

ADMINISTRATIVE DATA REGARDING THE INSTITUTION

Name of the institution:	University of Twente
Status of the institution:	Funded
Result institutional quality assurance assessment:	Positive

COMPOSITION OF THE ASSESSMENT PANEL

The NVAO has approved the composition of the panel on 1 April 2020. The panel that assessed the master's programme Geo-information Science and Earth Observation consisted of:

- Prof. dr L.J. (Leo) de Haan, emeritus professor of Development Studies and former Rector of the International Institute of Social Studies of Erasmus University Rotterdam [chair];
- Prof. dr J.M.F. (Jos) Van Orshoven, full professor and dean of the Faculty of Bioscience Engineering at KU Leuven (Belgium);
- Prof. dr Ing. L. (Liqiu) Meng, professor in Cartography at Technical University Munich (Germany);
- Ir. R. (Rob) Beck, founder and CEO of NEO (Netherlands Geomatics & Earth Observation BV);
- Drs. J.A.M. (Anita) Veltmaat, certified ECA auditor, senior policy advisor International Strategy & Relations at University of Groningen;
- J. (Jim) Klooster B.Sc., master student Economic Geography at University of Groningen [student member].

The panel was supported by dr I.M. (Irene) Conradie, who acted as secretary.

WORKING METHOD OF THE ASSESSMENT PANEL

On behalf of the participating universities, quality assurance agency Qanu was responsible for logistical support, panel guidance and the production of the report. Dr I.M. Conradie, a certified NVAO secretary, acted as project coordinator and as secretary during the site visit.

Preparation

The site visit was originally planned to take place on 18 and 19 May 2020. At the end of March 2020, it became clear that due to the COVID-19 virus all universities would be closed until further notice and that (international) travel would be severely disrupted. In consultation with the University of Twente and the panel, the site visit was postponed to 29 and 30 September 2020. At the request of the panel, the programme management wrote a corona addendum to supplement the self-evaluation reports that the Geo-information Science and Earth Observation Master's programme (M-GEO) had already submitted. This provided the panel with an overview of COVID-19 related measures and activities implemented between February and August 2020.

A first preparatory panel meeting was organised on 11 June 2020. During this online meeting, the panel members were instructed in the use of the NVAO and ECA assessment frameworks. The panel also discussed their working method and the planning of the site visit and reports. On 2 September 2020, the panel chair was further briefed by Qanu on his role and on specific aspects of the working method, the planning of the site visit and reports.

The project coordinator composed a schedule for the site visit in consultation with the ITC Faculty. Prior to the site visit, the ITC Faculty selected representative partners for the various interviews. See Appendix 5 for the final schedule.

Before the site visit to the University of Twente, Qanu received the NVAO and ECA self-evaluation reports of the programme and sent these to the panel. A thesis selection was made by the panel's chair and the project coordinator. The selection consisted of 19 theses and their assessment forms. A more detailed underpinning of the selection is provided in Appendix 6.

After studying the self-evaluation reports, theses and assessment forms, the panel members formulated their preliminary findings. The secretary collected all initial questions and remarks and distributed these amongst all panel members.

At the start of the site visit, the panel discussed its initial findings on the self-evaluation reports and the theses, as well as the division of tasks during the site visit.

Site visit

The site visit to the University of Twente took place on 29-30 September 2020. Before and during the site visit, the panel studied the additional documents provided by the programme. An overview of these materials can be found in Appendix 6. The panel conducted interviews with representatives of the programmes: students and staff members, the programme's management, alumni and representatives of the Board of Examiners. It also offered students and staff members an opportunity for confidential discussion during a consultation hour. No requests for private consultation were received.

The panel used the final part of the site visit to discuss its findings in an internal meeting. Afterwards, the chair presented the panel's preliminary findings and general observations to a small group of programme representatives.

The visit was concluded with a development dialogue, in which the panel members and the representatives of the programme discussed various development routes for the programme. The results of this conversation are summarised in a separate report, which will be published through the programme's communication channels.

Reports

After the site visit, the secretary wrote a draft NVAO assessment report as well as a draft ECA assessment report of quality in internationalisation. Both were based on the panel's findings and submitted to a Qanu colleague for peer assessment. Subsequently, the secretary sent the reports to the panel. After processing the panel members' feedback, she sent the draft reports to the ITC Faculty in order to have them checked for factual irregularities. The secretary discussed the ensuing comments with the panel's chair and changes were implemented accordingly. The report was then finalised and sent to the ITC Faculty and University Board.

Definition of judgements standards

In accordance with the NVAO's Assessment framework for limited programme assessments, the panel used the following definitions for the assessment of the standards:

Generic quality

The quality that, from an international perspective, may reasonably be expected from a higher education Associate Degree, Bachelor's or Master's programme.

Meets the standard
The programme meets the generic quality standard.

Partially meets the standard
The programme meets the generic quality standard to a significant extent, but improvements are required in order to fully meet the standard.

Does not meet the standard
The programme does not meet the generic quality standard.

The panel used the following definitions for the assessment of the programme as a whole:

Positive
The programme meets all the standards.

Conditionally positive
The programme meets standard 1 and partially meets a maximum of two standards, with the imposition of conditions being recommended by the panel.

Negative
In the following situations:
- The programme fails to meet one or more standards;
- The programme partially meets standard 1;
- The programme partially meets one or two standards, without the imposition of conditions being recommended by the panel;
- The programme partially meets three or more standards.

SUMMARY JUDGEMENT

Standard 1: Intended learning outcomes

The post-initial academic master's programme in Geo-information Science and Earth Observation offers a wide range of expertise and application areas, with a strong link with capacity development in countries of the Global South, in line with ITC's mandate. The panel finds this mission clear and important, both for its specific contribution to understanding and solving a wide range of pressing societal problems and for its efforts in including students and institutions from parts of the world where large shares of the population have little access to technological developments. The four Joint Education Programmes are entirely consistent with this mission. The panel recognises the longstanding, excellent international reputation of the ITC Faculty and the M-GEO programme and how this serves its international students. The panel considers solving real world problems through a spatial perspective on the broad scope of the geo-information and earth observation domain within a multicultural environment from a capacity building mission as the central pillars that constitute the programme's distinctive profile. All the GI-BoK knowledge areas are covered in the programme, more focused and in-depth in each of the seven different specialisations.

The panel concludes that the programme meets the requirements from the professional field and that the active involvement with stakeholders is further intensified with the recent establishment of a Professional Advisory Board. The panel appreciates how the Board is involved in the programme's deliberations and, as an opportunity for further quality enhancement, it recommends to diversify the Board's composition more.

The programme's goals have been translated into a well-structured set of learning outcomes, which clearly reflect a focus on research with applied aspects, the (geo)spatial perspective as well as the international orientation of the programme. They are appropriate for the professional and academic practices and industrial demands for skills and competencies in the broad field of geoscience, and very relevant in an increasingly interconnected world and labour market. They match ITC´s and UT's vision and comply with the Dublin level descriptors of the second cycle. The panel is pleased to find that the ILOs now include internationalisation goals that have been agreed on in liaison with various stakeholders.

Finally, the panel understands the motivation for changing the programme's name to M Geo-information Science and Earth Observation and agrees with it. It verified that no changes in the curriculum are made as a result of the proposed name. It recommends the change to be implemented with the registration of the reaccreditation.

Standard 2: Teaching-learning environment

The M-GEO programme has adequately translated its intended learning outcomes into a coherent curriculum that takes students to an advanced level of geospatial science and technological applications at the end of the programme. The panel considers the extension to a two-year programme a wise decision as this spreads the study load more and gives students more time to reflect on their study. The BoK knowledge areas that are applicable to the programme are (very) well reflected by the programme's courses. The courses show a mix of theory and practice that matches the profile of the programme. After a shared set of common courses which cover the core knowledge and skills, students can shape the curriculum along their own preferences by selecting specialisation courses and electives. This includes an optional internship that has garnered increased student interest. If the internship were to be extended, the panel would prefer to do this in exchange for some of the credit load of the thesis. With a 45 EC workload, the thesis is fairly large, even if the panel notes that this certainly adds value to the students' education and that the entire thesis trajectory is most carefully and thoroughly defined.

Although the JEPs may differ in content, structure and organisation from the in-house M-GEO programme and that some time lag is to be expected in implementing changes to the curriculum, the panel established that these differences are in scope, and do not get in the way of achieving the intended learning outcomes. The JEP coordinators are in close contact with the partner institutions and support the JEP students in the ITC part of their

studies. Together with a now formalised outline of the JEP quality assurance cycle and the detailed and standardised regular JEP quality checks, the panel concludes that this sufficiently ensures that these programmes meet the same standards.

The panel observed no major feasibility obstacles and commends the programme for deftly weathering the coronavirus situation. It encourages monitoring two recognised feasibility issues – the mix of parallel and sequential course scheduling and the transition from the first to second year - for which solutions have already been proposed and partly implemented. In addition, the programme offers a variety of (innovative) teaching methods, also to promote student-centred learning, as well as many opportunities for feedback and reflection, in a dedicated international learning environment combining state of the art (physical and digital) facilities, social events, mentoring, career advice and a great many other essential services (e.g. a smooth application process, airport pick-up, housing, international cuisine). The close-knit international community can be qualified as a bubble and though the panel appreciates its many advantages, it invites the programme to expand its horizon more. The panel was pleased to hear about the programme management's ideas to move in that direction.

The teaching staff is of high quality, both in terms of expertise and didactic skills, and forms a motivated team. The panel recommends promoting further reflection on and the development of, a shared international classroom concept, for instance through intervision or professional development courses. The use of English, as language of instruction, is well-motivated and implemented and fits the internationally oriented field in which students are likely to work.

In conclusion, the panel finds that the programme offers students a teaching-learning environment that enables them to achieve the ILOs.

