



# Master Metropolitan Analysis, Design and Engineering

MADE Programme Booklet



#### Degree

Master of Science

Joint degree

Wageningen University  
& Research (WUR) and Delft  
University of Technology  
(TUD)

#### Credits

120 ECTS, 24 months

#### Language

English

#### Location

Amsterdam

#### Start

September

#### Contact

mmd.msc@wur.nl

## Master Metropolitan Analysis, Design and Engineering

Wageningen University & Research (WUR) | Delft University of Technology (TUD)

### Handbook MSc MADE

This handbook provides information on all courses that are part of the MSc MADE programme.

Please note that this programme is offered at the Amsterdam Institute for Advanced Metropolitan Solutions in Amsterdam. Students who are not studying the master MADE but who would like to participate in any of the courses that are part of this programme should contact the course coordinator prior to registration.

Note: the calendar and the system of periods differ from WUR and TUD. Contact your study advisor if you have any questions about this.

Below, the outline of the MSc MADE programme is presented:

|             |                                                                                                                                                         |                                                 |                                            |                                                                                                                                                     |                                                    |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| First year  | <div>Metropolitan Challenges</div> <div>12 EC</div>                                                                                                     | <div>Metropol. Innovators</div> <div>6 EC</div> | <div>Data 2</div> <div>3 EC</div>          | <div>Selected Electives at WUR/TUD</div> <div>18 EC</div>                                                                                           | <div>Metropolitan Solutions</div> <div>12 EC</div> |
|             | <div>Data 1</div> <div>3 EC</div>                                                                                                                       | <div>Entrepr. Thinking</div> <div>3 EC</div>    | <div>Entrepr. Skills</div> <div>3 EC</div> |                                                                                                                                                     |                                                    |
| Second year | <div>Living Lab</div> <div>collaborate in transdisciplinary team to co-create metropolitan solutions in the Amsterdam Living Lab</div> <div>24 EC</div> |                                                 | <div>Prof. Profile</div> <div>6 EC</div>   | <div>Thesis</div> <div>building a theoretical framework, advancing analytical methods, and explicating conceptual approaches</div> <div>30 EC</div> |                                                    |

This master is a cooperation between:



WAGENINGEN  
UNIVERSITY & RESEARCH





**ECTS**  
12

**Course Coordinators**

dr. ir. BJM van Vliet (WUR)  
dr. R.O.V. Cardoso (TUD)

**Lecturer(s)**

dr. ir. BJM van Vliet (WUR)  
dr. R.O.V. Cardoso (TUD)

| Teaching method | Hours |
|-----------------|-------|
| Lecture         | 24    |
| Tutorial        | 28    |
| Practical       | 80    |
| Group Work      | 25    |
| Excursion       | 8     |

**Examination:**

|                         |     |
|-------------------------|-----|
| Individual interim exam | 45% |
| Group paper             | 25% |
| Group mini-lecture      | 15% |
| Group knowledge clip    | 15% |



## YMS-30812 Metropolitan Challenges

In this course on metropolitan challenges, students are introduced to various typologies of metropolises throughout the world, with the city of Amsterdam as a real life example. The course covers all aspects of what makes a metropolis. It gives an historical-critical overview, with reasons for the existence and emergence of cities, and the technological challenges they face today. Besides the metropolis is approached as a web of interrelated socio-technical systems in which professionals are challenged to integrate knowledge and analytical, design and engineering skills. The course presents a range of conceptual views on technologies and practices in the cycles and spheres of urban mobility, water, housing, health-care and well-being, food, waste and energy. Students learn and develop different concepts related to contemporary urban practices, and elaborate on them by means of observations, organizing debates, lecturing, and producing written accounts and videos. Learning activities in this course include lectures, studio research work in teams, field study and excursions in Amsterdam (by executing observations, interviews with stakeholders, and other methods presented in the course), as well as presentations and peer evaluations.

