FYTN04, ht13

Respondents: 30
Answer Count: 18
Answer Frequency: 60,00 %

General opinion

Give your opinion in the scale 1-5.

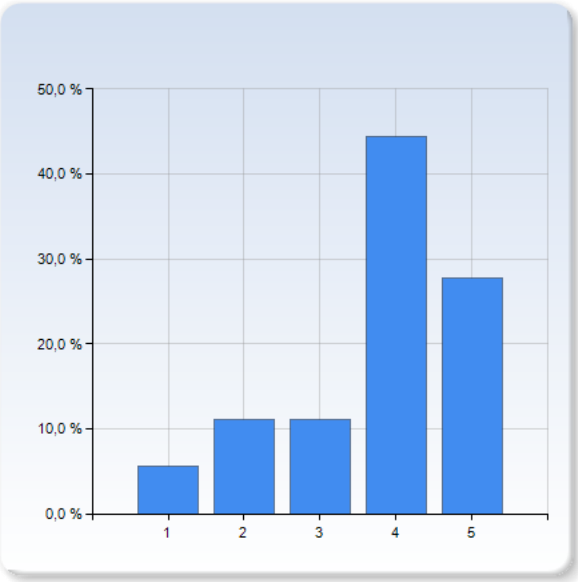
1 = very negative
2 = negative
3 = neutral
4 = positive
5 = very positive

The comment field in the end is very important! **It will help us understand what is to be kept when the grade is good, and what to change when the grade is poor.**

What is your general opinion of...

the course overall?

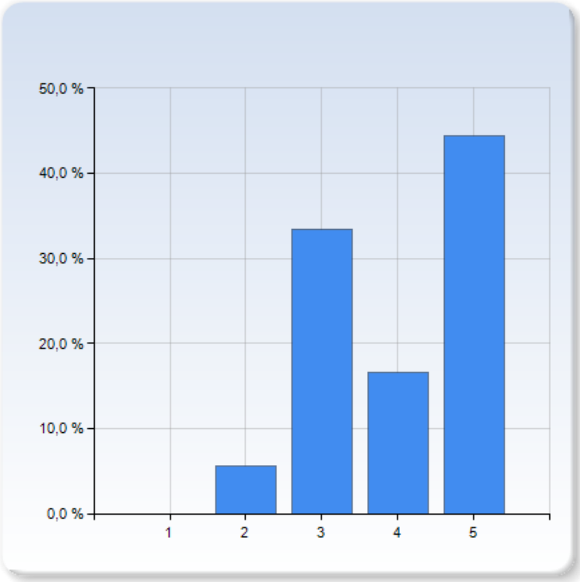
the course overall?	Number of Responses
1	1 (5,6%)
2	2 (11,1%)
3	2 (11,1%)
4	8 (44,4%)
5	5 (27,8%)
Total	18 (100,0%)



	Mean	Standard Deviation
the course overall?	3,8	1,2

the topics covered in the course?

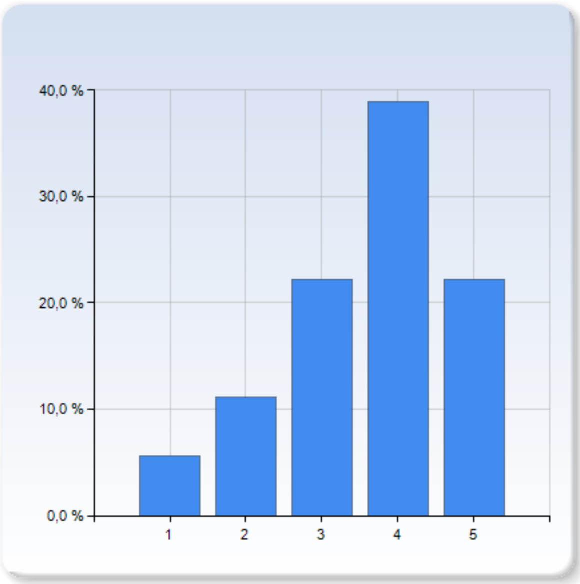
the topics covered in the course?	Number of Responses
1	0 (0,0%)
2	1 (5,6%)
3	6 (33,3%)
4	3 (16,7%)
5	8 (44,4%)
Total	18 (100,0%)



	Mean	Standard Deviation
the topics covered in the course?	4,0	1,0

the structure of the course?

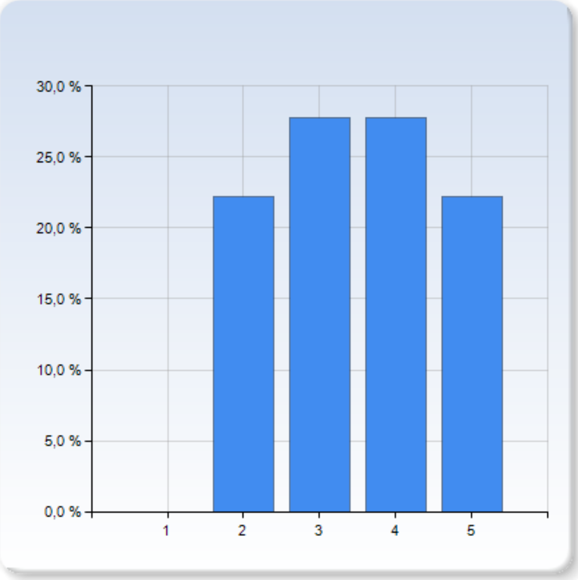
the structure of the course?	Number of Responses
1	1 (5,6%)
2	2 (11,1%)
3	4 (22,2%)
4	7 (38,9%)
5	4 (22,2%)
Total	18 (100,0%)



	Mean	Standard Deviation
the structure of the course?	3,6	1,1

the lectures with Johan Bijnens?