Standard 3: Student assessment

The M-GEO programme has developed a solid system of assessment, which is based on the UT-wide and ITC-wide assessment policies. Sufficient attention is paid to the validity, reliability and transparency of the examinations. The assessment methods are varied and fit the goals of the programme. The panel signalled two points of particular interest: the assessment of ILOs 10 and 11 on internationalisation, and assessment in the JEP programmes. Upon closer inspection of ILO 10 and 11 assessment, the panel established that all ILOs are assessed in the curriculum; ILO 10 and 11 in the core curriculum as well as in some later specialisation courses and the (optional) international internship. The panel suggests that the programme review how ILO 11 is best assessed throughout the curriculum. The panel is very much in support of plans to include international intended learning outcomes into the thesis assessment and evaluate its functioning in the near future. With regard to the JEP assessments, the panel noted that although the provided documentation is sometimes not yet fully transparent, meetings with programme representatives and a JEP representative show that the JEP evaluations are making progress, are taken seriously and contribute to improving the quality assurance procedure itself. The panel also takes into account that the thesis procedure at the JEPs is the same as for the in-house programme and that M-GEO staff is involved in the thesis supervision and assessment. The panel considers the JEP programmes sufficiently equivalent in terms of contents, learning objectives and assessment to the in-house programme, but it recommends to continue performing the JEP quality assurance procedure thoroughly and completely for all JEPs.

Two important strong points of M-GEO's student assessment are the thesis assessment and the Examination Board. The thesis assessment procedure and forms are well-designed and allow for a solid underpinning of the final grade. The EB proactively fulfils its role in the quality assurance of assessment and has sound procedures in place to monitor the quality of exams and theses. The panel commends the EB for stimulating colleagues to reflect upon their work and improve it.

Standard 4: Achieved learning outcomes

The panel reviewed a selection of theses that were produced by students of the M-GEO programme. It agreed with the grades given by the supervisor and examiners. The employability of the graduates is good and given the growing importance of geo-information science, technologies and applications, so is their outlook. Based on the selection of master's theses and course assignments on internationalisation, the evaluation of student performance in the international internship, the alumni survey and interviews with alumni during the site visit, the panel concludes that students realise the ILOs as formulated by the programme.

The panel assesses the standards from the *Assessment framework for limited programme assessments* in the following way:

Master's programme Geo-information Science and Earth Observation

Standard 1: Intended learning outcomes	meets the standard
Standard 2: Teaching-learning environment	meets the standard
Standard 3: Student assessment	meets the standard
Standard 4: Achieved learning outcomes	meets the standard
General conclusion	positive

The chair, Prof. dr Leo de Haan, and the secretary, dr Irene Conradie, of the panel hereby declare that all panel members have studied this report and that they agree with the judgements laid down in the report. They confirm that the assessment has been conducted in accordance with the demands relating to independence.

Date: 12 February 2021

DESCRIPTION OF THE STANDARDS FROM THE ASSESSMENT FRAMEWORK FOR LIMITED FRAMEWORK ASSESSMENTS

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 ITC Faculty at the University of Twente offers a post-initial academic master's programme in Geo-information Science and Earth Observation (henceforth: M-GEO). Since 2010, ITC has been incorporated into the University of Twente as its Faculty of Geo-Information Science and Earth Observation. Since its inception in 1950, ITC has had a capacity building mission to offer educational and research activities in the geospatial domain to individuals and institutions, particularly in developing countries. The panel acknowledges its excellent international reputation. The M-GEO programme shares ITC's capacity building mission.

As stated in the self-evaluation report, the M-GEO programme is a full-time, two-year programme (120 EC) that focuses on the core knowledge areas of Geo-information Science and Earth Observation and how scientifically sound spatio-temporal analysis and model development can be applied to address worldwide challenges in a local context. During the programme, students learn to take both environmental and socio-economic drivers of change into account.

The M-GEO programme is formally registered in the Central Register of Higher Education Programmes (CROHO) as: M Geoinformation Science and Earth Observation (M.Sc.). The other MSc programmes of the University of Twente do not have the addition of 'MSc' at the end of their names. Furthermore, geo-information is commonly spelled with a hyphen ('-') in the noun. This is consistently done in all communications regarding the M-GEO programme. The programme, therefore, wishes to make two minor adjustments in the CROHO name, changing it to: M Geo-information Science and Earth Observation. The panel understands this motivation and agrees with it. It verified that no changes in the curriculum are made as a result of the proposed name. It recommends the change to be implemented with the registration of the reaccreditation.

The panel studied the profile of the programme and initially looked for the programme's distinctive approach to the geospatial domain of Geo-information. It learned from interviews with staff and management that the M-GEO programme intends to tackle the entire geo-information and earth observation spectrum. Other Dutch academic education programmes often take a distinctive perspective on the field, or operate in a specific niche of the domain. Here, the distinctiveness arises from the spatial perspective - 'spatial' with explicit reference to geographical space, space on the surface of planet earth - in opening up the full scope of the core knowledge areas to international students, mostly from the Global South. This broad spatial approach equips them with the scientific knowledge, tools and academic skills needed to solve real-life global problems in a local context. According to the panel, the problem solving focus is very pronounced and this fits in well with the programme's post-initial status as it offers possibilities for professionals who need academic skills to further their career.

The breadth of the core knowledge areas is covered in the programme's seven specialisations: Applied Remote Sensing for Earth Sciences (ARS), Geoinformatics (GFM), Geo-information management for Land Administration (GIMLA), Natural Hazards and Disaster Risk Reduction (NHR), Natural Resources Management (NRM), Urban Planning and Management (UPM), Water Resources and Environmental Management (WREM). An eighth option is to follow a 'free specialisation'. The panel appreciates that M-GEO's various specialisations offer students the full

breadth of the domain. This is underpinned by the reference framework, in this case the Geographic Information Science & Technology Body of Knowledge (GI-BoK), see for an overview Appendix 2. The panel considers it a strong point that ITC staff work on the GI-BoK and are involved in the development of this framework. They are frontrunners in using what has been developed by the larger geo-information science community.

While the programme specifically addresses young and mid-career professionals from the Global South (in particular from countries that receive Official Development Assistance (ODA Countries)), its content is increasingly relevant - if not just as relevant - to students from other parts of the world (Global North), given the overall global interconnectedness and the increasingly global character of 'wicked problems' facing our society. The panel welcomes the fact that the programme management is currently exploring ways to open up the programme to an even more diverse student population. It notes that in that respect it could be advantageous to the programme to include more of the Dutch context. The planned relocation of the ITC Faculty to the UT campus in 2022 may offer new opportunities to do so.

Joint Education Programmes
The M-GEO programme jointly offers three double degree and one single degree Joint Education Programmes (JEPs):

- Geo-information Science and Earth Observation, double degree with Chang 'An University (JEP CAU), Xi'an (China);
- Geo-information Science and Earth Observation, double degree with Capital Normal University (JEP CNU), Beijing (China);
- Geo-information Science and Earth Observation for Geoinformatics (specialisation), single degree with Indian Institute for Remote Sensing (JEP IIRS), Dehradun (India);
- Geo-information Science and Earth Observation for Geoinformatics (specialisation), double degree with Khajeh Nasir Toosi University of Technology (JEP KNTU), Tehran (Iran).

The JEP IIRS is offered as a single degree because the IIRS is not a university and as such it is unable to grant a degree itself. Previously, the M-GEO programme offered several other JEPs as well; JEP GISNATUREM/Kwame Nkrumah University of Science and Technology (agreement not renewed; discontinued in 2018), JEP GEM/Lund University (agreement not renewed; new proposal under preparation), JEP DD Bandung/Technical University Bandung (suspended due to low intake; new proposal under preparation), JEP BNU/Beijing Normal University (agreement not renewed; discontinued in 2018), and JEP Gadjamadah/Gadjah Mada University (agreement not renewed; discontinued in 2018). As these are no longer offered, the panel did not include them in its assessment of Standard 2. In its thesis selection though, the panel did include a thesis of every available JEP (see Appendix 6).

These JEPs have been set up from a capacity building perspective: they originate from partnerships with selected partner institutions abroad, aimed to develop the teaching and research capacity of the partner institute and to focus on the exchange of staff and students. The panel considers this motivation to set up joint programmes with other institutions a valuable part of ITC's capacity building mission and was pleased to understand that the overall JEP partnership strategy is to work toward an increasingly equal relationship. This motivation is supported by the panel and since the JEPs are an integral part of the M-GEO programme, it has paid extra attention to how these JEPs tie in with the regular programme. Although this will be discussed in more detail under the following standards, the panel was satisfied to find that overall the JEPs adhere to the same standards and meet the same goals.

Connection to the professional field
In 2019, the M-GEO programme established a Professional Advisory Board, in which experts from the field participate and provide solicited and unsolicited advice about the development of the programme and its intended learning outcomes. The Board has already provided several suggestions, e.g. towards more explicit skill development. The panel realises that the Board needs time to improve itself further. Still, it recommends to pursue

a more diverse composition in the future. The predominantly white, all male composition does not reflect the rich diversity of M-GEO's staff and student bodies. The panel stresses the importance of inclusion and providing visible role models that can inspire others; more attention to a gender balance and Global South representation can be helpful in this regard. Internships and professional guest lecturers provide additional informal contacts with the professional field. Furthermore, the panel is impressed with the ITC alumni community, with ITC alumni associations in nearly thirty countries, alumni newsletters, short courses for alumni and an alumni survey in 2017. Recommendations of the respondents on the study programme were also incorporated into the new programme, starting with the 2018-2020 cohort.

Intended learning outcomes

The M-GEO programme has translated its goals into a set of 13 Intended Learning Outcomes (ILOs). An overview of the ILOs is included in Appendix 1. The ILOs are linked to the Dublin Descriptors, which ensures that the level and orientation are suitable. The panel is content that the ILOs are identical for all specialisations, as the core knowledge and skills provided to students are the same in all specialisations. Differentiation between the specialisations is constituted by the depth of knowledge and amount of experience provided to students on specialisation-specific topics.

The panel studied the intended learning outcomes listed in Appendix 1 and concludes that they are in accordance with (inter)national standards for an academic master's programme; they clearly reflect a focus on research with applied aspects, the geospatial perspective as well as the international orientation of the programme. In this sense, they match well with ITC's and University of Twente's shared vision of educating global citizens who find technological solutions for societal problems and worldwide challenges. In response to the recommendation from the previous accreditation (2014), the M-GEO programme incorporated two specific learning outcomes related to internationalisation. These were further reformed in 2018, based on input from staff, alumni and stakeholders met in projects across the world. The panel is pleased to find that the ILOs now include internationalisation goals that have been agreed on in liaison with various stakeholders.