**Activities:**

The 'Metropolitan Challenges' course consists of three distinct, but strongly related stages: a 2 weeks introductory period on metropolitan history, governance and research approaches, a 4 weeks period in which the MADE themes are studied separately from a multidisciplinary perspective, and a third period of 4 weeks in which an integrated, interdisciplinary metropolitan challenge is analysed and presented.

Work forms used in the course:

- lectures, including guest lectures;
- tutorials & peer review meetings;
- excursions;
- group work to prepare a student-lecture, paper writing, video and knowledge clip production.

*"We are committed to make cities and regions better places to live and work. To understand the challenges related to water, health, transport, energy, food and waste before starting to think about how to solve them."*

- Lecturer



ECTS  
3

#### Course Coordinator

dr. J. Urbano (TUD)

#### Lecturer(s)

dr. J. Urbano (TUD)

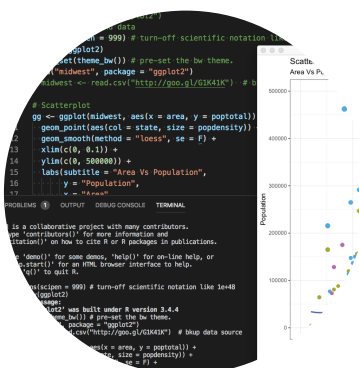
| Teaching method  | Hours |
|------------------|-------|
| Lecture          | 8     |
| Tutorial         | 7     |
| Practical        | 12    |
| Individual Paper | 1     |

## YMS-31803 Metropolitan Data 1

Data-driven methods have had a positive impact on many domains and research fields. This course prepares students to acquire, process, model, analyze, and understand complex metropolitan phenomena thanks to data-driven studies. The first part of the course focuses on properly designing data-driven studies to ask the right questions in the right way. The second part introduces students to techniques for exploration and basic analysis of data to provide rough answers to such questions. In the third part, students are introduced to more advance statistical modeling techniques for the purposes of understanding complex phenomena through data, or making reliable predictions.

### Activities:

The core of the course consists of 8 lectures and 6 related labs. Starting from week 1, students form groups and work on a project to analyze a real- world dataset and make predictions about it. There are two submissions for the project, accompanied by a short presentation to the class. In this way, students will be able to understand the main concepts of data-driven studies in order to gain new insights from data, but also apply concepts of data collection, processing, exploration and analysis in the context of real-world metropolitan data.



*"Students will see the positive impact that data science (or data-driven science) methods have on many different domains and research field, by acquiring, processing, analyzing and communicating about a range of data."*  
- Course Coordinator



ECTS  
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#### Course Coordinator

dr.ir. CPG Driessen (WUR)

dr. R.C. Rocco (TUD)

#### Lecturer(s)

dr.ir. CPG Driessen (WUR)

dr. R.C. Rocco (TUD)

| Teaching method  | Hours |
|------------------|-------|
| Lecture          | 16    |
| Tutorial         | 28    |
| Group Work       | 10    |
| Individual Paper | 1     |

## YMS-30306 Metropolitan Innovators

The innovators course enables students to use, contrast, discuss and integrate the many contemporary methodological and conceptual approaches to engage with metropolitan problems and potential solutions. Contemporary metropolitan regions face a variety of complex challenges that concern large numbers of stakeholders. Metropolitan challenges often have several dimensions: cultural, political, technical and aesthetic, to cite but a few. Those challenges cannot be addressed by planners, engineers and designers alone, as they require engagement with a multiplicity of perspectives necessary to understand and tackle all the dimensions involved. For any actor working to contribute to advanced metropolitan solutions, it becomes crucial to be able to understand, communicate and to co-operate with other actors in order to integrate their knowledge about issues at hand and to understand different (and often conflicting) objectives. Awareness of this context, as well as the implicit and explicit values and cultural norms operating in a specific place, are essential to achieve suitable solutions. The course includes meta-discussions, namely on the value and role of urban theories in metropolitan innovation commonly present in different communities of knowledge and in large groups of people working together.

### Activities:

The course consists of lectures, guest lectures, group discussions and a range of exercises to critically and creatively engage with different approaches for metropolitan issues.

