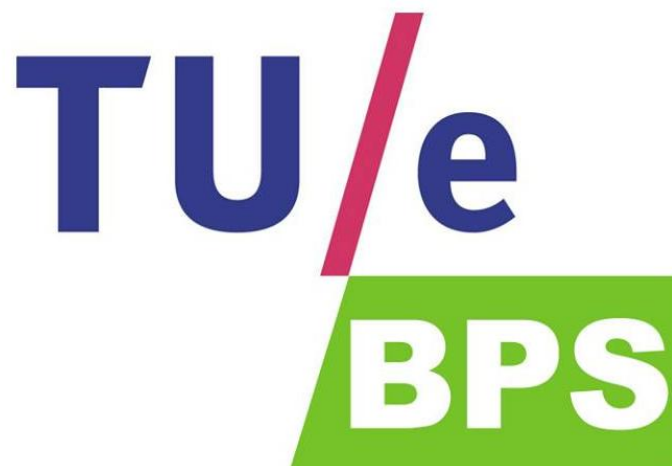


Eindhoven University of Technology – Faculty of the Built Environment

Master track Building Physics and Services

2014 - 2015



Organization of the master track Building Physics and Services (BPS)

The program (courses) of the master track is presented in the attachment of this document.

Organization of the courses

The first and second semester of the first year are organized with mostly compulsory courses. Every academic chair is represented through these courses:

- Building Acoustics
- Building Lighting
- Building Performance
- Building Services
- Building Materials
- Building Physics

The provided optional courses are considered representatives of the academic chairs of BPS and can be courses from other faculties as well.

Organization of the projects

In the first year there are two master projects, M1 and M2, with a study load of 14 ECTS each. In the second year a third master project is offered, M3 (9 ECTS) and the final graduation project (37 ECTS). The third master project can be an independent project like M1 or M2, or a combined project with the final project (e.g. the literature study). It will be finalized with a separate report.

There are three types of master projects:

- *Design projects*
- *Consultancy projects*
- *Research projects*

Students can make their own choices between these three types.

Design projects

A design project that has been offered is the MIO project. In groups from different master tracks (Architecture, Structural Design and BPS) an integrated design will be offered during the semester. Applied sciences students (HBO) are advised to follow this project (second semester).

Consultancy projects

Consultancy projects are often based on requests from the science shop, consultancy bureaus and other faculties.

Research projects

Research projects are often initiated by PhD research or research staff. Students participate in the larger picture by completing a part of the research. Performing measurements or simulations are examples of a typical research project.

How to get started on a project

All these types of projects are collected in our BPS database where students can find these project proposals. The online link to the database is:

<http://archbpsshpt.bwk.tue.nl/projects/Lists/MasterProjects/AlleProjecten.aspx>

Students are advised to contact the supervisors of such projects as soon as possible, but at the least before the end of the first week of the semester to gain information on such a project. It may take a while to get actually started on a project if students contact supervisors later than this.

Often students are supervised by two supervisors; mostly one main supervisor and a second supervisor who will be kept informed on the progress of the project. He will attend the initial, intermediate and final presentation to review the project and be able to assess the project. Often the first supervisor is a PhD candidate and the second supervisor a permanent staff member.

The master project will be reviewed based on a list of well-defined criteria. In the appendix the criteria can be found. Projects should be completed in one semester and are defined as such. Supervisors will also aim to complete a project within this timeframe.

At the end of a semester the students will present the research they have conducted to the entire unit of BPS. The presentation will be held in English supported by a PowerPoint presentation and poster. The BPS student day will be organized for this occasion. During this day the unit is able to attend the presentations and ask questions. During this day a lunch is organized, a poster competition is held for the Inside Information Magazine and afterwards everyone is invited for drinks. To make this possible the study association Mollier helps us organize this. During the lunch they organize a feedback session for students and staff to reflect upon the given courses.

Final graduation project

The final graduation project has an initial, an intermediate and a final colloquium. During the Student Day the initial colloquium can be held. The intermediate and final colloquium will be planned by the student. In principal a so-called ‘*green light*’ meeting will be planned as well, this is often done three weeks before the final colloquium. At least one or two weeks before the final colloquium, the report or thesis needs to be handed in.