Considerations

The post-initial academic master's programme in Geo-information Science and Earth Observation offers a wide range of expertise and application areas, with a strong link with capacity development in countries of the Global South, in line with ITC's mandate. The panel finds this mission clear and important, both for its specific contribution to understanding and solving a wide range of pressing societal problems and for its efforts in including students and institutions from parts of the world where large shares of the population have little access to technological developments. The four Joint Education Programmes are entirely consistent with this mission. The panel recognises the longstanding, excellent international reputation of the ITC Faculty and the M-GEO programme and how this serves its international students. The panel considers solving real world problems through a spatial perspective on the broad scope of the geo-information and earth observation domain within a multicultural environment from a capacity building mission as the central pillars that constitute the programme's distinctive profile. All the GI-BoK knowledge areas are covered in the programme, more focused and in-depth in each of the seven different specialisations.

The panel concludes that the programme meets the requirements from the professional field and that the active involvement with stakeholders is further intensified with the recent establishment of a Professional Advisory Board. The panel appreciates how the Board is involved in the programme's deliberations and, as an opportunity for further quality enhancement, it recommends to diversify the Board's composition more.

The programme's goals have been translated into a well-structured set of learning outcomes, which clearly reflect a focus on research with applied aspects, the (geo)spatial perspective as well as the international orientation of the programme. They are appropriate for the professional and academic practices and industrial demands for skills and competencies in the broad field of geoscience, and very relevant in an increasingly interconnected world and labour

market. They match ITC´s and UT's vision and comply with the Dublin level descriptors of the second cycle. The panel is pleased to find that the ILOs now include internationalisation goals that have been agreed on in liaison with various stakeholders.

Finally, the panel understands the motivation for changing the programme's name to M Geo-information Science and Earth Observation and agrees with it. It verified that no changes in the curriculum are made as a result of the proposed name. It recommends the change to be implemented with the registration of the reaccreditation.

Conclusion

Master's programme Geo-information Science and Earth Observation: the panel assesses Standard 1 as 'meets the standard'.

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.

Findings

Intake and entry level assessment

The M-GEO master's programme is open to students with a bachelor degree or equivalent from a recognised university in a discipline related to the master's programme (ranging from geologists to architects), preferably combined with working experience in a relevant field. The latter refers to the programme's post-initial character, though in a more informal way. M-GEO's specialisation coordinators assess the applicants' background knowledge for their domain. As all courses are given in English, proficiency in the English language at C2/C1 level is a prerequisite and needs to be demonstrated by means of internationally recognised test results, unless the applicant's nationality is mentioned on the list of select countries exempted from an English language test. These minimum English level requirements are somewhat lower than they are for most other master's programmes, which tend to require C1 level, though M-GEO does require a comparable British Council / IELTS minimum sub-score of 6.0 for speaking and writing. The panel mentions raising the standard to a C1 level as a point for consideration; though it acknowledges that the minimum score on speaking ensures that students can effectively take part in classroom discussions. The interviewed students and alumni and sampled theses also demonstrated an adequate level of English language proficiency.

Curriculum

As from 2018, the M-GEO programme was changed from an 18-month programme (118 EC) into a two-year programme (120 EC). It can be followed at ITC in Enschede or as a Joint Education Programme (JEP). The 120 EC curriculum consists of mandatory common courses (25 EC), specialisation-specific courses (28 EC), electives (22 EC), and the MSc research proposal and thesis project (45 EC). The curriculum structure is included in Appendix 3. Students choose a specialisation at the start of the programme and follow the associated curriculum. Besides the seven specialisations listed under Standard 1, an eighth option is to follow a 'free specialisation'. In this case, the student can compose an alternative course selection based on the courses on offer in the different specialisations. The study adviser assesses the student's motivation and checks whether the courses as selected by the student are feasible planning-wise.

In the first year, the common courses introduce the ten Gi-BoK knowledge areas, cover academic research skills and bring students from different backgrounds to a common level of understanding. The Global Challenges, Local Action (GCLA) course in the third quarter of the first year is a keystone course within the curriculum. It reviews core areas, boosts students' analysis and evaluation skills and adds an interdisciplinary approach by engaging students in a project-based investigation of a global issue and have them collaboratively design a solution at the local level. Also

in the first year, students take a first elective course, and four specialisation courses (7 EC each) in their chosen specialisation. This way, students start to add focus to their study path.

In the second year, students pursue an individual study programme that includes electives and the thesis project. The programme offers a wide range of elective courses, that either deepen or broaden students' knowledge. These electives can focus on specific themes, e.g. Earth Observation for Wetland Monitoring and Management (5 EC) or Geo-journalism (5 EC), or on specific methods, laboratory skills or tools, e.g. Data Assimilation (7 EC) or Python Solutions (5 EC). Another elective option is to use up to 10 EC to carry out an internship within a consultant company, government agency, research institute, NGO or intergovernmental organisation in or outside the Netherlands. The internship can have either a more professional or a more academic focus, depending on the student's intended career prospects. A growing number of students - currently, around 50 to 60 percent - opt for an internship, which the majority do outside of the Netherlands (in some cases in their home country). The programme offers adequate support to students who wish to do an internship. The panel regards the increased student interest in, and programme's support of the internship as a positive development, especially in light of the changing student population (see below).

The programme management is already aware that the 45 EC thesis load limits the flexibility of students. In its self-evaluation report, the programme stated that it is looking into possibilities to reduce the credit load of the thesis and provide more room for an extended internship. It was also a suggestion of the Professional Advisory Board to enlarge the internship further as the current size is impractical for employers and limits the tasks students can perform. The panel understands these considerations and concludes that if there would be an increased internship, it would prefer this to be done at the expense of the credit load of the thesis.

With regard to the thesis, the panel thinks that the 45 EC research-oriented thesis is rather extensive, yet it certainly adds value to the students' education, also because the entire thesis trajectory is carefully and thoroughly defined. The thesis project starts when students develop a research proposal with support and feedback from staff and peers. At the end of the first quartile of the second year, the proposal is assessed by a Proposal Assessment Board. Next, the student works independently on the individual research project, which often includes fieldwork for data collection. Meanwhile, the students regularly meet with their supervisors and actively participate in seminars and activities related to their research theme. The six interlinked research themes are those of the Faculty ITC research programme: 4D-Earth; Acquisition and quality of geo-spatial information; Forest Agriculture and Environment in the Spatial Sciences; People, Land and Urban Systems; Spatio-temporal analytics, maps and processing; and Water Cycle and Climate. With respect to the selection of topics for the individual research projects, the panel suggests the programme to find a balance between a focus on students studying a relevant issue in their home country versus a focus on students studying relevant issues elsewhere in the world in order to broaden their horizon. The mid-term presentation and final oral presentation and defence of the MSc thesis complete the trajectory. The panel values how this set-up provides students with ample opportunities to propose and analyse ideas, participate in a research environment and receive feedback on their own work and performance.

The panel studied the curriculum, teaching methods and the content of a number of courses, and discussed them with the programme management, students and teaching staff. It concludes that the curriculum has a solid design which supports the students' trajectory from understanding to designing their programme, to designing and carrying out (applied) research, to writing and presenting independently. The panel appreciates the firm foundation provided in the core courses, which helps to bring the heterogeneous student population to a common entry level in GIS and Earth Observation prior to the specialisation phase. It also approves that the curriculum has been adjusted to include more project-based learning in which students are encouraged to shape innovation. Courses are well embedded in a research context, and the students are encouraged to conduct research. The courses show a mix of theory and practice that is fitting to the profile of the programme and is appreciated by the students.

During the site visit interviews, the panel learned that previously the student population was mostly made up of mid-career professionals who brought in their own hands-on experience. With growing numbers of young BSc-graduates entering the programme, M-GEO staff recognise the need to provide more practical examples to come to a common understanding. Another effect of this student population shift is the students' growing interest in doing an internship, whereas until fairly recently, mid-career professionals already had employment, hence work experience. The panel is pleased with the way in which the programme identifies and responds to these changes in the student population.

It also noted that the programme uses a variety of (innovative) teaching methods, which help to promote student-centred learning, as well as many opportunities for feedback and reflection. The latter aspects also play an important part in M-GEO's international teaching approach in which internationalisation is regarded as a mindset and an experience. As such, the programme pays close attention to creating a culture that encourages international and multicultural learning. This extends beyond the classroom and includes various social events, such as the International Food Festival. In terms of geospatial content, the BoK knowledge areas that are applicable to the programme are (very) well reflected by the programme's courses. The new Living Textbook (LTB) is a good example of how the programme's content ties in with the GI-BoK and relevant developments in the field.

According to the panel, the pace of technological development in geo-information science and earth observation has gone up considerably recently (especially since around 2016). Of course it is important that students are confronted with theory and concepts as they are (always) discussed in the core courses. Still, it may be wise to take students along from the beginning in the expected impact of this changing environment. A modern geodata analyst needs to be able to deal with issues such as privacy, the (lack of) freedom to disclose information or 'democratised' data access results (when more people use geodata, geodata become debatable and 'fake news' may happen). The staff confirmed in the interviews that these issues may be touched upon in special course elements and the panel encourages the programme to consider these aspects for any data product a student produces in his/her exercises and thesis. In this regard, the panel applauds the increased attention to geo-ethics with the recently established Ethics Committee at ITC, the planned inclusion of an ethical paragraph in the thesis proposal and notes that ILO 11 already alludes to the importance of operating ethically.

JEP curriculum

Over the years, the M-GEO programme has also been offered in the form of various Joint Education Programmes (JEPs) as part of ITC's partnerships with education institutions around the world. The panel studied the provided overview of the JEPs, their quality assurance procedures, and a short self-reflection and implementation plan for each JEP. In addition, it interviewed the JEP coordinators at ITC and held an online meeting with the local coordinator and an alumnus of the IIRS JEP and the chair of the MSc thesis assessment board.