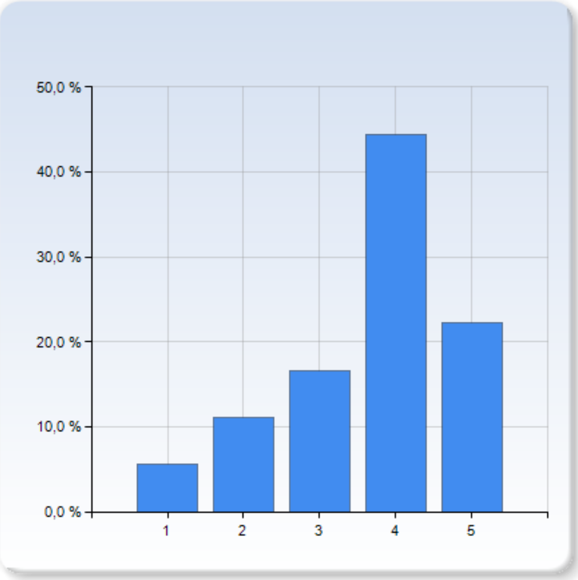
the lectures with Johan Bijnens?	Number of Responses
1	0 (0,0%)
2	4 (22,2%)
3	5 (27,8%)
4	5 (27,8%)
5	4 (22,2%)
Total	18 (100,0%)



	Mean	Standard Deviation
the lectures with Johan Bijnens?	3,5	1,1

the lectures with Torbjörn Sjöstrand?

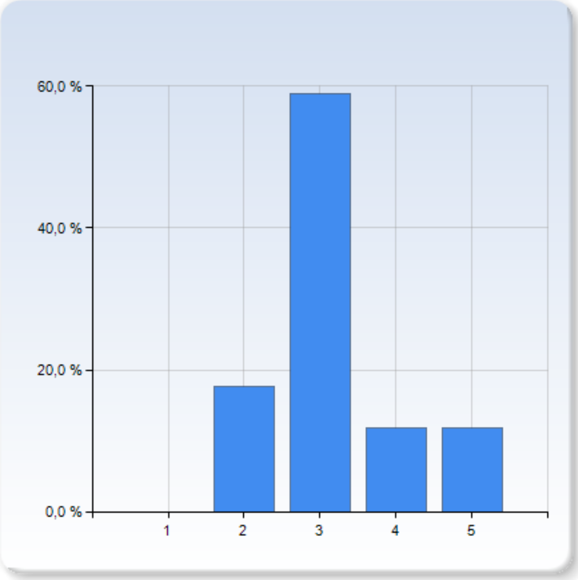
the lectures with Torbjörn Sjöstrand?	Number of Responses
1	1 (5,6%)
2	2 (11,1%)
3	3 (16,7%)
4	8 (44,4%)
5	4 (22,2%)
Total	18 (100,0%)



	Mean	Standard Deviation
the lectures with Torbjörn Sjöstrand?	3,7	1,1

the problem solving classes?

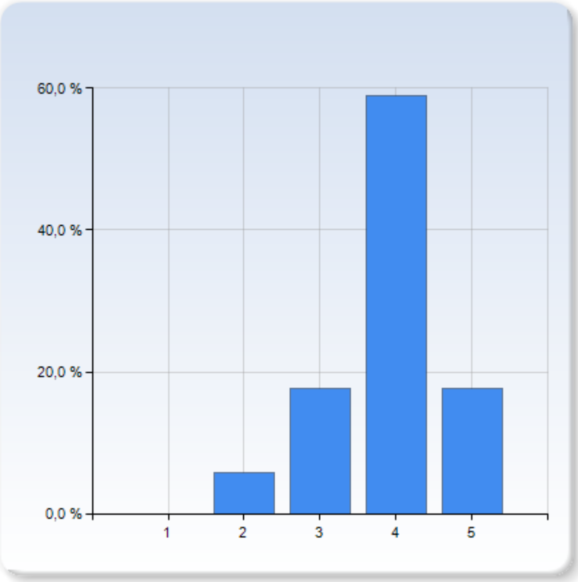
the problem solving classes?	Number of Responses
1	0 (0,0%)
2	3 (17,6%)
3	10 (58,8%)
4	2 (11,8%)
5	2 (11,8%)
Total	17 (100,0%)



	Mean	Standard Deviation
the problem solving classes?	3,2	0,9

the balance between lectures and problem-solving classes?

