

## Guideline for Master Theses

Welcome to the assistant professorship of management analytics! Our research conducts research on data-driven business process management (BPM) by means of process mining and machine learning. We are interested in finding data-driven solutions to real-world BPM problems. Our main research focus topics are user behavior mining and the application of process mining techniques in practice, but we also supervise thesis topics in adjacent fields, such as the digitalization of BPM.

We're happy to see that you apparently find our research interesting enough to think about writing a master thesis at our chair. This document will support you in this process. It provides the most relevant information for students that are interested in writing their master thesis at the assistant professorship of management analytics. It should answer all (administrative) questions that might come up before or during the thesis process. For any additional questions, please contact your supervisor or the chair at [jpmac@uni-mannheim.de](mailto:jpmac@uni-mannheim.de).

Good luck on your thesis!

### Before you start

**Eligible programs:** Our chair supervises master students in the Mannheim Master of Management (MMM) and Master of Business Informatics (BI) programs. The programs differ with regards to the timespan of the thesis and the number of credit points (CP):

- MMM: 4 months, 24 CP
- BI: 6 months, 30 CP

These differences will be considered when scoping your topic.

**Prerequisites:** To write a master thesis at our chair, you must fulfill the following requirements:

- 1) Successful completion of the seminar at the assistant professorship for management (IS 752).  
*Alternatively*, seminar theses from other business or business informatics chairs can be accepted if the topic is relevant for the envisioned master thesis topic. This will be checked on a case-by-case basis.
- 2) Some experience with business process management and/or process mining (proven, e.g., by successful completion of the course IS 515 Process Management & Analytics).

These prerequisites are necessary, because you need at least some level of experience for writing a master thesis in a technically challenging field like process mining. If you start without any previous experience, you spend too much time learning the basics.

**Finding a topic:** Typically, we do not have thesis topics “in stock” that we can hand out to students. We define each topic individually, such that it matches the research topics of the supervisor and the experience and preferences of the student. Therefore, you should think about concrete topics before you approach us about writing a thesis. Ideally, such topic ideas have emerged while writing your seminar thesis, during the IS 515 course, or in the context of your working student position. Alternatively, you can read recent publications of the chair (or other researchers in the same domain) and see whether those match your interests and offer potentials for a thesis topic. Make sure that your idea is as concrete as possible.

If you want to read current literature in the BPM domain to find some motivation for a topic, we suggest that you check out the current proceedings of the International Conference on Business Process Management (BPM) or the International Conference on Process Mining (ICPM) or the associated workshops. You can also look at the BPM tracks of the European Conference on Information Systems (ECIS) or the International Conference on Information Systems (ICIS). The journals Business & Information Systems Engineering (BISE, Springer) or Information Systems (IS, Elsevier) also publish BPM papers.

In the rare case that we do have concrete thesis topics available, you will find them on our website.

**Application procedure:** If you fulfil the prerequisites and have found one or multiple ideas for a thesis topic, you can apply for supervision. For applying, please send an e-mail with the following documents:

- Motivation for writing a thesis at our chair (in the body of your e-mail)
- Application documents (CV, Current Transcript of Records)
- PDF of your seminar thesis
- Concrete ideas for a thesis topic (at least half a page, “I want to do something with Management Analytics / Process Mining / Machine Learning” is not a concrete idea)

You should address your e-mail to the employee of the chair who in your opinion has the best fit with the topic (check their websites and publication records for details). If you are not sure, you can alternatively address your e-mail to [jpmac@mail.uni-mannheim.de](mailto:jpmac@mail.uni-mannheim.de).

If we already know you, e.g., because you have written your seminar thesis at our chair, you can skip the application procedure and approach your seminar thesis supervisor about potential thesis topics directly.

**Research proposal:** If an employee of the chair finds your topic sufficiently interesting and has free capacities, you can start working on a detailed proposal of your research topic. This proposal is very important because it sets the objectives and expectations of your thesis. You can expect that your proposal will go through multiple iterations before your supervisors accepts it. Only then you may only officially register your thesis. Working on a proposal is therefore not a commitment for supervising your thesis! There is always a chance (for you and for us) to decide against supervision if we feel that it’s not a good fit for one side.

In the first iteration, research proposal should be about 3-5 pages (net, so text and figures only). It should contain the following:

- Motivation of your topic
- Research questions and research objectives
- Research method
- Preliminary outline
- Seminal literature (at least 20 references)

You should use the official thesis template (see below, available at the chair website or from your supervisor).

Once the research proposal is accepted, it will serve as an orientation throughout your writing process. However, that does not mean that everything in the proposal is set in stone. If during the writing process, you realize that you need to change something, that is always possible (if your supervisor agrees).

**Official registration:** Once your proposal is accepted, you may officially register your thesis. For registering, you need to fill out the official registration form, which your supervisor will send to you. This document needs to be signed by Prof. Rehse and sent to the study office. You can freely choose the official start date and hence the submission deadline of your thesis.