Currently, the ITC Faculty offers four JEPs in which students who successfully complete the programme, acquire a UT MSc degree in Geo-information Science and Earth Observation. In all cases, three criteria are met:

1) The JEP programme covers at least 60% of the in-house M-GEO programme;
2) Learning outcomes of the M-GEO programme are all met in the JEP;
3) Students spend at least 25% (6 months) of their study time in the Netherlands.

Although the JEPs may differ in content, structure and organisation, business agreements are laid down for each JEP and each has its own JEP coordinator at ITC. The coordinator has regular contact with the partner institution about the JEP curriculum design and implementation, looks after the JEP students' arrival and development at ITC, and organises the online MSc thesis defences.

Education in these programmes is partly provided by the ITC Faculty in Enschede and partly by the partner institution. Some JEP courses are modelled on the basis of, or identical to, ITC courses (with some adaptation to

local contexts, but with the same exams), taught by ITC-trained staff or (at the start) even by ITC staff. The panel concurs that leaving room to handle local cases is desirable as it helps local staff and students to get better acquainted with the subject at hand. The JEP theses are supervised by joint teams and ITC professors chair the thesis assessment committees.

The panel of the previous accreditation (2015) concluded that the quality assurance of the JEPs is well established, but it did note that drawing up a formal document with all general agreements, working guidelines, procedures and quality criteria for ITC JEPs should be a priority. The programme management has taken up this point, resulting in a policy document entitled Outline and Procedure of JEP Quality Assurance. It describes the separate quality assurance procedure for the JEPs that is issued on top of the regular quality assurance activities and Education and Examination Regulations (EER) of each of the partners. A quality check is performed for each entire JEP programme and for its particular study units at least once every three years. The check should provide evidence on how the learning outcomes, contents, teaching and learning format, study load and assessment justify that the basic quality is present at all levels. The panel supports the insightful overview and the standardised quality check, including who assumes responsibility for the various steps. It agrees that this information is required to enable the ITC Faculty and the ITC's Examination Board to issue an academic degree.

Some of the ITC's screenings, however, noted shortcomings relating to missing documentation, and the self-evaluation of JEP IIRS stated that quality control was hampered by changes in the curriculum at ITC. Specifically, the panel was triggered by the latest IIRS quality assurance evaluation in which components from the old 18-month curriculum were reviewed. The JEP coordinators reflected on these findings and pointed out several explanations. Generally, changes to the M-GEO curriculum are usually adopted one year later by the JEP partner. This way the JEP curriculum can benefit from the ITC's initial experience with and evaluations of the implemented changes. With the redesign of the M-GEO curriculum in 2018, the time lag had a larger impact than usual and this affected the quality assurance evaluation. The panel was satisfied that these differences were in scope and that a new complete quality assurance cycle would be performed once the partner had at least once executed the new two-year curriculum. It was told that as a rule, when the Dutch M-GEO standards differ, both partners have thorough discussions to come to a shared standard and maintain that standard. Failure to meet UT/ITC's quality assurance standards has in the past led to the discontinuation of a number of JEPs. Finally, the use of all types of tools for online collaboration now further facilitates a common way of handling research and courses and to achieve the right supervision. The programme management shared the panel's concerns about differences between the M-GEO and JEP programmes and indicated that it monitors the situation. The panel concludes that the M-GEO programme management and staff have a clear view of the quality control that is needed and have the necessary means to remediate if required. As such, the panel is convinced that students in all versions of the programme receive comparable quality education and are all able to achieve the learning outcomes through their curriculum.

Teaching-learning environment and feasibility

The panel finds that the programme management and staff are committed and generally succeed in creating a dedicated and stimulating international learning environment and take due account of feasibility issues and student well-being. As a result of the extension of the programme to 24 months and an overall reduction of the number of contact hours (though the first year still has ample contact hours), students now have more time to choose, reflect, and assimilate. Students reported to the panel that they feel adequately supported by the programme and that the teaching staff is open and approachable. Students can further express their views on the education offered through course evaluation surveys, programme evaluation surveys and the National Student Survey, and in group discussions or panel meetings. Students also participate in the Programme Committee, the Faculty Council and the Student Association Board. The programme committee members felt that they were heard, and their recommendations are taken seriously.

Prior to the site visit, the programme management provided the panel with a Corona Addendum in which it outlined the consequences of the coronavirus situation for the M-GEO programme and its students and staff. The panel

found that the consequences were in line with experiences of other Dutch institutes providing international programmes. The panel greatly appreciates the efforts of staff to switch to online education so swiftly with seemingly good results. Also commendable is the thorough and proactive way in which programme management and examination board re-examined the course level ILOs and tests to accommodate online teaching and assessment. Some JEP students were unable to travel to the Netherlands to attend the courses they were scheduled to follow; these were therefore offered online to them. The programme was even able to provide students with online internships. The panel was pleased to hear that the new cohort of students that started in September 2020 are having face-to-face education except those few not able to arrive because of travel restrictions. During the site visit, students reported limited negative effects and were generally satisfied with the way the M-GEO programme continued to offer its courses, guidance and assessments. The panel concludes that the programme is deftly weathering the crisis and commends it for doing so.

The panel learned from the self-evaluation report, course evaluations, and on site discussions, that there are still two points of attention with regard to feasibility. Firstly, the course scheduling structure will be adjusted to include only parallel courses as from September 2020. Students had indicated to the programme management that the initial sequential courses in the first semester followed by parallel courses in the second semester were perceived as confusing, yet course evaluations of Global Challenges, Local Action pointed out that the course running parallel with different specialisation courses made group assignments difficult to plan due to uneven peaks in workload in various specialisations. The panel understands that a uniform scheduling structure may help students to plan consistently, yet it would like to encourage the programme management to closely monitor this switch to completely parallel courses, given the concerns raised by students concerning the planning. Secondly, a side effect of the strong focus on an individual study programme in the second year is that the transition from the first to the second year can be lonely for some students. In certain cases, supervisors helped students to stay engaged. The students have proposed a shared classroom where they can meet each other and the panel understood this will be incorporated in the designs for the new building, as part of the move to the UT campus. The outlook of moving to the campus is widely viewed as a positive development with the prospect of even better facilities and better networking opportunities with the rest of UT.

Students were very satisfied with the facilities offered by the programme. These include state of the art (physical and digital) facilities, such as the library, decision room and labs. Students are further facilitated by social events, mentoring, career advice and a great many other essential services (e.g. a smooth application process, airport pick-up, housing, international cuisine). In the student chapter, ITC is even described by the students as 'their second home'. During a tour, the panel was impressed by the Group Decision Room and excellent lab facilities in the Geo-Science Lab and the fact that these are mainly used by MSc students, who - because of their limited stay at ITC - have priority over staff and PhD students. With regard to career preparation, both students and alumni felt well-supported and equipped. The annual career fair, internship and thesis provide insight into possible careers as a geo-information professional or scientist, both in academia and in the professional field. Furthermore, the programme offers an elective course, Entrepreneurship: a Bridge towards Geospatial Innovation, in which students improve their professional and academic entrepreneurial and valorisation skills by designing, evaluating and pitching a business idea. The panel approves of the career preparation within the programme and thinks that students are well-informed and prepared for their future career.

During the site visit, the panel discussed the international classroom experience with the students, alumni, staff and programme management. The student composition is highly international, with many non-European students, and with the majority of the students originating from ODA countries such as India, Kenya, Ethiopia, Indonesia and Brazil. China is also well represented. These international students qualify for Nuffic scholarships or receive funds from their home countries, whereas for Dutch students the higher tuition fee often proves to be a major obstacle. The panel noted that students and alumni greatly appreciated the opportunity to learn and work together in an international environment, to understand cultural differences and to reflect on one's own assumptions and attitudes. The ITC staff composition is also internationally diverse, with more than half the scientific staff members being non-

Dutch. To the scientific staff it is a given fact that they teach in an international context in which informal co-learning from colleagues frequently takes place, and in which bringing in international experience is a requirement.

This specific international classroom experience helps to create something of a perfect bubble, that reminded the panel of a close-knit expat community. Initially, this is a good thing as it contributes to a great sense of community, coherence and security. However, the panel challenged the M-GEO programme to consider what they may lose out on in the process: opportunities for students to interact with Dutch society and a broader exposure to international society. In a sense, this pertains to the scientific staff members as well; the panel noticed that their view on internationalisation is still very much shaped by what they experience at ITC. The panel discussed with the programme management the idea of reducing the bubble effect with some strategic measures. The programme management responded positively, indicating that it recognised this and was intent on breaking the bubble effect in various ways. It plans to facilitate more internships with Dutch companies, incorporate more assignments to do field research in the Netherlands, e.g. at the Speulderbos fiducial reference site where students interact with farmers in the data collection process. Also, the distance from the ITC building to the UT campus is considerable. Being on campus will make it easier to expose ITC students more to a wider UT influence. In this respect the projected move of the faculties' premises to the UT campus is an opportunity the programme management is proactively elaborating. The programme management is thus thinking of ways to promote the new environment, while safeguarding the good things that they have. And a fourth way of breaking the bubble effect could be to transition to a funded regular master's programme. This possibility is given serious thought, also in light of the changing student population. By comparison, the new ITC master's programme in Spatial Engineering is made up of 50 percent international and 50 percent Dutch students and this works well. The panel was pleased with the programme management's positive and forward-looking response and encourages the programme to continue to pursue these efforts of opening up the programme community to interact with the wider contexts.

Teaching language

The internationally oriented M-GEO programme is offered entirely in English under an English programme name, as it considers this the common language for both the academic and professional field of geo-information science and earth observation. This is also in line with the UT language policy which considers English the leading language in the organisation and the leading language of instruction. As active researchers in the field, all the teaching staff sufficiently master the English language. Upon hiring, the university requests teachers to either show or obtain a Qualification of English Proficiency at level C1. Students are satisfied with the English language proficiency of their teachers. The panel fully supports the use of English in the master's programme, given its capacity building mission aimed at the Global South, the students' backgrounds (on average over 20 nationalities per cohort), the international classroom, ITC's internationally oriented research and the global labour market. The panel is positive about the proficiency qualification required of the teaching staff and with the oral proficiency demonstrated in the meetings with the panel.