Students will be asked to select a particular metropolitan issue in which a clear socio-technical system can be identified. They will develop short evaluations of each issue using the frameworks presented: socio- technical, ecosystems and spatial justice. Before and after classes, students are mentored in their essay writing.

### Other Activities:

- peer reviewed exercises;
- group work leading to presentations ;
- role playing and other games ;
- drawing and sketching (brainstorming, mind mapping, actor mapping, life stories);
- movies and clips for discussion;
- one or two significant field trips.

*"Imagining the unexpected effects of interventions is as important as responding to these creatively and responsibly."*

- Course Coordinator



**ECTS**  
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**Course Coordinator**

dr. L.J.L. Ploum (WUR)

dr. J.D. Lomas (TUD)

**Lecturer(s)**

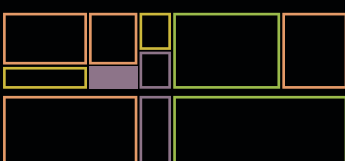
dr. L.J.L. Ploum (WUR)

dr. J.D. Lomas (TUD)

| Teaching method | Hours |
|-----------------|-------|
| Tutorial        | 24    |
| Group Work      | 60    |

**Examination:**

|                          |     |
|--------------------------|-----|
| Home assignments         | 45% |
| Reflection group process | 70% |



## YMS-31803 Entrepreneurial Thinking

In this course, students develop an awareness of what it takes to engage in entrepreneurial projects and ventures and start thinking about their own entrepreneurial competencies. Entrepreneurship may be manifested by various groups: individuals that are actively engaged in a new start-up, by business developers who are engaged in new venture development within established organizations, policy makers that are initiating new movements or academics that want create more impact with their research. What they have in common is that they all face complex, interdisciplinary working environments which are spiced with ambiguity and uncertainty. Entrepreneurial thinking and developing an entrepreneurial mind-set helps in tackling such challenges. One of the principles of this course is that everyone has a unique entrepreneurial starting point: experiences, capacities and prior knowledge differ. Secondly, work environment differ in the way they afford and/or stimulate entrepreneurial thinking and acting. You are introduced to various theoretical models and methodologies to analyse entrepreneurial thinking, -action and -behaviour. The lectures, practical entrepreneurship tools, feedback sessions and working on several cases will help you discover your position towards entrepreneurship.

### Activities:

During the course, several learning activities will take place, all contributing to your development as an entrepreneurial professional.

- lectures introducing key entrepreneurship topics (opportunity identification, effectuation, multiple value creation, teams;
- guest lectures of entrepreneurial professionals from different work contexts;
- working on cases to understand and apply entrepreneurship theory;
- feedback sessions to assess and reflect on progress and development of your own entrepreneurial mind-set;
- interviewing an entrepreneurial professional with peer.

*"Capture the unfolding entrepreneurial mind-set among students by engaging them in entrepreneurial scenarios and games."*

- Course Coordinator



**ECTS**  
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**Course Coordinator**

dr.ir. R van Lammeren (WUR)  
ir. C Vreugdenhil (WUR)

**Lecturer(s)**

dr.ir. R van Lammeren (WUR)  
ir. C Vreugdenhil (WUR)

| Teaching method | Hours |
|-----------------|-------|
| Lecture         | 28    |
| Tutorial        | 14    |
| Practical       | 14    |
| Group Work      | 28    |

**Examination:**

|                 |     |
|-----------------|-----|
| Individual exam | 40% |
| Group report    | 60% |



## YMS-31403 Metropolitan Data 2

The Metropolitan Data II course links the Big Data Analysis topics as learned in Metropolitan Data I to specific geodata gathering, handling and visualizing concepts. We do so because multi modal data that can be used in Metropolitan studies do have specific location components. Especially geometric properties of the many metropolitan phenomena will be explicitly discussed in such a way that it opens the window of opportunities to apply the variety of analysis, synthesis and visualisation options. The many processes in a Metropolitan environment are not at all directly connected to each other, except that they all have in common to take place in the same time and space continuum. It shows that the spatial dimension of geodata is somehow linked to a temporal dimension. In this course we challenge you to make use of this window of opportunities to address a Metropolitan study topic by combining geodata resources, processing steps and visualization approaches. The course intends to make you aware of the integrative strengths and weaknesses of geo-information regarding metropolitan solutions given living lab settings and entrepreneurial skills.