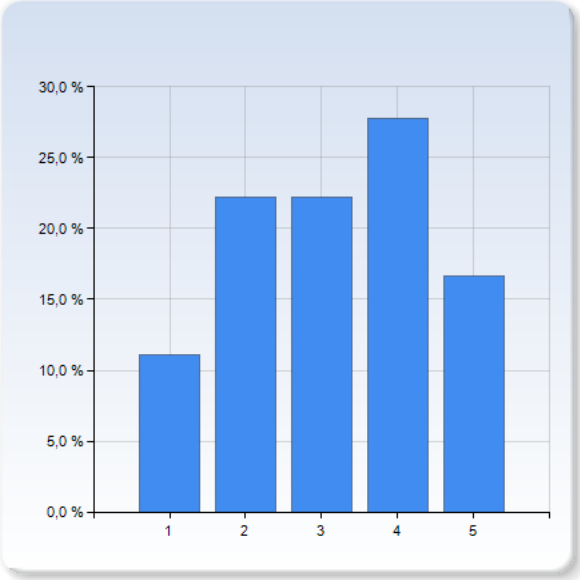
the balance between lectures and problem-solving classes?	Number of Responses
1	0 (0,0%)
2	1 (5,9%)
3	3 (17,6%)
4	10 (58,8%)
5	3 (17,6%)
Total	17 (100,0%)



	Mean	Standard Deviation
the balance between lectures and problem-solving classes?	3,9	0,8

the course book?

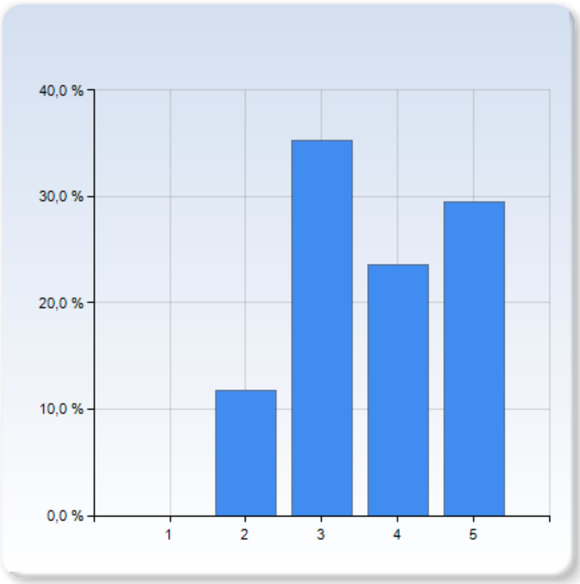
the course book?	Number of Responses
1	2 (11,1%)
2	4 (22,2%)
3	4 (22,2%)
4	5 (27,8%)
5	3 (16,7%)
Total	18 (100,0%)



	Mean	Standard Deviation
the course book?	3,2	1,3

the written exam?

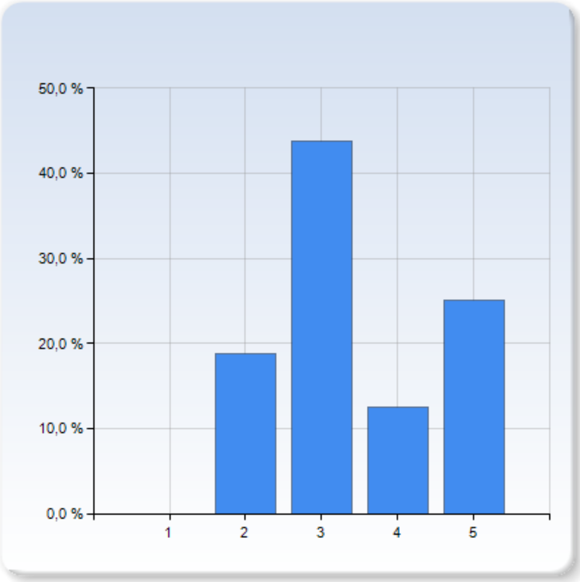
the written exam?	Number of Responses
1	0 (0,0%)
2	2 (11,8%)
3	6 (35,3%)
4	4 (23,5%)
5	5 (29,4%)
Total	17 (100,0%)



	Mean	Standard Deviation
the written exam?	3,7	1,0

the oral exam?

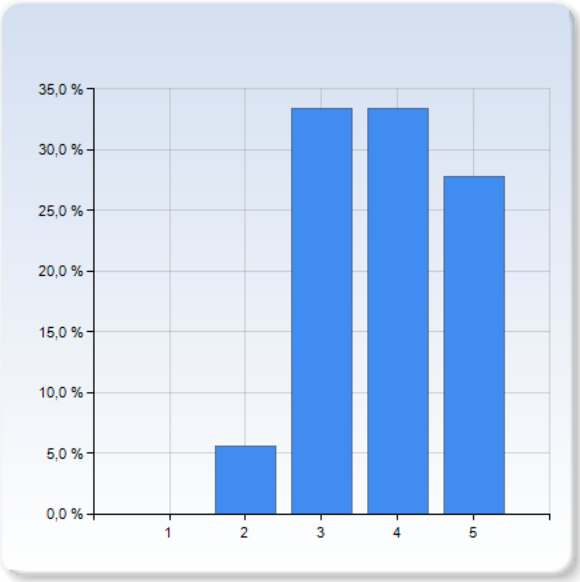
the oral exam?	Number of Responses
1	0 (0,0%)
2	3 (18,8%)
3	7 (43,8%)
4	2 (12,5%)
5	4 (25,0%)
Total	16 (100,0%)



	Mean	Standard Deviation
the oral exam?	3,4	1,1

the information about the course when it started?

