High Tech Equipment Design

BEETHOVEN IN MECHANICAL ENGINEERING

PITCH FOR NEW *PROFILE* AND COURSE(S)

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WHY NEW PROFILE "HIGH TECH EQUIPMENT DESIGN"?

Students

- The new profile can be marketed well, and is attractive for students
- We can encourage more BSc students to continue into the master ME
- Broaden the influx from IDE, Physics, Advanced Technology and more
- We could attract more students from outside the UT for the master with a focused HT equipment profile (just like with MSc-ROB ~90 enrolled last year 24/25)
  - Internationally
  - From universities of applied sciences

Content

- UT is missing out on important content
  (no courses available mechatronics (ME), optomechanical, thermomechanical, etc.

- Many in-depth courses available at UT however,
  - For equipment design a broad understanding beyond BSc level is essential, however comprehensive in-depth knowledge of all is too much for in the master
  - Need for two courses that advance knowledge beyond the bachelor's level—highly valuable for designers of high-tech equipment—while not reaching the full depth of each of the single master's courses

RESULTS QUESTIONNAIRE

	Prec. mech.	Mechatr.	Syst. Eng	Control	Dynamics	Manuf.	Testing	Opto	Analysis	Thermal	AI/ML	Mainten.	Optimiz	Materials	Contamin.	Tribo	Vacuum	Proj.man.
Total	431	375	316	258	239	233	217	217	212	207	198	186	180	158	146	145	140	102
Avg	6.5	5.7	4.8	3.9	3.6	3.5	3.3	3.3	3.2	3.1	3.0	2.8	2.7	2.4	2.2	2.2	2.1	1.5
SD	3.3	2.8	2.1	2.0	1.8	2.2	1.8	2.1	1.8	1.7	2.1	1.5	1.5	1.2	1.3	1.3	1.3	1.5
SD/avg	0.50	0.50	0.45	0.51	0.50	0.62	0.56	0.63	0.56	0.54	0.70	0.54	0.56	0.51	0.58	0.61	0.62	0.96
5	49	41	32	19	18	16	11	14	14	13	8	9	7	5	2	5	7	2
10	16	9	5	2	2	1	2	3	2	1	2	0	1	0	0	0	0	1

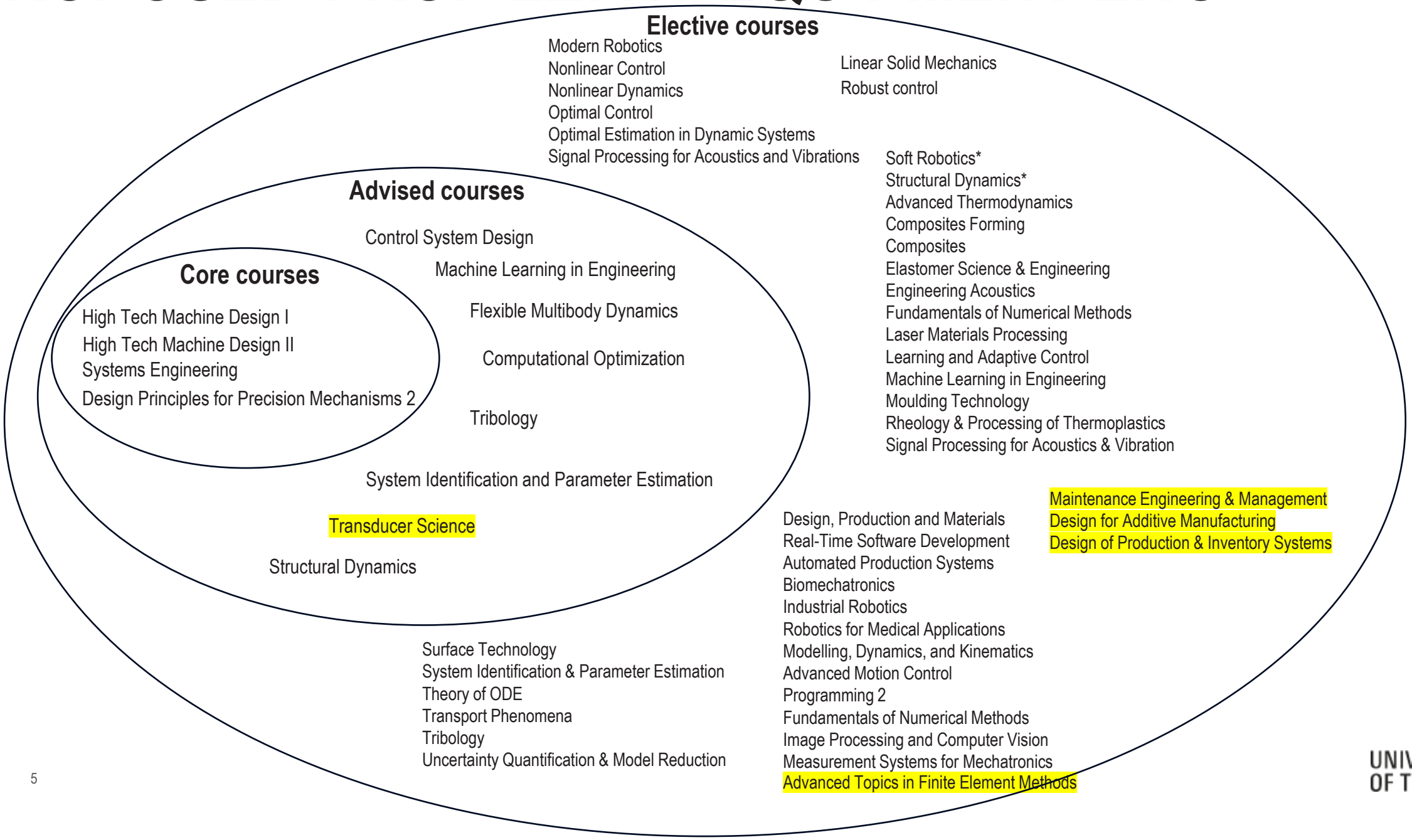
62 responses (ASML(42), Demcon (8), VDL (4), Thermo Fisher(4), Canon(3), VMI(1))
SD/avg: level of agreement
>5 measure of importance (number of times that 5 or more ECs were allocated)
>10 important and should invest a lot of time in (number of times that 10 or more ECs were allocated)