Teaching staff

The self-evaluation report indicates that in 2019 ITC employed 163 scientific staff members, 120 of whom devoted at least 30 percent of their time to teaching. With 250 students enrolled in ITC programmes at UT, this provides an exceptionally low student-staff ratio. From an overview of teaching staff online CVs and qualifications, the panel concluded that the teaching staff is highly competent in their fields and many conduct research on international projects. As such, many have intensive contact with international colleagues abroad. The staff composition is diverse; more than half of the scientific staff members have a non-Dutch nationality. Furthermore, all staff meet English language proficiency requirements (see above), and most have passed their UTQ, which demonstrates didactic skills. Five ITC staff had completed their Senior University Teaching Qualification (SUTQ). Further professionalisation is encouraged by the ITC faculty, and ITC's Education Development Unit regularly offers education seminars and courses for staff. UT also organises internationalisation courses for staff, in which about 25 staff members haven taken part so far. The panel appreciates their efforts, especially because the international environment is such an important characteristic of this programme. It recommends promoting further reflection on and development of a

shared international classroom concept, for instance through intervision or professional development courses. The panel also encountered two staff members who had carried out interesting internationalisation projects as part of their SUTQ. The follow-up was in one case unfortunately only informal, with a staff member sharing outcomes with colleagues, while the other project resulted in an innovative course on entrepreneurship, namely the elective course Entrepreneurship: a bridge towards Geospatial Innovation. In the panel's view, these types of projects can really function as a leverage in innovation within programmes and it suggests to embed its findings into the programme. Overall, it concludes that the quantity and quality of staff is very good, that staff has relevant expertise and sufficient didactic skills.

Considerations

The M-GEO programme has adequately translated its intended learning outcomes into a coherent curriculum that takes students to an advanced level of geospatial science and technological applications at the end of the programme. The panel considers the extension to a two-year programme a wise decision as this spreads the study load more and gives students more time to reflect on their study. The BoK knowledge areas that are applicable to the programme are (very) well reflected by the programme's courses. The courses show a mix of theory and practice that matches the profile of the programme. After a shared set of common courses which cover the core knowledge and skills, students can shape the curriculum along their own preferences by selecting specialisation courses and electives. This includes an optional internship that has garnered increased student interest. If the internship were to be extended, the panel would prefer to do this in exchange for some of the credit load of the thesis. With a 45 EC workload, the thesis is fairly large, even if the panel notes that this certainly adds value to the students' education and that the entire thesis trajectory is most carefully and thoroughly defined.

Although the JEPs may differ in content, structure and organisation from the in-house M-GEO programme and that some time lag is to be expected in implementing changes to the curriculum, the panel established that these differences are in scope, and do not get in the way of achieving the intended learning outcomes. The JEP coordinators are in close contact with the partner institutions and support the JEP students in the ITC part of their studies. Together with a now formalised outline of the JEP quality assurance cycle and the detailed and standardised regular JEP quality checks, the panel concludes that this sufficiently ensures that these programmes meet the same standards.

The panel observed no major feasibility obstacles and commends the programme for deftly weathering the coronavirus situation. It encourages monitoring two recognised feasibility issues – the switch to parallel course scheduling and the transition from the first to second year - for which solutions have already been proposed and partly implemented. In addition, the programme offers a variety of (innovative) teaching methods, also to promote student-centred learning, as well as many opportunities for feedback and reflection, in a dedicated international learning environment combining state of the art (physical and digital) facilities, social events, mentoring, career advice and a great many other essential services (e.g. a smooth application process, airport pick-up, housing, international cuisine). The close-knit international community can be qualified as a bubble and though the panel appreciates its many advantages, it invites the programme to expand its horizon more. The panel was pleased to hear about the programme management's ideas to move in that direction.

The teaching staff is of high quality, both in terms of expertise and didactic skills, and forms a motivated team. The panel recommends promoting further reflection on and the development of, a shared international classroom concept, for instance through intervision or professional development courses. The use of English as language of instruction is well-motivated and implemented and fits the internationally oriented field in which students are likely to work.

In conclusion, the panel finds that the programme offers students a teaching-learning environment that enables them to achieve the ILOs.

Conclusion

Master's programme Geo-information Science and Earth Observation: the panel assesses Standard 2 as 'meets the standard'.

Standard 3: Student assessment
The programme has an adequate system of student assessment in place.

Findings

Assessment system

The assessment system is guided by the UT assessment guidelines and framework. The self-evaluation report, the Education and Examination Regulations (EER) and online appendix *M-GEO Education Regulations* explain the procedures, documentation and responsibilities at all levels. The panel studied the assessment system of the programme and established that it demonstrates that the study cycle is step-by-step safeguarded. The assessment plan makes the alignment of the assessment system with the intended learning outcomes explicit at the programme and course level. It also provides information on the assessment formats, marking system and weight. The panel finds the assessment system transparent, well-scheduled and extensively documented, allowing mutual feedbacks between examiners and students. The self-evaluation report also explains which measures are taken to promote (academic) integrity and avoid or repair irregularities, especially plagiarism. According to the panel, to have a faculty Ethics Committee is both commendable and indispensable; not only to protect students, staff and their institutions, but also, and equally important, any external stakeholders.

The quality of test results and theses demonstrated a normal distribution, reflecting an overall good standard. Only few M-GEO students received a mark of 6.0 or failed their master's thesis, and the high average of 7.6 reflects the dedication that international students demonstrate. The programme is aware of the high number of cum laude graduates after switching to the Dutch 1-10 marking scale, first applied to the 2019 theses. It has checked that this is no longer the case as of 2020. Rubric adjustments were applied to the 2020 theses, which provided examiners with clearer boundaries to choose between marks.

The panel also studied an overview of the assessment methods and criteria per course, and some examples of exams used within the programme. It concludes that there is sufficient variation in assessment types and that these are fitting to the learning outcomes involved. Frequently used are individual and group assignments, oral presentations, individual self-reflections and peer reviews. Some of these assessments monitor individual knowledge competencies and research skills, whereas others tie in well with the programme's emphasis on multi-disciplinary aspects of research and project-based learning. For instance, the Global Challenges, Local Action (GCLA) course is assessed by one individual written mid-term test (50%) and one group project (50%). The interdisciplinary and project-based group assignment creates a learning situation in which students from different specialisations work together. The panel appreciated that the rubric assessment criteria were well specified as this helps staff and students to recognise the desired results and attitude, though they could be linked more clearly to the learning outcomes (see below). In the study guide and in the electronic learning environment, students are well informed about relevant aspects of the assessment.

During the site visit, the panel discussed specifically the assessment of the international intended learning outcomes (ILOs 10 and 11) throughout the curriculum with the various programme representatives. The motive for this discussion was that these ILOs are not assessed in the thesis. The CeQuInt self-evaluation report indicated that all internationalisation ILOs are already achieved in year 1, with valorisation through the internship in year 2. The CeQuInt documentation also included the student assignments in four core courses aimed at the assessment of ILOs 10 and 11. The panel established that in the Mapping Cultures exercise of the GIS core course, ILO 10 is very much addressed in a fitting way, not with a summative but formative assessment, and the same holds for the other

two core courses and GCLA. From interviews with staff, it gathered that ILO 11 is assessed in a common data integration assignment, where students get a real case from a GIS application and reflect on how this could be implemented in their country. The map is put to broader discussions on how spatial data are used in their professional environment, what obstacles people have in building trust on using data, and to what extent data are shared in an ethical way. In the GCLA course, students do the assignment in a multicultural environment and professionalism and ethics are implied in the assessment of GCLA, but the panel recommends to address these aspects more explicitly in the assessment rubrics, which also helps to define what is expected of students.

Finally, the programme management intends for internationalisation learning outcomes to be part of the thesis assessment. So far, the programme committee has seemed reluctant regarding this issue, claiming that internationalisation is not clearly identifiable in the (more theoretical) MSc Research projects. The panel understands the programme committee's objection to adding criteria that may not add value to the students' work, yet it feels that meaningful incorporation is possible. With respect to these ILOs and their incorporation into the thesis assessment, the panel is very much in support of the programme management's ambition to include them and evaluate this in the near future.

Assessment thesis

The panel finds the thesis assessment procedure of the MSc Research to be transparent and particularly rigorous, and considers it a best practice. The assessment of the individual research work of the thesis consists of four elements: 1) a detailed research proposal presented to a proposal assessment board; 2) a mid-term presentation as a half-way formative assessment to monitor progress; 3) the MSc Research exam request upon approval by the first supervisor; and 4) the MSc Research exam, consisting of the assessment of the thesis and its oral defence by a thesis assessment board, including an external examiner from a respected institution. The panel notes that recommendations from the previous review and accreditation panel have been incorporated and have led to improvements in the thesis procedure. The panel also studied the assessment form and the use thereof in a selection of theses of the programme. It was satisfied to find that, in general, the final reports provide quite extensive written reports. It concludes that the assessment procedure for research projects is sound and that the structure of the assessment form promotes a transparent grading process.

Assessment JEPs

From the annual reports of the EB and the on-site discussions, the panel learned that obtaining the documentation for the evaluation of JEP courses has been a lengthy process taking several years. Besides the general JEP quality assurance procedure, the panel received for each JEP a short JEP-specific self-evaluation, and for the JEP IIRS and JEP KNTU specific quality assurance documentation for the 2017-2019 programme, as well as test screenings (one for JEP IIRS and one for JEP KNTU). The evaluation reveals that the tests were largely, though not fully, valid, reliable and transparent. The panel concludes that the quality assessment of partners in JEPs is not always entirely consistent with the in-house assessment and that this is likely to be caused by the time lag in the documents and the transition to a two-year curriculum. If additional issues lie at the root of this difference, it is important that the programme knows this at an early stage. The documentation was occasionally still incomplete or inconclusive. These gaps were identified by the programme and resulted in recommendations to the educational programme partner. The documentation confirms that the JEP coordinators sent the feedback to the related module coordinators to be implemented the following year. The observations also show that performing these quality checks has in itself helped M-GEO to sharpen procedures and redefine which information is needed from the JEP programmes.