**Activities:**

This course consists of two stages. In the first stage the different geo-information concepts are discussed and practiced by following lectures, online materials and computer practical. The second stage is performing a small project where students get more experience in working through all steps of the geo-information cycle in an entrepreneurial skills case.

*"The strength of GIS is that it enables cross-disciplinary approaches of challenges through the dimensions of space and time."*

- Course Coordinator



ECTS  
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**Course Coordinator**

dr. L.J.L. Ploum (WUR)  
dr. J.D. Lomas (TUD)

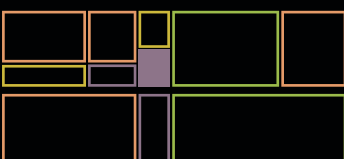
**Lecturer(s)**

dr. L.J.L. Ploum (WUR)  
dr. J.D. Lomas (TUD)

| Teaching method | Hours |
|-----------------|-------|
| Tutorial        | 24    |
| Group Work      | 60    |

**Examination:**

|                           |     |
|---------------------------|-----|
| Entrepreneurial pitch     | 20% |
| Group report   2-pager    | 25% |
| Group report   background | 15% |



## YMS-31903 Entrepreneurial Skills

This course is directly connected to a real-life metropolitan challenge. Based on this challenge, you will develop a solution that addresses the challenge and work on the development of this solution with the help of several entrepreneurship tools. These tools (business model canvas, value proposition canvas, partnership design) will be discussed during the lectures and help you strengthen your ideas. Questions to be answered are: What is the value of their idea? Is the solution/plan feasible? Which stakeholders are involved and what are their needs, desires and conditions? What is the socio-spatial impact of the solution? Is the solution sustainable?

**Activities:**

During the course, several learning activities will take place, all contributing to your development as a professional.

- masterclasses;
- group work;
- interviews with informants, users and customers;
- site visits to university-based incubators;
- progress meetings/coaching session with relevant stakeholders and experts;
- final presentation session. Sessions to assess and reflect on progress and development of your own entrepreneurial mind-set.

*“Working in a multidisciplinary team to develop a strategy to implement a technology not yet applied on a large scale, proved to be very engaging. During the project several organizations were positive about our idea and entrepreneurial mindset. This, combined with winning the best pitch of the day, is a great reward for our work together!”*

- Student



ECTS  
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## Electives

In this part of the programme students tap into the knowledge from courses at WUR, the TUD or another university and design their own learning plan. The elective period offers students a way to deepen their interests and anticipate the changing contexts and issues at play in the metropolitan regions. Students follow elective courses which are linked to the specific interdisciplinary and transdisciplinary MADE domains, such as mobility, climate resilience, water, urban intelligence, food and circularity. The study advisor assists the students in making choices in this process.

As MSc MADE students you can take part in courses at WUR and TUD to obtain 18 ECTS of elective credits. But you can also explore what other universities have to offer. You can design your own differentiation package in line with your own interests and ambitions.



*"It helped me to think about which themes from MSc MADE interested me the most and if I wanted to deepen my knowledge or look for courses that would broaden my view. After establishing this I started looking for specific courses."*

- Student



**ECTS**  
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**Course Coordinators**

dr.ir. KBM Peters (WUR)  
dr. Y. Chen (TUD)

**Lecturer(s)**

dr.ir. KBM Peters (WUR)  
dr. Y. Chen (TUD)

| Teaching method | Hours |
|-----------------|-------|
| Field Practical | 76    |
| Group Work      | 182   |
| Practical       | 50    |

**Examination:**

|                                             |     |
|---------------------------------------------|-----|
| Group end products                          | 50% |
| Group performance and individual reflection | 50% |