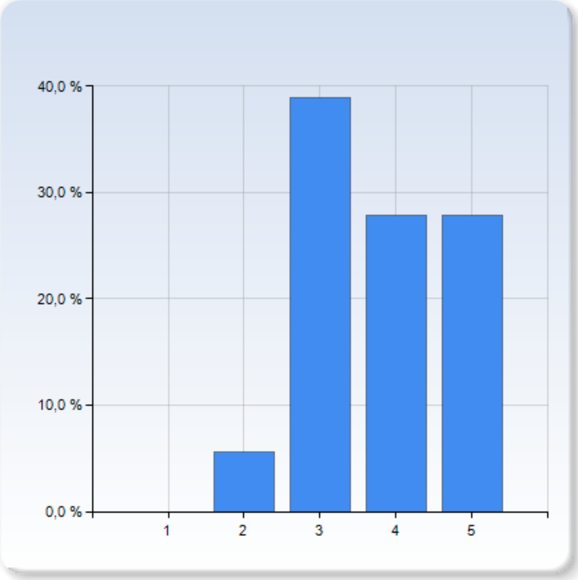
the information about the course when it started?	Number of Responses
1	0 (0,0%)
2	1 (5,6%)
3	6 (33,3%)
4	6 (33,3%)
5	5 (27,8%)
Total	18 (100,0%)



	Mean	Standard Deviation
the information about the course when it started?	3,8	0,9

the information about what was expected of you?

the information about what was expected of you?	Number of Responses
1	0 (0,0%)
2	1 (5,6%)
3	7 (38,9%)
4	5 (27,8%)
5	5 (27,8%)
Total	18 (100,0%)



	Mean	Standard Deviation
the information about what was expected of you?	3,8	0,9

Comment (*help us interpret your grades!*)
It is a very good course!
From the List of typical oral exam questions, I expected having to explain ideas and principles rather than showing actual computations. That the typical questions are distributed equally over all chapters gave me the impression all chapters would be equally relevant for the exam. Especially since computations in the book often were threated a little "roughly" and also have been tested in the hand-in exam, I did not expect them to be a topic any longer. Eventhough the course book claims to not require any previous knowledge of the topic it is quite hard to follow it if one really never touched particle physics at all before. One example for this is that suddenly Feynman diagrams show up and become a significant part of considerations without being introduced or explained (ok, we got a handout for this but that does not count as part of the book). Furthermore a problem with the book is that it is quite old so several chapters are out-of-date. This might be useful to see how things were thought to come out 20 years ago and what actually has been found, but on the other hand, for a beginner like me it is time-consuming having to think all the time if the assumptions the book makes for its computations are even valid any longer since neutrinos have masses, we know the higgs and top mass and the tau has been observed. Nevertheless I learned a lot in this course and got a good qualitative understanding what is done and why.
Bijnens lectures: Very useful but maybe too fast... Problem solving classes: Good concept but does not like the part of essentially being forced up to the blackboard Corse book: Outdated, but very good at explaining.. could be better with spin calculations Written exam: I prefer a 5 or 6-hour exam... Oral exam: Bijnens style is a bit awkward.. would like some feedback..
The lectures were really good, but I would prefer if they deviated a bit more from the book. Most derivations in the book are not that hard to perform, just time consuming in the lectures. It would have been nice if you talked about out the general features instead, like "the standard model is constructed out of doublets rotated by the W-boson and triplet rotated by the gluons", "the mass-term of the gauge fields are not locally gauge invariant --> we need the Higgs mechanism", "massless particles have two polarization states, so in order to become massive, they take the degree of freedom from the goldstone boson", "equation 9.6 can only be used if there are two final particles", "we can only exchange p_c for sqrt(s)/2 when the masses are negligible" etc. To emphasize the main features of the book rather than barely having the time to mention everything. And more group theory!
It was a very interesting course in general. The lecturers were good, but sometimes it got a bit technical and hard to follow, especially in the beginning of the course when a lot of the topics were new and sometimes it felt like there could be easier ways to explain certain stuff. The problem sheets we got every week were good and helpful to get one to understand the topics better. The book was really hard in the beginning and I didn't really get that much of it, however after some time it started to make more sense and in the end of the course I enjoyed it (but sometimes it feels like it skips some explanations which could be useful to have). The exams, I would say, were both good.
There were to many topics. Some less and on others more time spent would be helpful. Both lecturers talk a lot with the blackboard and not with their students. Since the book covers nearly everything I don't see the nessesarity to do all calculations during class - turn to the students and explain (!) more. The book has the pedagogical standard from the 80s which is bad. More clear and complete calculations in the book and more explainatory talking during class would be great.
I didn't like the book at all. It is not really clear and does not give any reason for why the theory looks like it is. Also sections at the end are out of date and it is annoying not to have a single reference book.