The panel understands that the procedure for quality assurance of JEPs is relatively new, that it needs further development, and it notes that the right questions are being asked. In that regard, it is convinced that the EB's persistent attention to, and detailed examination of, the evaluation of JEP courses have proven to be crucial to ensure the JEP programmes are of comparable quality. The panel also takes into account that the thesis assessment procedure is the same as for the in-house programme, that supervision is generally done jointly and that the MSc research exam is always done under the responsibility of a thesis assessment board, presided by a chair of ITC.

Because of this, ITC representatives play an important part in the final assessment and the assessment provides the M-GEO programme with valuable insight into the final level that JEP students achieve. In conclusion, the panel considers the JEP programmes sufficiently equivalent in terms of contents, learning objectives and assessment to the in-house programme, but recommends to continue performing the JEP quality assurance procedure thoroughly and completely for all JEPs.

Examination Board

The ITC Examination Board is responsible for safeguarding the quality of assessments and providing assurance that the programme learning outcomes are met by all ITC graduates. The Board consists of five members, four of whom work at ITC faculty as scientific staff members. The fifth (external member) works as an education specialist at the UT Centre of Expertise on Learning and Teaching. The Board meets seven to eight times a year. As of 2016-2017, the Board annually selects a number of courses to check whether the course learning outcomes adhere to the programme learning outcomes and whether the assessment is adequately done. The panel studied three test screenings and established these are extensive reports per course following the rubrics of the screening documentation. It is pleased to note the attention for correctly formulated ILOs, and their achievement, test plans, formulations of goals of assignment, level of testing according to Bloom's taxonomy, student evaluation of the course, summative and formative balance etc. The education specialist and a peer do the screening, followed by a discussion with the examiner. The examiner writes a reflection which is usually followed by an improvement plan. After a year the EB monitors the follow-up. Furthermore, it has worked on procedures for remote assessment, it requires the UTQ for appointing staff as examiner (or for new staff members, entering a UTQ course), and it prepared and discussed a document describing the consequences for the introduction of the Dutch-UT marking system at ITC (marks from 1-10 instead of 0-100). Based on its meeting with the Board during the site visit, and after studying the annual reports and test screenings, the panel concludes that the Board is on top of quality control.

Considerations

The M-GEO programme has developed a solid system of assessment, which is based on the UT-wide and ITC-wide assessment policies. Sufficient attention is paid to the validity, reliability and transparency of the examinations. The assessment methods are varied and fit the goals of the programme. The panel signalled two points of particular interest: the assessment of ILOs 10 and 11 on internationalisation, and assessment in the JEP programmes. Upon closer inspection of ILO 10 and 11 assessment, the panel established that all ILOs are assessed in the curriculum; ILO 10 and 11 in the core curriculum as well as in some later specialisation courses and the (optional) international internship. The panel suggests that the programme reviews how ILO 11 is best assessed throughout the curriculum. The panel is very much in support of plans to include international intended learning outcomes into the thesis assessment and evaluate its functioning in the near future. With regard to the JEP assessments, the panel noted that although the provided documentation is sometimes not yet fully transparent, meetings with programme representatives and a JEP representative show that the JEP evaluations are making progress, are taken seriously and contribute to improving the quality assurance procedure itself. The panel also takes into account that the thesis procedure at the JEPs is the same as for the in-house programme and that M-GEO staff is involved in the thesis supervision and assessment. The panel considers the JEP programmes sufficiently equivalent in terms of contents, learning objectives and assessment to the in-house programme, but it recommends to continue performing the JEP quality assurance procedure thoroughly and completely for all JEPs.

Two important strong points of M-GEO's student assessment are the thesis assessment and the Examination Board. The thesis assessment procedure and forms are well-designed and allow for a solid underpinning of the final grade. The EB proactively fulfils its role in the quality assurance of assessment and has sound procedures in place to monitor the quality of exams and theses. The panel commends the EB for stimulating colleagues to reflect upon their work and improve it.

Conclusion

Master's programme Geo-information Science and Earth Observation: the panel assesses Standard 3 as 'meets the standard'.

Standard 4: Achieved learning outcomes

The programme demonstrates that the intended learning outcomes are achieved.

Findings

Theses

Prior to the site visit, the panel studied a total of 19 theses of the master's programme Geo-information Science and Earth Observation; 15 had been selected and 4 theses from the 2018-2020 cohort that became available right before the site visit were added by the programme to provide further insight into the most recent final work and updated thesis assessment instructions. Without exception, they sufficiently demonstrated, in the panel's view, that the graduates realised the assessed ILOs. The panel was in general impressed with the good academic level of the theses and found that the candidates demonstrated ample knowledge in the professional domain of producing, handling and interpreting geodata. As the ILOs with respect to internationalisation and intercultural learning are not covered in the thesis - including the most recent theses, the panel probed further into the curriculum, and looked extensively into several course assignments covering these ILOs (see the discussion under Standard 3), after which it found evidence that the students do fulfil ILO 10 and 11. Because the internationalisation ILOs are already achieved in year 1, the panel also considered the international internship survey amongst employers as an important indicator for the achieved learning outcomes. more specifically the professional skills. The survey showed that companies are largely positive about the know-how and skills of the interns, especially their adaptation to a professional environment, cooperation with colleagues and attitude towards colleagues. These indicators can be linked to internationalisation and intercultural learning as well.

Position of graduates

The position of graduates after completion of the M-GEO programme underlines that the students achieve the ILOs. The respondents to the 2017 alumni survey were positive to very positive about their experience with the M-GEO study programme, and the employability rate of M-GEO graduates is more than 90%. Many M-GEO graduates come to hold relevant and influential positions in their home countries or abroad. Alumni and student surveys and feedback sessions, including the student chapter in the SER, indicated satisfaction with the programme and overall achievement of the learning outcomes. From the alumni interviews it was clear that alumni generally felt that the programme has provided them with a solid foundation from which they can benefit their respective careers.

Considerations

The panel reviewed a selection of theses that were produced by students of the M-GEO programme. It agreed with the grades given by the supervisor and examiners. The employability of the graduates is good and given the growing importance of geo-information science, technologies and applications, so is their outlook. Based on the selection of master's theses and course assignments on internationalisation, the evaluation of student performance in the international internship, the alumni survey and interviews with alumni during the site visit, the panel concludes that students realise the ILOs as formulated by the programme.

Conclusion

Master's programme Geo-information Science and Earth Observation: the panel assesses Standard 4 as 'meets the standard'.

GENERAL CONCLUSION

According to the panel, the master's programme Geo-information Science and Earth Observation has a strong international profile based on ITC's capacity building mission and a focus on student centred, active learning aimed at solving geospatial problems and dealing with geospatial issues for the benefit of society. The panel appreciates the solid foundation offered in the core courses, the combination of theory and application in and between the courses, and the high quality of staff. Strong points are the thorough thesis trajectory and dedicated international learning environment. JEP assessment evaluation is clearly on the agenda and the panel observes that the implementation of an all-round quality assurance cycle is well on its way. Assessment of the ILOs is covered in assessment plans and the panel verified that the ILOs are achieved.

The panel's judgement on standards 1, 2, 3 and 4 for the master's programme Geo-information Science and Earth Observation at University of Twente is 'meets the standard'. Therefore, according to the rules of the Accreditation Organisation of the Netherlands and Flanders, the general and final judgement is positive.

Conclusion
The panel assesses the *master's programme Geo-information Science and Earth Observation* as 'positive'.

APPENDICES

APPENDIX 1: INTENDED LEARNING OUTCOMES

At the successful completion of the Master's programme, the student is able,

within the domain/academic field to:

1. Identify and explain principles, concepts, methods and techniques relevant for Geo-Information processing and earth observation.
2. Analyse problems and cases from a (geo-)spatial perspective.
3. Use and design models to simulate (or: study) processes in the system earth with a spatial component.
4. Apply principles, concepts, methods and techniques in the context of system earth, the user and an application domain to solve scientific and practical problems.
5. Independently design and carry out research in the domain according to scientific quality standards

scientifically to:

6. Analyse issues in an academic manner and formulate judgments based on this.
7. Analyse scientific and practical domain problems in a systematic manner and develop scientifically valid solutions for these problems in a societal context.
8. Communicate both orally and in writing on findings of research work to specialists and non-specialists.
9. Explore the temporal and social context of geo-information science and technology and be able to integrate these insights into scientific work.

with regards to internationalization to:

10. Explain and contrast cultural and contextual differences that influence the collection, classification and visualization of spatial information.
11. Operate professionally and ethically in a multicultural environment.

in general to:

12. Critically reflect on own and other's work.
13. Study in a manner that is largely self-directed and autonomous.

These learning outcomes at programme level are worked out into specific intended learning outcomes (ILOs) at course level. These specific ILOs can be found in the study guide of the MGEO programme.