STU Course *Writing and Presentation Skills*

In the first year of the master the course *Academic Writing and Presentation Skills* will be offered. During this course you will learn from a STU teacher as well as your peers. Students get information on how to correctly write an academic report or article and how to give a presentation. Students are expected to participate in this course as part of an M1 or M2 project.

Schakelprogramma 2014-2015

Building Physics and Services

			Quarter 1	Quarter 2
		ECTS		
2DB03	Calculus	3		
7U9X0	Onderzoek en statistiek	5		
7XX11	Inleiding architectuur	2		
7SS05	Instaproject BPS	5		
2DBA0	Matrices en differentiaalvergelijkingen	5		
7S4X0	Bouwfysisch en installatietechnologisch ontwerpen	5		
7S5X0	Acoustic Awareness	5		
total		30		

Master track 2014-2015					
Building Physics and Services					
Compulsary courses					
	ECTS	Quarter 1	Quarter 2	Quarter 3	Quarter 4
Year 1 - semester A					
7S532 Heat and moisture transfer in building envelopes	5				
7S620 Sustainable Building 2/ Building materials 3	3				
7S680 Physical aspects of building materials	2				
7S750 State of the art in building performance simulations and solutions	3				
7S892 CFD for building engineering	3				
7S515 Master project 1 (research, design, consultancy)	14				
Year 1 - semester B					
7S690 Architectural acoustics	5				
CODE Lighting technology and excercises	5				
7Y415 Intelligent buildings	4				
7S525 Master project 2 (research, design, consultancy)	14				
Year 2 - semester A					
7S545 Master project 3	9				
7S541 Learning portfolio	4				
Year 2 - semester B					
7S537 Final project (start in quarter 2)	37				
Compulsory course elements	108				
Optional course elements	12				
total	120				

	ECTS	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Remarks
Optional courses						
7N500 Practical assignment science shop for building technology (self study)	3					
7S801 Computational building physics and systems using matlab	1					
7S810 Computational modeling for building physics and systems (self-study)	3					
7S812 Measurement excursion	3					
7S815 Design of sustainable energy systems for the built environment	3					
7S820 Basic building performance simulation (self-study)	2					if 7S410 not completed in BSc
7S910 Capita selecta Building materials	3					
7Y320 Building Safety	3					
7Y400 Design Methodology	3					
7Y700 Sustainable building systems modeling	3					
7S5X0 Acoustic Awareness	5					BSc course; only possible in agreement with the professor
7S6X0 The Science of Sound	5					BSc course; only possible in agreement with the professor
7SAX0 Sounds good!	5					BSc course; only possible in agreement with the professor
0C900 Technology for sustainable development	3					
0C903 Energy and consumer	3					
0H530 Sound perception	4					
0H610 Agents and interfaces	3					
0LM11 Energy analysis for industry and the built environment	3					
0LM12 From industrial ecology to cradle-to-cradle	3					no course given
0PM20 Psychology of the light	3					
9ST14 Academic skills in English 1	4					
9ST15 Academic skills in English 2	4					
2DN41 Aero-Acoustics	3					
3F011 Fusion on the back of an envelope	4					
3P250 Energy and Sustainability	3					
4CA00 Signals	5					
4B680 heat transfer	3					last examination 2014/2015
4J530 Engineering optimization: concepts and applications	3					
4K560 Physical modelling for systems and control	3					
4K580 System theory for control	3					
4L810 Vibro-acoustics in engineering systems	3					
4P510 Renewable energy sources	3					
4P570 Energy Conversion	3					
4P630 Application of the finite element method to heat and flow problems	3					
4P730 Thermal energy storage	3					
5EE40 Electrical power engineering and system integration	4					
5N510 Decentral Power Generation	4					
7U855 Research methods for the built environment	3					