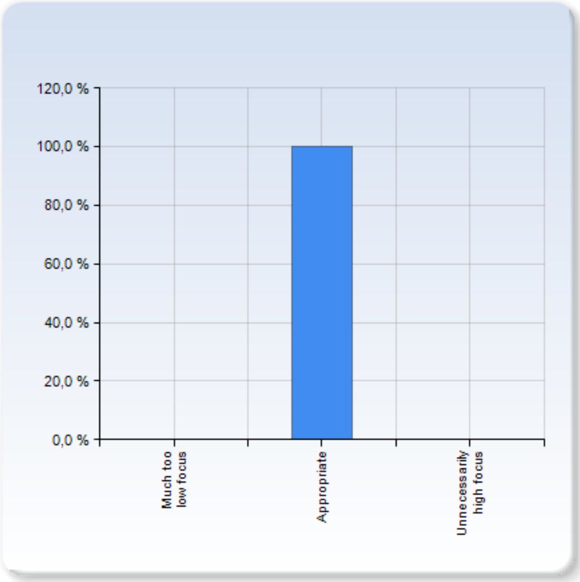
The focus of the course.

Below are learning goals from the course plan. Mark how much focus these goals got during the course, compared to what you feel would be needed.

"The student..."

can give an account of all quarks, leptons and gauge bosons that are part of the Standard Model as well as the ordering in mass of the particles

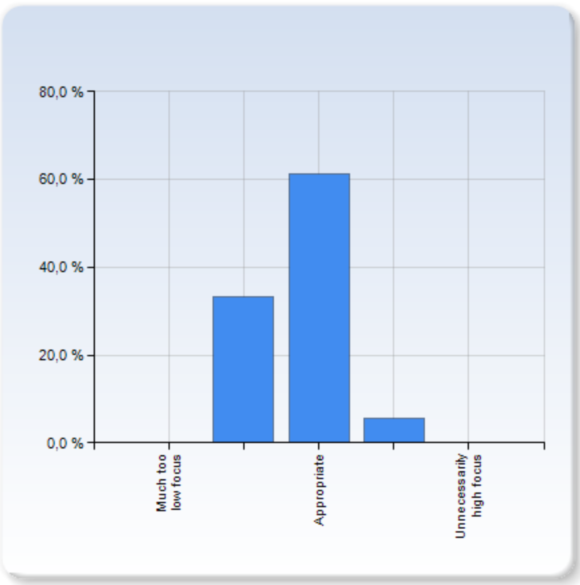
can give an account of all quarks, leptons and gauge bosons that are part of the Standard Model as well as the ordering in mass of the particles	Number of Responses
Much too low focus	0 (0,0%)
	0 (0,0%)
Appropriate	18 (100,0%)
	0 (0,0%)
Unnecessarily high focus	0 (0,0%)
Total	18 (100,0%)



	Mean	Standard Deviation
can give an account of all quarks, leptons and gauge bosons that are part of the Standard Model as well as the ordering in mass of the particles	3,0	0,0

understands how local gauge symmetry via covariant derivatives leads to interaction terms in the Lagrangian density.

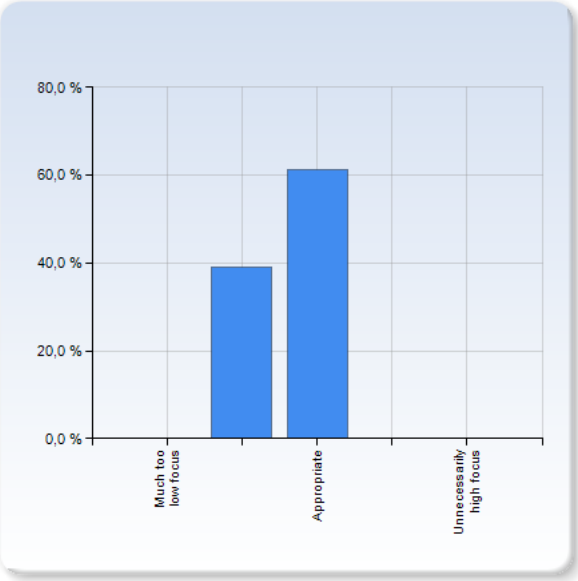
understands how local gauge symmetry via covariant derivatives leads to interaction terms in the Lagrangian density.	Number of Responses
Much too low focus	0 (0,0%)
	6 (33,3%)
Appropriate	11 (61,1%)
	1 (5,6%)
Unnecessarily high focus	0 (0,0%)
Total	18 (100,0%)



	Mean	Standard Deviation
understands how local gauge symmetry via covariant derivatives leads to interaction terms in the Lagrangian density.	2,7	0,6

can explain the different terms in the Lagrangian densityand which type of processes these lead to