APPENDIX 2: REFERENCE FRAMEWORK GEOGRAPHIC SCIENCE & TECHNOLOGY BODY OF KNOWLEDGE

Data Manipulation

DN1 Representation transformation
1-1 Impacts of transformations
1-2 Data model and format conversion
1-3 Interpolation
1-4 Vector-to-raster and raster-to-vector conversions
1-5 Raster resampling
1-6 Coordinate transformations

DN2 Generalization and aggregation
2-1 Scale and generalization
2-2 Point, line, and area generalization
2-3 Classification and transformation of attribute measurement levels
2-4 Aggregation of spatial entities

DN3 Transaction management
3-1 Database change
3-2 Modeling database change
3-3 Reconciling database change
3-4 Managing versioned geospatial databases

Geocomputation

GC1 Emergence of geocomputation
1-1 Origins
1-2 Trends

GC2 Computational aspects and neurocomputing
2-1 High performance computing
2-2 Computational intelligence
2-3 Non-linearity relationships and non-Gaussian distributions
2-4 Pattern recognition
2-5 Geospatial data classification
2-6 Multi-layer feed-forward neutral networks
2-7 Space-scale algorithms
2-8 Rule learning
2-9 Neural network schemes

GC3 Cellular Automata (CA)
3-1 CA Model Structure
3-2 CA Transition Rule
3-3 CA simulation and calibration
3-4 Integration of CA and other geocomputation methods
3-5 Typical CA applications

GC4 Heuristics
4-1 Greedy heuristics
4-2 Interchange heuristics
4-3 Interchange with probability
4-4 Simulated annealing
4-5 Lagrangian relaxation

GC5 Genetic algorithms (GA)
5-1 GA and global solutions
5-2 Genetic algorithms and artificial genomes

GC6 Agent-based models
6-1 Structure of agent-based models
6-2 Specification of agent-based models
6-3 Adaptive agents
6-4 Microsimulation and calibration of agent activities
6-5 Encoding agent-based models

GC7 Simulation modeling
7-1 Simulation modeling

GC8 Uncertainty
8-1 Conceptual model of uncertainty
8-2 Error
8-3 Problems of scale and zoning
8-4 Propagation of error in geospatial modeling
8-5 Theory of error propagation
8-6 Problems of currency, source, and scale

GC9 Fuzzy sets
9-1 Fuzzy logic
9-2 Fuzzy measures
9-3 Fuzzy aggregation operators
9-4 Standardization
9-5 Weighting schemes

Geospatial Data

GD1 Earth geometry
1-1 History of understanding Earth's shape
1-2 Geoids
1-3 Spheres and ellipsoids

GD2 Land partitioning systems
2-1 Unsystematic methods
2-2 Systematic methods

GD3 Georeferencing systems
3-1 Geographic coordinate system
3-2 Plane coordinate systems
3-3 Tessellated referencing systems
3-4 Linear referencing systems

GD4 Datums
4-1 Horizontal datums
4-2 Vertical datums

GD5 Map projections
5-1 Map projection properties
5-2 Map projection classes
5-3 Map projection parameters
5-4 Georegistration

GD6 Data quality
6-1 Geometric accuracy
6-2 Thematic accuracy
6-3 Resolution
6-4 Precision
6-5 Primary and secondary sources

GD7 Land surveying and GPS
7-1 Survey theory and electro-optical methods
7-2 Land records
7-3 Global Positioning System

GD8 Digitizing
8-1 Tablet digitizing
8-2 On-screen digitizing
8-3 Scanning and automated vectorization

GD9 Field data collection
9-1 Sample size selection
9-2 Spatial sample types
9-3 Sample intervals
9-4 Field data technologies

GD10 Aerial imaging and photogrammetry
10-1 Nature of aerial image data
10-2 Platforms and sensors
10-3 Aerial image interpretation
10-4 Stereoscopy and orthoimagery
10-5 Vector data extraction
10-6 Mission planning

GD11 Satellite and shipboard remote sensing
11-1 Nature of multispectral image data
11-2 Platforms and sensors
11-3 Algorithms and processing
11-4 Ground verification and accuracy assessment
11-5 Applications and settings

GD12 Metadata, standards, and infrastructures
12-1 Metadata
12-2 Content standards
12-3 Data warehouses
12-4 Exchange specifications
12-5 Transport protocols
12-6 Spatial Data Infrastructures

GIS&T and Society

GS1 Legal aspects
1-1 The legal regime
1-2 Contract law
1-3 Liability
1-4 Privacy

GS2 Economic aspects
2-1 Economics and the role of information
2-2 Valuing and measuring benefits
2-3 Models of benefits
2-4 Agency, organizational, and individual perspectives
2-5 Measuring costs

GS3 Use of geospatial information in the public sector
3-1 Uses of geospatial information in government
3-2 Public participation in governing
3-3 Public participation GIS

GS4 Geospatial information as property
4-1 Property regimes
4-2 Mechanisms of control of geospatial information
4-3 Enforcing control

GS5 Dissemination of geospatial information
5-1 Incentives and barriers to sharing geospatial information
5-2 Data sharing among organizations and individuals
5-3 Legal mechanisms for sharing geospatial information
5-4 Balancing security and open access to geospatial information

GS6 Ethical aspects
6-1 Ethics and geospatial information
6-2 Codes of ethics for geospatial professionals

GS7 Critical GIS
7-1 Epistemological critiques
7-2 Ethical critiques
7-3 Feminist critiques
7-4 Social critiques

Organizational & Institutional Aspects

OI1 Origins of GIS&T
1-1 Public sector origins
1-2 Private sector origins
1-3 Academic origins
1-4 Learning from experience
1-5 Future trends

OI2 Managing the GI system operations and infrastructure
2-1 Managing the GI system operations and infrastructure
2-2 Ongoing GI system revision
2-3 Budgeting for GI system management
2-4 Database administration
2-5 System management
2-6 User support

OI3 Organizational structures and procedures
3-1 Organizational models for GI system management
3-2 Organizational models for coordinating GI systems and/or program participants and stakeholders
3-3 Integrating GIS&T with management information systems (MIS)

OI4 GIS&T workforce themes
4-1 GIS&T staff development
4-2 GIS&T positions and qualifications
4-3 GIS&T training and education
4-4 Incorporating GIS&T into existing job classifications

OI5 Institutional and inter-institutional aspects
5-1 Spatial data infrastructures
5-2 Adoption of standards
5-3 Technology transfer
5-4 Spatial data sharing among organizations
5-5 Openness
5-6 Balancing data access, security, and privacy
5-7 Implications of distributed GIS&T
5-8 Interorganizational and vendor GI systems

OI6 Coordinating organizations
6-1 Federal agencies and national and international organizations and programs
6-2 State and regional coordinating bodies
6-3 Professional organizations
6-4 Publications
6-5 The geospatial community
6-6 The geospatial Industry

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The *Geographic Information Science and Technology Body of Knowledge* may be ordered online from the AAG at www.aag.org/bok or by mailing or faxing this form to:

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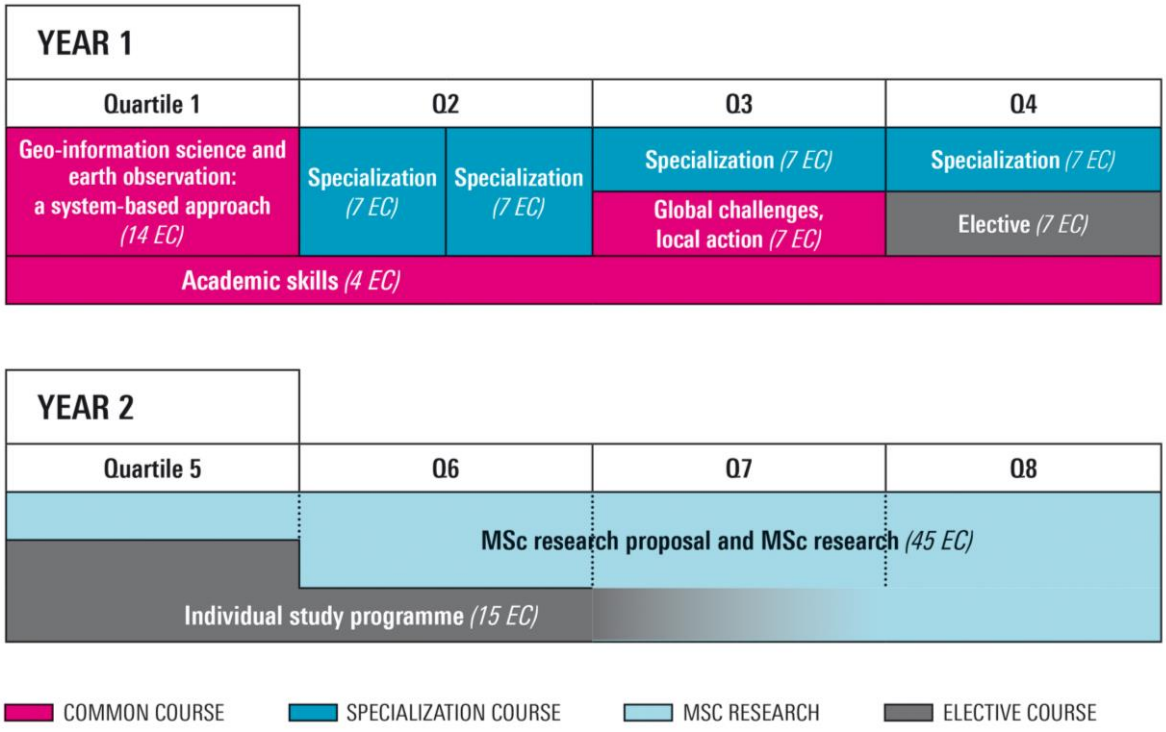
APPENDIX 3: OVERVIEW OF THE CURRICULUM

Please note: the (optional) internship is not listed separately in the overview; it is included as an elective of up to 10 EC.