42 responses
Ranked by total
SD/avg: level of agreement
>5EC measure of importance
>10EC important and should invest a lot of time in

WHAT IS A PROFILE

- Within the Master mechanical engineering
  - 4 Core courses (compulsory)
  - 4 Advised courses (out of total set of ~8)
  - 4 Elective courses (used to specialize, from a broad set of courses)

PROPOSED PROFILE: HT EQUIPMENT ENG.



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HIGH-TECH MACHINE DESIGN COURSE

Compulsory course of new profile
Builds upon:

- Systems Engineering,
- Precision Engineering,
- Production Management and
- Manufacturing Systems.

Aim:

to learn how equipment design requires many aspects to be considered, balanced and integrated into a well functioning machine that can be built, used, maintained, and will make money for the customer and machine builder.

Cross-cutting aspects:

- Integration into a facility/fab
- Balancing of performance over subsystems
- System reliability
- Energy use
- and much more

Approaches:

- Trade-offs
- Modelling
  (low-order/back of the envelope)

Approach based on “Electric Vehicle System Design”, see https://doi.org/10.3390/wevj16080475

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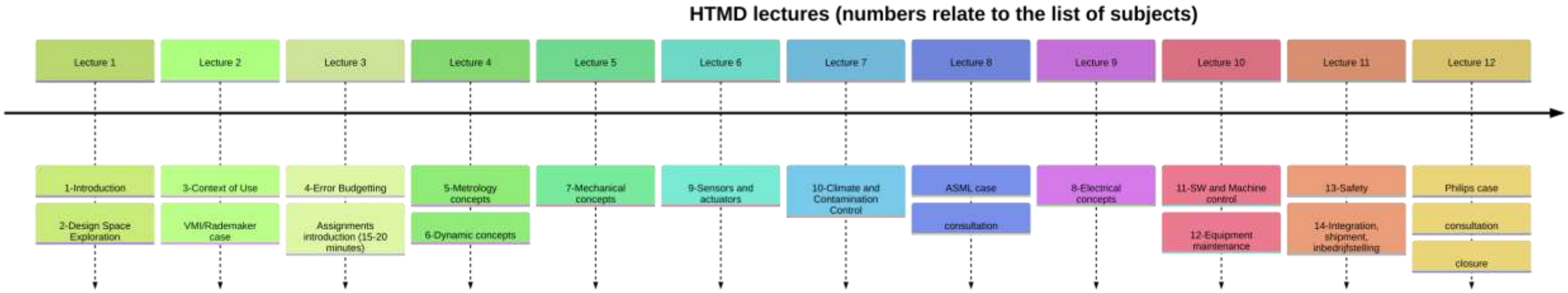
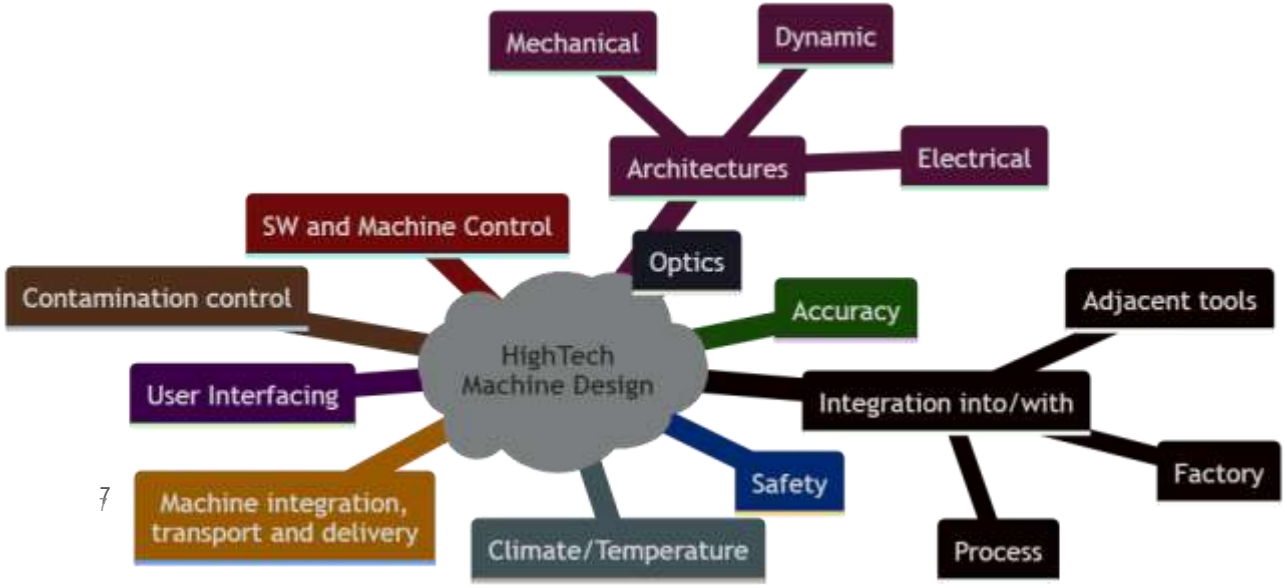
SETUP OF THE COURSE