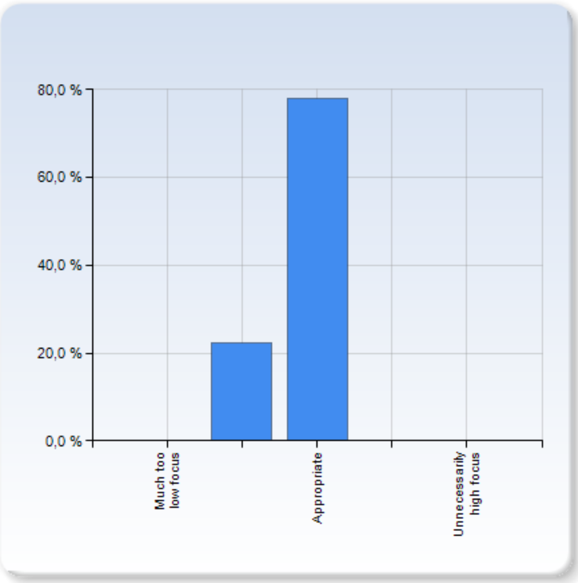
can explain the different terms in the Lagrangian densityand which type of processes these lead to	Number of Responses
Much too low focus	0 (0,0%)
	7 (38,9%)
Appropriate	11 (61,1%)
	0 (0,0%)
Unnecessarily high focus	0 (0,0%)
Total	18 (100,0%)



	Mean	Standard Deviation
can explain the different terms in the Lagrangian densityand which type of processes these lead to	2,6	0,5

can explain the Higgs mechanism and how particle masses are introduced via it

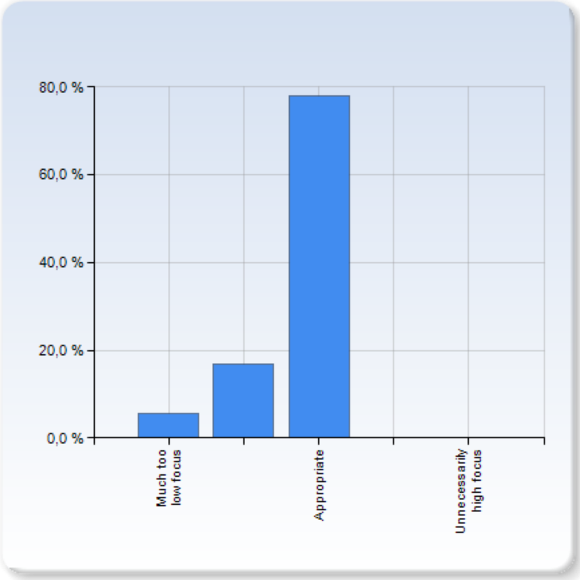
can explain the Higgs mechanism and how particle masses are introduced via it	Number of Responses
Much too low focus	0 (0,0%)
	4 (22,2%)
Appropriate	14 (77,8%)
	0 (0,0%)
Unnecessarily high focus	0 (0,0%)
Total	18 (100,0%)



	Mean	Standard Deviation
can explain the Higgs mechanism and how particle masses are introduced via it	2,8	0,4

understands how to interpret interaction terms in the Lagrangian density in terms of Feynman diagrams and can use those to estimate cross-sections for various production, decay and scattering processes.

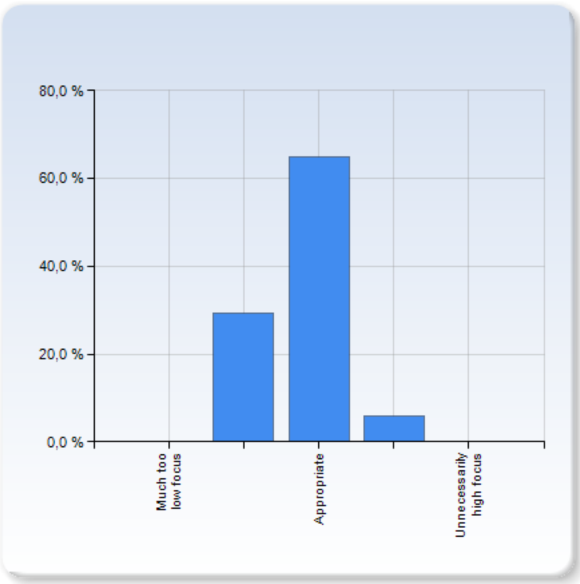
understands how to interpret interaction terms in the Lagrangian density in terms of Feynman diagrams and can use those to estimate cross-sections for various production, decay and scattering processes.	Number of Responses
Much too low focus	1 (5,6%)
	3 (16,7%)
Appropriate	14 (77,8%)
	0 (0,0%)
Unnecessarily high focus	0 (0,0%)
Total	18 (100,0%)



	Mean	Standard Deviation
understands how to interpret interaction terms in the Lagrangian density in terms of Feynman diagrams and can use those to estimate cross-sections for various production, decay and scattering processes.	2,7	0,6

understands the concept of asymptotic freedom and that it leads to confinement for quarks and gluons.