## YMS-60312 Metropolitan Solutions

In this course, students put their acquired skills into practice for the first time. In multidisciplinary themes they work on an AMS themed issue in a metropolitan region commissioned by a client from the private or public sector. Based on the briefing and terms of reference (TOR) received from the client, students develop a consultancy or project plan, including a preliminary problem definition and analysis and a plan for data generation and analysis. This leads to the 'Metropolitan Solution', a socio-technical design-related project and/or strategy in response to a clients request. The course builds on the courses Metropolitan Challenges and Metropolitan Innovators: The solution operates within the larger metropolitan system, while interrelating actors and entities. An applied training course (follow up of skills learning processes) in project management and leadership, scenario planning, innovation management, group dynamics and teamwork, multi-actor settings and intercultural communication is offered. In some cases, lectures will prove students with additional background information to tackle the issue at play in their case. Every student is expected to contribute his / her own knowledge and expertise to the group assignment and to reflect on this.

**Activities:**

- start with a presentation of possible cases by the clients / commissioner and let students apply for a case and a position. Students are then assigned to a case and can start with the project; a maximum of 4 a 5 students per team;
- prepare a proposal - assessment of the commissioner's terms of reference and present a pitch (5 minutes) to the other groups (peer review);
- guidance is provided by coaches on a weekly basis, helping with the process and methods as well as with the content. Additional guidance on the content is provided by experts with an on-demand 'hour budget';
- the course ends with a presentation to the clients in a parallel or plenary session;
- depending on the commissioned assignments, in addition to a report and presentation students also produce a product for the commissioning client. This can vary from a design, map, infographic, video, or dataset, to a model, or prototype.

*"You will be trained in project management, group dynamic, team work and personal competences."*  
- Course Coordinator



**ECTS**

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**Course Coordinators**

N.L. Bohm, MSc (TUD)

JM Wreyford, MSc (WUR)

drs. J.A. Andernach (TUD)

**Examination:**

|                        |     |
|------------------------|-----|
| Living Lab plan        | 10% |
| Living Lab report      | 40% |
| Living Lab product     | 30% |
| Individual reflection  | 10% |
| Individual performance | 10% |

## YMS-70324 Amsterdam Living Laboratory

In the final year of the MSc MADE programme, students engage in a Living Lab project. This project gives students the chance to operate in a real-life problem-solving setting. Students will select from a variety of predefined case challenges related to urban sustainability in Amsterdam. These cases are developed and presented by AMS partner organizations who will also act as the primary stakeholders throughout the project.

Over the course students will work in groups to define the case problem, develop solutions, and present their products. Students will spend part of their week working with the case owners, coaches, and within their groups. The aim is to co-creatively develop an innovative product or process that helps the partner organization get closer to urban sustainability. In the final month of the course, students will prepare a report, deliver a masterclass, as well as organize and participate in an exhibition at AMS Institute to showcase their Living Lab project results.

Within the groups, students are expected to collaborate but can also specialize in certain themes or take specific roles within the process. Students are asked to collaboratively give shape to their projects while also working with the case-owners, coaches, and other stakeholders in the case. The course both challenges the design and engineering expertise of the students and allows them to shape the process to fit their own personal learning objectives.





**ECTS**  
6

**Course Coordinators**

J Willet, MSc (WUR)  
drs. J.A. Andernach (TUD)

| Teaching method  | Hours |
|------------------|-------|
| Group Work       | 56    |
| Individual Paper | 56    |
| Tutorial         | 56    |

**Examination:**

T.B.A. in course guide

## YMS-32306 Professional Profile

The professional profile course runs as a recurring reflexive learning line through the second year of the MMD programme. The course will function as the linking pin between the Amsterdam Living Lab course (YMS70324) and the Thesis (YMS-80330). Students will reflect on the interrelation of research, design and engineering, the process of both, and the contribution of the project for society as well as for science.