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FUTURE: HTMD – II

- Subjects that are relevant for machine design
- Not treated in “specialized courses”
- Compulsory or elective?
- Set-up and planning to be developed

THANK YOU

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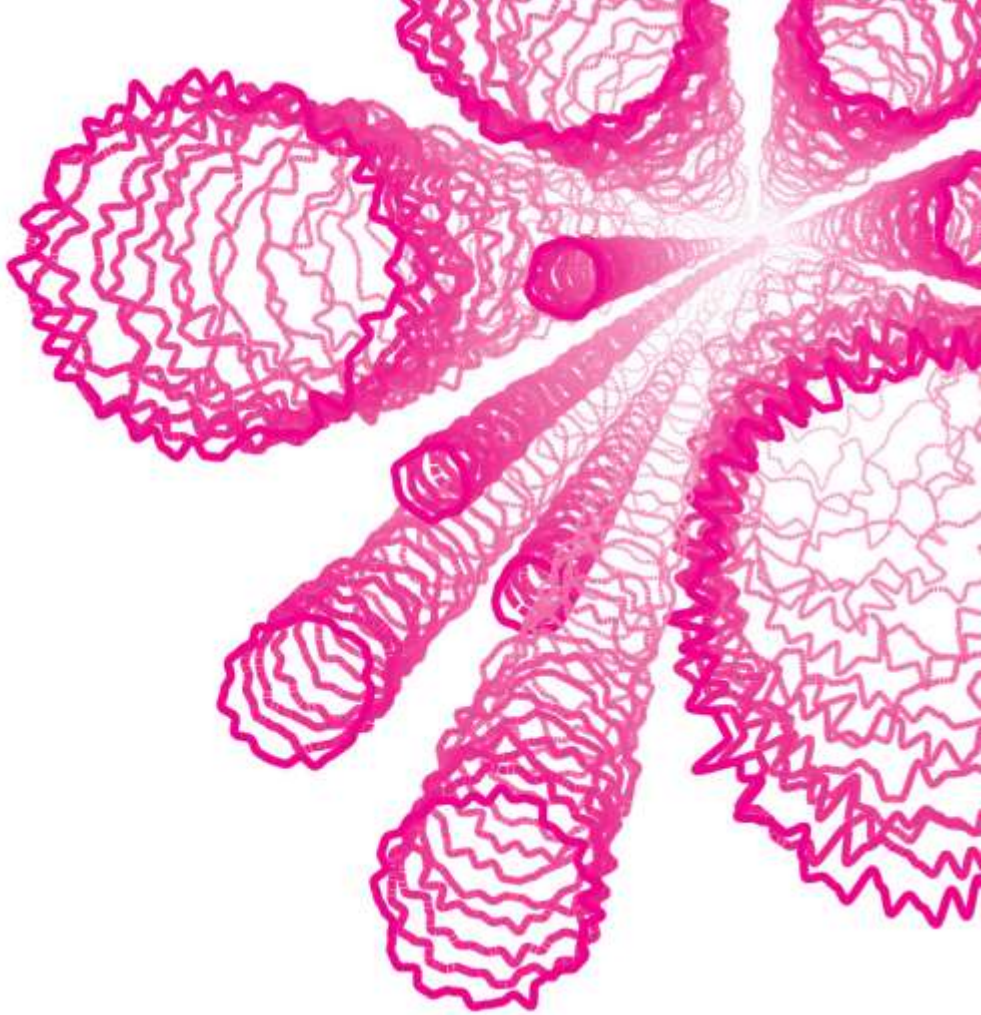

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