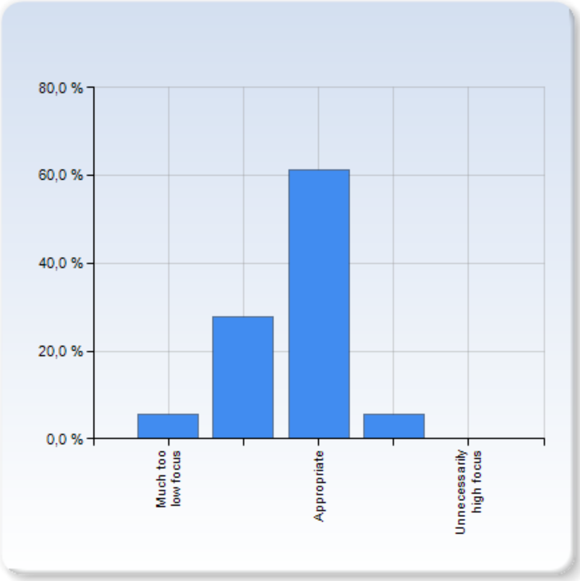
understands the concept of asymptotic freedom and that it leads to confinement for quarks and gluons.	Number of Responses
Much too low focus	0 (0,0%)
	5 (29,4%)
Appropriate	11 (64,7%)
	1 (5,9%)
Unnecessarily high focus	0 (0,0%)
Total	17 (100,0%)



	Mean	Standard Deviation
understands the concept of asymptotic freedom and that it leads to confinement for quarks and gluons.	2,8	0,6

understands the concept of parton densities and their use in calculating cross-sections in hadron collisions.

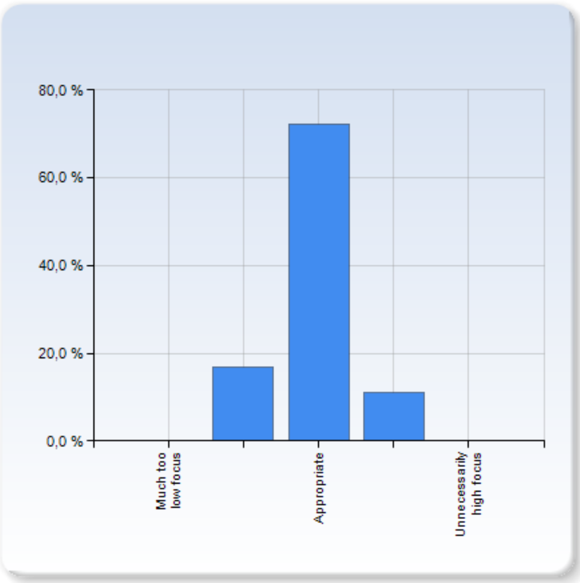
understands the concept of parton densities and their use in calculating cross-sections in hadron collisions.	Number of Responses
Much too low focus	1 (5,6%)
	5 (27,8%)
Appropriate	11 (61,1%)
	1 (5,6%)
Unnecessarily high focus	0 (0,0%)
Total	18 (100,0%)



	Mean	Standard Deviation
understands the concept of parton densities and their use in calculating cross-sections in hadron collisions.	2,7	0,7

can calculate lifetimes and decay widths for the electroweak vector bosons and the Higgs particle, as well as estimate productions cross-sections for them.

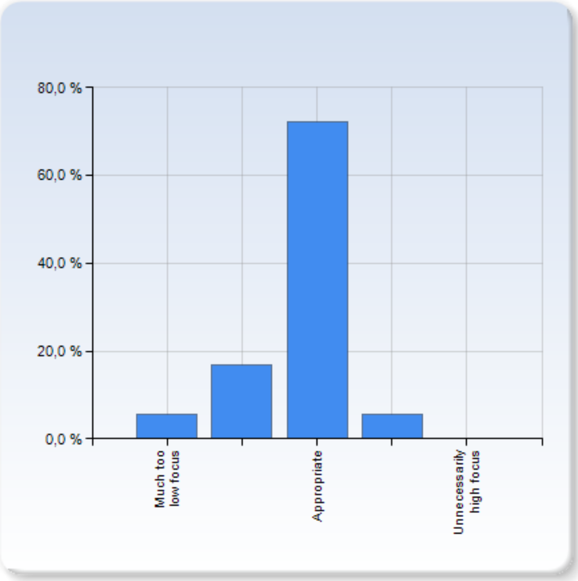
can calculate lifetimes and decay widths for the electroweak vector bosons and the Higgs particle, as well as estimate productions cross-sections for them.	Number of Responses
Much too low focus	0 (0,0%)
	3 (16,7%)
Appropriate	13 (72,2%)
	2 (11,1%)
Unnecessarily high focus	0 (0,0%)
Total	18 (100,0%)



	Mean	Standard Deviation
can calculate lifetimes and decay widths for the electroweak vector bosons and the Higgs particle, as well as estimate productions cross-sections for them.	2,9	0,5

can explain why the coupling constants can vary depending on the energies involved in a process.

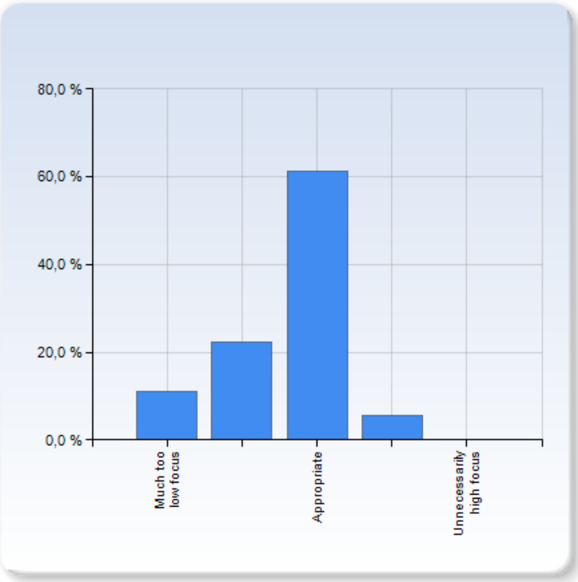
can explain why the coupling constants can vary depending on the energies involved in a process.	Number of Responses
Much too low focus	1 (5,6%)
	3 (16,7%)
Appropriate	13 (72,2%)
	1 (5,6%)
Unnecessarily high focus	0 (0,0%)
Total	18 (100,0%)



	Mean	Standard Deviation
can explain why the coupling constants can vary depending on the energies involved in a process.	2,8	0,6

can describe the mixing between quark families and how the mixing between three quark families leads to the breaking of CP symmetry.