Via interactive sessions and workshops, students receive input and feedback from fellow participants and experienced trainers. Depending on the student's cross-over MADE profile, the course results in a business model design, a PhD proposal, a governance arrangement, a policy paper or an abstract representation of a firm or (non)governmental organisation, based on the results from the Thesis and Living Lab courses that responds to actual needs in the sustainable metropolis.

The course integrates the results of the Thesis and the Living Lab and applies academic and entrepreneurial skills, creatively adding to innovation, and identifying opportunities and challenges that go hand-in-hand with organising, marketing and financing new initiatives, including business ventures and start-ups related to metropolitan challenges of today.

Work forms used in the course:

- workshops on selected skills;
- peer-to-peer sessions;
- networking.



*"An innovative educational setup in which students are stimulated to work on open ended projects in real life settings."*

- Programme Director



ECTS  
30

#### Course Coordinators

drs. J.A. Andernach (TUD)

A.J. van Oosten, MSc

#### Examination:

|                     |     |
|---------------------|-----|
| Research Competence | 40% |
| Thesis Report       | 40% |
| Presentation        | 10% |
| Oral Defence        | 10% |

## YMS-80330 MSc Thesis Metropolitan Analysis, Design and Engineering

The MSc thesis enables the student to put their acquired knowledge and skills into practice by individually and independently conducting a research project in the field of the programme.

### Activities:

The thesis programme starts with a kick-off week with input sessions on how to write a research proposal, research methodology, research by design and academic writing. In the same week, you already start looking for possible thesis topics, writing your thesis proposal and looking for thesis supervisors. This phase ends with signing a thesis contract between student and supervisors.

Together with your supervisors you work on your thesis proposal. You present a draft version of your proposal to fellow students and staff. About two weeks later, you will submit your full thesis proposal.

After submitting your full thesis proposal, you start designing and executing your research and writing your thesis under the supervision of your thesis supervisors. During that process there is the option to form a thesis buddy group and/or be a member of a thesis ring. The thesis buddy group gives you the opportunity to get feedback on parts of your text from fellow students, help with difficult questions or decisions and keep motivating each other. Thesis rings are supervised by a staff member and are focussed more on the content of your thesis. You will also join peer reflection sessions.

Six weeks before your presentation and defence you will have a go/no go session with your supervisors. One week before that, you hand in a 80% version of your thesis to your supervisors.

Two weeks before your thesis defence, you hand in your final thesis. The final presentation and defence will end your thesis work and result in a thesis assessment.

The exact deadlines for the proposal, go/no go, thesis report and defence will be communicated via Brightspace.

*"By facing real life challenges, I have a better perspective on the different stakeholders involved as well as the technical aspects required to reach an innovative solution."*

- Student





## YMS-70324 Amsterdam Living Laboratory

### Activities:

#### Week 1: Kick-off

- Join a meet and greet event with case owners
- Select preferred (challenging) cases
- Meet and develop group roles
- Get familiar with the Living Lab concept
- Collect tools for shaping a Living Lab process
- Prepare a Living Lab plan

#### Week 2-3: Tools & Information

- Collect tools for shaping the case in the context of the Living Lab
- Attend input sessions and workshops

#### Week 4: Plan Development

- Prepare a Living Lab plan and roadmap
- Present the state of the case to the other students, coaches, and case owners
- Present the Living Lab plan & Roadmap

#### Week 5-9: Exploration

- Work on self-defined activities in the Living Lab process
- Organize team meetings, coach meetings and case owner meetings
- Collaborate and co-create with urban actor groups
- Present midterm results

#### Week 10-14: Development

- Further develop the case and the proposed product
- Continue with meetings and co-creation sessions
- Attend check-in and input sessions
- Assign (1) masterclass, (1) exhibition, and (1) website representative per group.

#### Week 15-16: Translation

- Finalize and present the product
- Reflect on the impact of the lab
- Write and submit the Living Lab report
- Develop and produce the product & exhibition
- Organize a masterclass & website

*"You design a solution to a metropolitan challenge in the Amsterdam region. As an end result, you will contribute to urban sustainability in Amsterdam."*

- Course Coordinator