**Cooperations with industry:** In general, our chair welcomes thesis projects in cooperation with industry. We have a lot of experience in this area and have seen great results come out of those cooperations. However, before starting your thesis project in cooperation with a company, here's a few things you should consider:

- **Topic:** We prefer that the company supplies the topic in these cooperative projects. This ensures that the company is sufficiently involved in the successful outcome of the thesis (see also below). However, the topic must also be sufficiently interesting to make a contribution to research (i.e., it may not already be solved in academic literature).
- **Company involvement:** We find that the most successful cooperation projects are those where the company has a genuine interest in the outcome of the thesis and is involved in the day-to-day business. This ensures a good supervision from their side. One way to show this involvement is, for example, that they offer you a contract as a thesis student (with payment) and name a concrete supervisor for you to work with on a daily basis. If they do not do that, you can still work with them, but you need to consider that supporting you may not be the first priority of the company, which means that you may be left to solve potentially arising problems on your own.
- **Time pressure:** When working with a company, you can expect things to go slower than they normally would, because you rely on the input of people that are potentially very busy with other things. You risk coming under time pressure for submitting your thesis on time. When possible, plan for long waiting times, incorporate time buffers, and think about alternative plans.
- **Increased expectations:** A great cooperation project makes a contribution to both research and practice. This is absolutely possible but may be more challenging than just making a contribution to research.
- **Data protection:** When you're working with company data (for example, event logs, interviews, internal documents), you typically need to ensure that this data is sufficiently protected. Think about this topic up front and remember that it does not only involve

you but also your supervisor and a potential second reviewer, If the company asks for an NDA, please approach us as early as possible.

If you're convinced about doing your thesis in cooperation with a company, don't let these points discourage you! These projects can be great starting points for your career in a company and may be very helpful in the long run.

## While you write

**Formalities:** Your thesis should be around 60 pages long. If your topic contains a major implementation, this can be shortened to around 40 pages. Any major deviations from these guidelines need to be approved by your supervisor. These page counts refer to net pages (i.e., pages with text, tables, and figures) and do not include table of contents, lists of tables and figures, appendices, and the bibliography.

Your thesis should be formatted according to the chair template (available on the chair website or from your supervisor). The template is available for Word and LaTeX (on Overleaf).

**Schedule:** Your thesis project will (roughly) consist of the following phases:

- Exploration phase (research proposal phase): In this phase, you will approach your topic by reading relevant literature, clarify the expectations of your supervisor, and scope your topic. The end product of this phase is the completed and agreed-upon research proposal. Typically, this phase takes about 1-2 months and does not count towards the official timespan of your thesis. However, it is very relevant to get familiar with the literature. After this phase, you can start the actual research work.
- Research phase: In this phase, you will conduct the actual research, following the specifications of goal and method from the research proposal. What exactly you do here, depends on your thesis topic. Depending on the scope of your thesis, this phase takes between 1 and 4 months.
- (*Optional*) Implementation phase: If your topic involves the production of code, such as a data analysis or an implementation of a newly designed algorithm, this happens in this phase. Typically, the implementation phase is closely intertwined with the research phase, but you should treat them differently. Implementations are inherently hard to schedule for, because a lot of unexpected things can happen (e.g., problems with dependencies, bug fixing, provision of computing resources). Therefore, you should plan for plenty of buffer time to not get into trouble.
- Writing phase: Once your research is done, you start writing the thesis document itself. To make this easier, it's important to document the previous phases really well. This phase typically takes about 1 month.
- Finalization phase: Ideally, the first complete draft of your thesis is done a few weeks before the submission deadline, which leaves plenty of time for finalizing it. In this phase, you correct and finalize the draft, have it proofread, and clarify final small questions before submission.

To manage your thesis project, it is helpful to make a rough schedule before you register.

**Contact with your supervisor:** Your supervisor's task is to guide your research, to help you in case of questions, and (eventually) to grade your work after submission. Your supervisor may be interested in your topic, but that doesn't mean that it's "their" topic – your thesis is your responsibility, and your supervisor will not do the work for you. This also means that you sometimes need to make your own decisions and justify them.

Our general policy is that you need to be proactive about contacting your supervisor if you need their input. Depending on their availability and preferences, you can either clarify questions via e-mail or schedule a meeting. As a rule of thumb, you should be in touch with your supervisor at least once a month, but no more than twice per month (except for emergencies). If you have many small questions, it's better to collect them in one larger e-mail or meeting.