Example projects from database BPS

Title	Comfortable atrium climate at ministry in The Hague
Omschrijving	<p>The building of the former ministry of VROM (Ministry of Housing, Spatial Planning and the Environment) on the Rijnstraat 8 is a major office building in the centre of The Hague. The building originates from 1992 and requires major renovations to meet today's standards in terms of comfort, service and sustainability. The consortium led by BAM was granted project to perform the renovation of this iconic structure in The Hague.</p> <p>The building features six large atria. As part of the renovation, the ventilation concept for the atria is re-designed. The glass façade of the atria on the North side will be upgraded to HR++ standard. The north atria will be conditioned by balance ventilation air which overflows from the offices. The offices themselves keep their original glazing. The south side atria are 'cold atria' which keeps its original façade glazing. Instead, the glazing of the office bordering the atrium will be upgraded.</p> <p>Using operable windows, the airflow through both facades can be controlled. There are however uncertainties concerning the climate and user comfort in the atria. Some of the main questions:</p> <ul style="list-style-type: none"> - What will be the temperature in the atria in extreme winter/summer conditions? - Are additional measures required to prevent condensation at the facades? - is a thermic separation between the atria required/beneficial? Or should the atria be connected? <p>Possibly a CFD combined with BES is required to provide the answers to these questions, although the problem solving strategy will depend on your initial analysis.</p> <p>This is a practical and highly relevant project for a building which will be renovated next year, the result of your research will thus be visible directly. BAM provides the opportunity to learn in a practical environment on our project office at OMA in Rotterdam, and later at the project location in Den Haag. Some of the partners in the consortium are: DRMG consultants, BAM Techniek, BAM Utility, ISS and Ynno.</p>
Literatuur	
Begeleider 1	Hensen, J.L.M.
Begeleider 2	Loomans, M.G.L.C.
Begeleider 3	
Begeleider 4	
Status	
Studiefase	afstudeerproject
Keywords	Building Performance ; Simulation

Title	Sound exposure of musicians on stage (AVAILABLE from sept '14)
Omschrijving	The sound exposure of musicians in an symphonic orchestra is known to be too high. To better understand the sound exposure in order to find solutions to reduces it, a model is being developed. In your project, you will further develop the model in Matlab and translate the models output from a time-average to a time-dependent result. Besides, you will perform sound level measurements in an actual orchestra on stage and compare results to the model output. Having succesfully finalised the course Architectural Acoustics is desired to be able to do this project. Also, experience as a musician would be helpfull. The project can only be done as a combination of M3 and M4.
Literatuur	Wenmaekers, R.H.C., Hak, C.C.J.M., Luxemburg, L.C.J. van (2011) The influence of Room Acoustic Aspects on the Noise Exposure of Symphonic Orchestra Musicians Proceedings of ICBEN 2011, London [attached pdf] Wenmaekers, R.H.C., Hak, C.C.J.M., Luxemburg, L.C.J. van (2011) A Model for the Prediction of Sound Levels within a Symphonic Orchestra based on measured Sound Strength, Proceedings of Forum Acusticum 2011, Aalborg [attached pdf]
Begeleider 1	Wenmaekers, R.H.C.
Begeleider 2	
Begeleider 3	
Begeleider 4	
Status	
Studiefase	afstudeerproject
Keywords	Acoustics ; Building acoustics
Attachments	2011 - A Model for the prediction of Sound Levels within a Symphonic Orchestra based on measured Sound Strength - UPDATE.pdf

Assessment criteria

Eindhoven University of Technology	Master:
Evaluation form Master project BPS	Code:
Phase:	