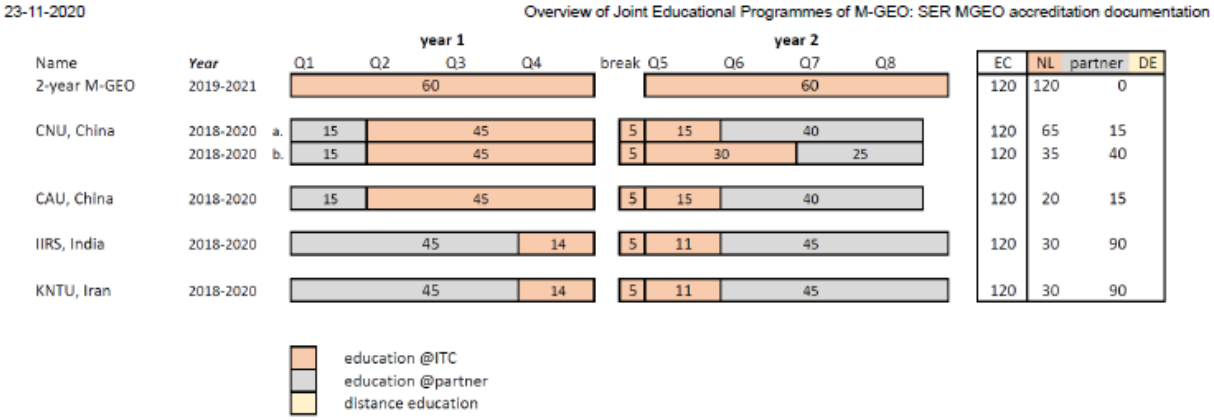


APPENDIX 4: OVERVIEW OF THE JOINT EDUCATION PROGRAMMES

The following Joint Education Programmes are being offered in cooperation with partner universities and institutes within the Master's programme (as per academic year 2017-2019):

JEP-partner	Location	Programme title	Specialisation offered	Joint, Double
Indian Institute for Remote Sensing (IIRS)	Dehradun, India	Geo-information Science and Earth Observation for Geoinformatics	GFM	Single Degree
Chang 'An University (CAU)	Xi'An, China	Geo-information Science and Earth Observation	All	Double Degree
Capital Normal University (CNU)	Beijing, China	Geo-information Science and Earth Observation	All	Double Degree
Khajeh Nasir Toosi University of Technology (KNTU)	Tehran, Iran	Geo-information Science and Earth Observation for Geoinformatics	GFM	Double Degree

The following diagram shows the distribution of programme ECTS between the UT and the partner Universities. 'Education @ ITC' means that all participating JEP students attend the classes of the regular 2-Year M-GEO programme during these periods.



APPENDIX 5: PROGRAMME OF THE SITE VISIT

28 September 2020
Location: IntercityHotel Enschede

17:00-19:00	Preparatory internal panel discussion
19:00	Dinner (panel meeting)

29 September 2020
Location: ITC Building

08:00-08:25	Arrival of the panel at ITC
08:30-08:45	Welcome by Faculty Board
08:45-09:25	Meeting Programme management & M-GEO-presentation
09:30-10:30	Showcase by students of the M-GEO programme
10:30-11:45	Internal panel discussion
11:50-12:10	Meeting M-GEO Alumni (timezone dependent)
12:15-12:45	Lunch
12:45-13:00	Internal panel discussion
13:00-13:50	Meeting Students (including PC members)
13:50-14:10	Break/Internal panel discussion
14:10-14:50	Meeting Teaching Staff (incl. internationalisation) (including PC members)
14:50-15:00	Break/Internal panel discussion
15:00-16:15	Site visit tour
16:15-17:00	Consultation hour
17:00-17:45	Internal panel discussion – programme management available for questions
17:45-18:30	Travelling to the hotel / restaurant
18:30	Dinner (panel meeting)

30 September 2020
Location: ITC Building

08:15-08:30	Arrival of the panel at ITC
08:30-09:00	Meeting a JEP partner and alumni (IIRS) (timezone dependent)
09:00-09:20	Meeting JEP Programme Coordinators
09:20-09:30	Break/Internal panel discussion
09:30-10:10	Examination Board
10.10-11:15	Internal panel discussion
11:15-11:45	Final interview with Programme Management/Education Management
11:45-12:30	Deliberations panel (formulating preliminary findings and conclusions)
12:30-13:00	Lunch
13:00-13:30	Initial feedback to the management, closing of formal site visit
13:30-14:15	Development dialogue
14:30-14:45	Panel presentation of preliminary findings to staff and students
14:45-15:30	Drinks
15:30	Departure

APPENDIX 6: THESES AND DOCUMENTS STUDIED BY THE PANEL

Thesis selection

Prior to the site visit, the panel studied a total of 19 theses of the master's programme Geo-information Science and Earth Observation; 15 had been selected and 4 more recent theses from the 2018-2020 cohort were added later to provide further insight into the most recent work and updated thesis assessment instructions. The original selection of 15 was based on two provided lists, one of 117 graduates of the 2016-2018 cohort, and one of 128 graduates of the 2017-2019 cohort, including information on the 7 specialisations and Joint Education Programmes (JEPs); the discontinued JEPs are marked grey. A variety of topics and a diversity of examiners were included in the selection. The project manager and panel chair assured that the distribution of grades in the selection matched the distribution of grades of all available theses. This resulted in the following distribution:

Specialisation	**Theses 2017-2019**	**Theses 2016-2018**	**Thesis selection**
Applied Remote Sensing for Earth Sciences (AES)	11	10	1 (JEP Gadjamadah: 1)
Geoinformatics (GFM)	42	20	5 (JEP IIRS: 2; JEP CNU: 1)
Geo-information Management for Land Administration (GIMLA)	5	17	1 (JEP CAU: 1)
Natural Resources Management (NRM)	30	23	3 (JEP BNU: 1; JEP GISNATUREM: 1)
Urban Planning and Management (UPM)	17	22	2 (JEP DD Bandung: 1)
Water Resources and Environmental Management (WREM)	15	17	2
Natural Hazards and Disaster Risk Reduction (NHR)	8	8	1
Total	**128**	**117**	**15**

Joint Education Programme	**Theses 2017-2019**	**Theses 2016-2018**	**Specialisations included**
JEP IIRS	12	8	GFM
JEP KNTU*	0	0	
JEP CAU	9	9	AES / GIMLA / UPM / GFM / WREM
JEP CNU	0	4	GFM / UPM / WREM
JEP GISNATUREM	4	0	NRM
JEP GEM	0	0	
JEP DD Bandung	0	1	UPM
JEP BNU	0	1	NRM
JEP Gadjamadah	0	1	AES

* The JEP KNTU programme started in 2012 as JKIP and was revised into JEP KNTU which started again in 2017; there were no theses available yet to review.

Documents studied

During the site visit, the panel studied, among other things, the following documents (partly as hard copies, partly via the institute's electronic learning environment):

- Self-evaluation Report
- Annexes linked in the Self-evaluation Report:

1. ITC Vision 2020
2. UTwente Shaping 2030

3. The GIS and EO Body of Knowledge
4. Living Textbook and the GI and EO Body of Knowledge
5. The M-GEO Professional Advisory Board
6. Self-Assessment Report for the Certificate for Quality in Internationalisation
7. M-GEO online study guide
8. Joint Education Programmes of M-GEO
9. Final Report Alumni Survey ITC 2017
10. Overview International Fieldwork locations
11. International staff and language Policy UT
12. ITC Vision on education (revised version 2017)
13. Origin of students
14. Services for students
15. Quality Agreement Plan of the University of Twente
16. Quality of Agreement Plan of the ITC Faculty
17. UT Policy Framework Educational Quality Assurance (updated Jan 2017)
18. VSNU Code of Conduct with respect to International Students in Dutch Higher Education
19. Internal Quality Assurance at the Faculty ITC
20. Programme Committee ITC
21. Annual Reports of the Programme Committee
22. EvaSys report - GEO - Global challenges local action Q3 1819.pdf
23. Study unit evaluations at the Faculty ITC
24. PDCA at Faculty level
25. Procedure for quality control of tests
26. Transition of the curriculum into a 2-year programme
27. M-GEO Education Regulations
28. Education and Examination regulations of the Faculty ITC
29. Step-by-step Guide for examination
30. Rules and Regulations of the Examination Board
31. Assessment Rubrics of Global Challenges Local Action
32. Instructions for the Proposal Assessment Board
33. Mid-term assessment of the MSc thesis
34. Instructions for the Thesis Assessment Boards
35. SimCheck by TurnitIn
36. Diplomas and Diploma Supplements
37. Plagiarism
38. ITC Ethics Committee
39. The ITC Examination Board
40. Rules of procedure of the examination board
41. Annual Reports of the Examination board
42. End works and grades of the M-GEO programme
43. The Dutch Grading System, University of Twente
44. Marks and Cum Laude comparison 2015-2019
45. National Student Evaluation (NSE) Keuzegids Masters

- Appendix 8: Overview of Course coordinators with link to CV's
- Corona (COVID-19) Addendum (COVID-19 related measures and activities implemented between February and August 2020)

Annex SER: Surveys
- Course evaluation results of internationalisation the common courses and overall study programme

- Internationalisation 2019
- Alumni Survey 2017 results
- Customer Satisfaction 2019 Survey

Appendix SER: Quality Assurance of the education at the Faculty ITC
- Programme Assessment Criteria for Internal Quality Assurance
- Quality-assurance-framework-student-assessment-ut.pdf
- UT announcement ITK.pdf
- Test Screening

Annex SER 2: Overview of M-GEO ILOs and curriculum
- PDF document of the full M-GEO study guide
- Diagrammatic overview of the curriculum
- Intended Programme Learning Outcomes of the M-GEO programme
- Linking the ILOs of M-GEO with the Dublin Descriptors
- Linking to the Domain Specific Reference Framework
- Relation between Course and Programme Learning outcomes
- Blooms-Taxonomy-Handout
- Average final grades of M-GEO graduates

Appendix SER: Teaching and examination regulations
- Assessment instructions for end works of the programme
- Internship manual for students

Appendix SER: Staff with names, positions, size of appointment, degree and expertise
- Overview of Staff Nationalities and Positions (UFO)

Appendix SER: Terms of reference for the Professional Advisory Board
- Terms of Reference for the M-GEO Professional Advisory Board
- Members of the M-GEO Professional Advisory Board
- Summary of the first meeting of the Professional Advisory Board

Appendix SER: The teaching and learning environment of students in M-GEO
- The Four Pillars of the ITC Learning Environment
- University plan student well-being
- Additional Student Services
- ITC study career counselling policy
- Facilities for Students
- Additional Student facilities

Annex SER: Staff Composition and CV's
- Academic Staff nationalities and UFO profiles
- Staff CV's and experience

Appendix SER: Joint Education Programmes
- Overview of Joint Educational Programmes of M-GEO
- Outline and Procedure of JEP Quality Assurance
- JEP with Chang'an University - Xian, China
- JEP with Capital Normal University - Beijing, China
- JEP with IIRS - Dehra Dun, India

- JEP with KNTU - Tehran, Iran

Appendix SER: Student, origin, Internship and fieldwork locations
- Country of origin of M-GEO Students admitted in 2017 and 2018
- BJK_M-GEO_2018_Internship.pdf
- Map of all alumni of ITC (1950-2018)