**Confidentiality:** If your thesis contains confidential data (for example, if you cooperated with a company), there are two ways to deal with this:

- 1) You can anonymize the company in your thesis, such that a reader will not know what company or other entity the data refers to. This is advisable when you're working, e.g., with an event log of a common process that exists in any company.
- 2) You can add a so-called clause of confidentiality or blocking notice to your thesis. This blocks the contents of your thesis from any unauthorized readers. This is advisable when you're working with data that is very specific to the respective company or individual. To do this, you add a page at the beginning of your thesis document, which contains the following text:

*This master thesis TITLE contains confidential information of COMPANY. This thesis may only be made available to the members of the examination board of the University of Mannheim and must not be published, reproduced, or disclosed to any other third party – neither in full or in part – for a period of DURATION years after completion of the thesis examination process without explicit prior written approval by COMPANY.*

Which way you choose depends on the circumstances of your thesis. It is important that you clarify any data protection concerns early in your thesis project such that they don't cause problems after the fact. Note that your thesis must always be available to the examiners, i.e., your supervisor, Prof. Rehse, and a potential second reviewer.

**Usage of generative AI tools (e.g., ChatGPT):** Generative AI tools like ChatGPT are great tools to support you in your writing process. However, they should be used with care. The most important thing to consider is that you are 100% responsible for the contents of your thesis, whether you wrote them from scratch, used writing tips from tools like Grammarly, or if you used ChatGPT for certain parts. It is crucial that you recognize that ChatGPT does not actually understand the answers that it provides, can reply with unwarranted confidence, may provide non-existing references, and does not know the rest of your thesis, e.g., which terminology you have defined.

Therefore, you should only use this technology for tasks for which you can (and will) verify the correctness of the output. This means that with respect to your thesis, you should primarily use it as a tool for writing support, not to come up with argumentation and other actual content. For example, you can use ChatGPT to get quick suggestions on how to turn a set of bullet points into a nicely flowing paragraph, or how to improve the textual flow of an initial paragraph you drafted. Do not blindly copy the given answer but pick and choose the parts of its answer that you like, while also making sure that the meaning and terminology of the final paragraph remain correct.

**IMPORTANT:** Make sure that you use generative AI tools in such a way that it does not violate plagiarism and other rules of the University of Mannheim. At the time of this writing (03-05-2023), no official university policy has been released, though.

## When you are done

**Final Check:** You have the option to send a preliminary version of your final submission to your supervisor for feedback. They will not read every word of your manuscript, but they can give you high-level feedback on the content and structure and point out obvious flaws if there are any.

**Submission:** You need to submit your thesis in two ways:

- 1) Electronic submission: On the date of your submission date (or earlier), submit the thesis via e-mail to your supervisor. This e-mail should contain your finalized thesis document as well as all additional data that is part of your submission (e.g., analysis results, implementations, etc.) as one ZIP file. If the data is too large to be submitted via e-mail, you can alternatively provide a github link or something comparable, where we can download the data.
- 2) Printed submission: In addition, you need to submit **two** printed copies of your thesis. We prefer your printed copies to be A4, softcover, with an adhesive binding in black. You can submit the printed versions either in person at our office (please make an appointment with your supervisor to make sure someone is there) or via mail. Our mail address is

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If you send the thesis via mail, it does not need to arrive here on the date of the submission deadline. Only the submission of the electronic version counts.

Make sure that your electronic and your printed submission are identical. Both should contain the required affidavit as specified in the Prüfungsordnung.

**Certificate of passing:** Once you have submitted your thesis, we will automatically issue a submission confirmation and send it to the study office. In addition, we can issue a certificate of passing, which confirms that your thesis will be graded with at least a 4.0. If you need such a certificate, approach your supervisor.

**Presentations & Publications:** In addition to supervision, you are expected to participate in the chair's thesis colloquium. The aim of the colloquium is to promote the exchange between students and to strengthen your presentation skills and feedback competences. To this end, you are expected to present your work at least once. A good time to do this is around the middle of your editing period, when you already have a good idea of your topic but can still incorporate feedback. Participation in the colloquium is mandatory during the editing period, even if you do not present. The colloquium usually takes place on the second last Thursday of the month. An invitation is sent separately to the respective students as soon as they officially registered for writing their theses. Master theses are not published. However, very good theses can be turned into a research paper at a conference or in a journal. If this is the case for your thesis, your supervisor will let you know. You will have the chance to work on turning your thesis into a publication and of course will be listed as an author of this publication.

**Grading criteria:** Your thesis will be graded based on the following criteria:

- Structure and outline: Your topic is well-motivated and contextualized in existing research. The research problem at hand is well-described and specified by means of concrete research questions. Your thesis is structured adequately.
- Foundations: The scientific foundations of your thesis are relevant and complete.
- Use of literature: The used scientific literature is relevant and complete. The differences between existing literature and your contribution are shown.
- Content / method: The chosen research method is well-executed. The research results address the research problem and solve it in an adequate way.
- Evaluation: The research results are evaluated appropriately.
- Discussion: Scientific and practical potentials and limitations are discussed.
- Citations: Citations are adequately used and formatted correctly.
- Linguistic & formal presentation: The language of your thesis is adequate, precise, and understandable. The thesis is free from grammatical, syntactical, or orthographical errors. The thesis is formatted uniformly according to the template.