Student name and id.nr.
Project name
Tutors (at least 2)
Other

Assessment

	Process			Product			Presentation			Total
Grade	+	#	-	+	#	-	+	#	-	#
Aspect	<input type="radio"/>	Independence	<input type="radio"/>	<input type="radio"/>	Objectives	<input type="radio"/>	<input type="radio"/>	Report	<input type="radio"/>	
	<input type="radio"/>	Execution of research	<input type="radio"/>	<input type="radio"/>	Research plan	<input type="radio"/>	<input type="radio"/>	Presentation	<input type="radio"/>	
	<input type="radio"/>	Analysis	<input type="radio"/>	<input type="radio"/>	Applied methods	<input type="radio"/>	<input type="radio"/>	Poster	<input type="radio"/>	
	<input type="radio"/>	Academic attitude	<input type="radio"/>	<input type="radio"/>	Theory/Knowledge	<input type="radio"/>	<input type="radio"/>	...	<input type="radio"/>	
	<input type="radio"/>	...	<input type="radio"/>	<input type="radio"/>	Results research	<input type="radio"/>	<input type="radio"/>	...	<input type="radio"/>	
	<input type="radio"/>	...	<input type="radio"/>	<input type="radio"/>	Report (substance)	<input type="radio"/>	<input type="radio"/>	...	<input type="radio"/>	
	<input type="radio"/>	...	<input type="radio"/>	<input type="radio"/>	Applicability of results	<input type="radio"/>	<input type="radio"/>	...	<input type="radio"/>	
				<input type="radio"/>	...	<input type="radio"/>				
				<input type="radio"/>	...	<input type="radio"/>				

- 1) '○' mark when aspect is positive (+) or negative (-) in evaluation
- 2) Explanation of the criteria used see next page(s)

Comments to evaluation: Process, Product, Presentation...

Signature:..... **Date:**.....

Explanation assessment criteria

Process	
<i>Independence</i>	- control of own project (little steering); capability of gathering information and developing knowledge
<i>Execution of research</i>	- systematical; according to the time plan
<i>Analysis</i>	- translation problem definition (to objectives + research questions)
<i>Academic attitude</i>	- critical interpretation and assessment of obtained results; pro-active; reflection on own work, critics, etc.
Product	
<i>Objectives</i>	- present and formulated clearly and sufficiently
<i>Research plan</i>	- present and clearly written; end goals of the research clear (objectives)
<i>Applied methods</i>	- explanation of methods applied and why they have been applied in the context of the research objectives (or why not)
<i>Theory/Knowledge</i>	- is sufficient knowledge building on the research topic demonstrated (for example through literature, modeling, experimental research) in relation to the complexity of the problem.
<i>Report (substance)</i>	- to-the-point (information provided is relevant, accurate and sufficient to answer the research questions)
<i>Results research</i>	- interpretation of the results (correct and adequate); conclusions based on results
<i>Applicability of results</i>	- future research (what, why); practice (directly usable)
Presentation	
<i>Report</i>	- Structure, summary follows report requirements > see checklist Annex I - Lay-out
<i>Presentation</i>	- Performance follows presentation requirements > see checklist Annex II - Used materials
<i>Poster</i>	- Lay-out, core message

Annex I Checklist report (Perrenet, 2001)

Aspects	Special points of attention
<i>Title page</i>	
<i>Table of content</i>	Page numbers / informative titles / annex (numbers and titles)
<i>Summary</i>	Problem / goal of the research / methods / conclusion
<i>Introduction</i>	Research motivation, goal and main research question
<i>Method</i>	Justification of choices made
<i>Chapters</i>	Order / introduction / closing
<i>Conclusion</i>	Answer to main question / evaluation of the result / reflection on wider applicability of chosen methods and techniques
<i>References</i>	Alphabetically ordered / complete and correct / reference in the main text
<i>Spelling</i>	
<i>Grammar (style)</i>	
<i>Annex</i>	

Annex II Checklist presentation (Perrenet, 2001)

Aspects	Special points-of-attention
<i>Content</i>	Intermediate presentation: interpretation of assignment and research approach Final presentation: essence of report with explanation
<i>Information value</i>	Level / separation major and minor topics
<i>Structure</i>	Introduction / structured centre part / closing
<i>Oral quality</i>	Volume / intonation / articulation / speed
<i>Non-oral quality</i>	Posture and behavior / contact with audience /use of audiovisual media
<i>Discussion</i>	Content related response to criticism

Reference

Perrenet, J.C. 2001. Beoordelen van Groepswork bij Ontwerpgericht onderwijs – Een serie richtvragen bij het opzetten van een beoordelingssysteem. OGO-brochure 4. Technische Universiteit Eindhoven.