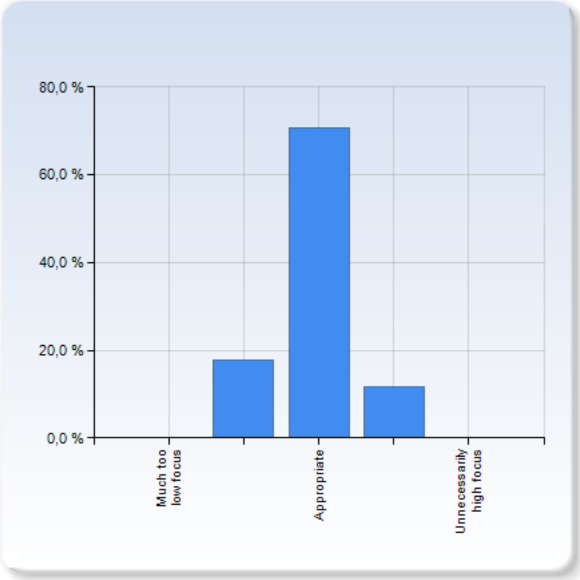
can describe the mixing between quark families and how the mixing between three quark families leads to the breaking of CP symmetry.	Number of Responses
Much too low focus	2 (11,1%)
	4 (22,2%)
Appropriate	11 (61,1%)
	1 (5,6%)
Unnecessarily high focus	0 (0,0%)
Total	18 (100,0%)



	Mean	Standard Deviation
can describe the mixing between quark families and how the mixing between three quark families leads to the breaking of CP symmetry.	2,6	0,8

understands how the existence of neutrino masses may lead to neutrino oscillations.

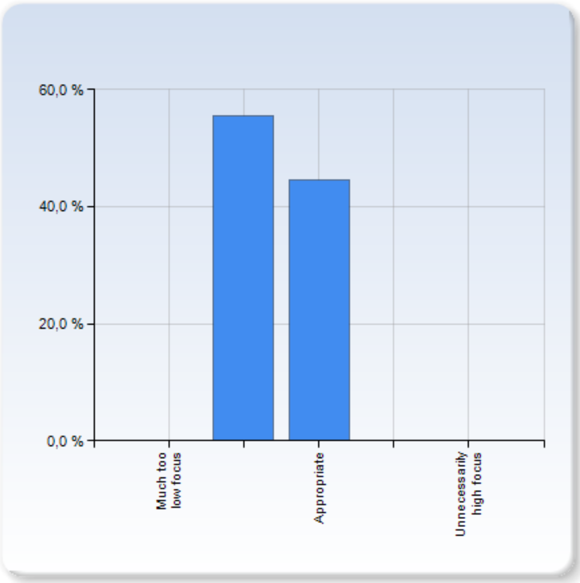
understands how the existence of neutrino masses may lead to neutrino oscillations.	Number of Responses
Much too low focus	0 (0,0%)
	3 (17,6%)
Appropriate	12 (70,6%)
	2 (11,8%)
Unnecessarily high focus	0 (0,0%)
Total	17 (100,0%)



	Mean	Standard Deviation
understands how the existence of neutrino masses may lead to neutrino oscillations.	2,9	0,6

is able to describe all parameters in the standard model and give examples of how these can be measured.

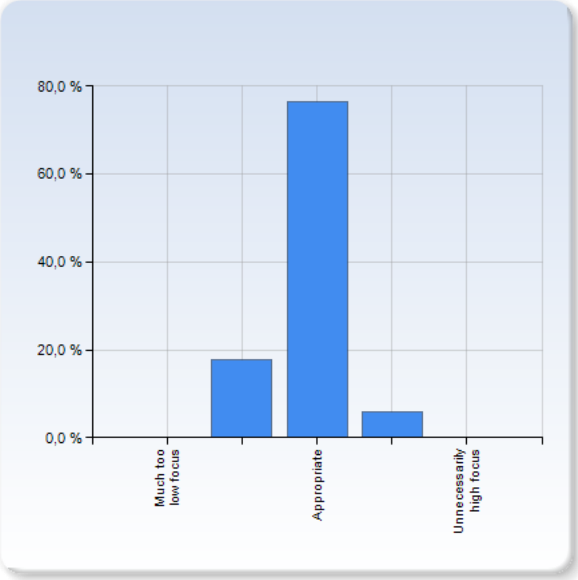
is able to describe all parameters in the standard model and give examples of how these can be measured.	Number of Responses
Much too low focus	0 (0,0%)
	10 (55,6%)
Appropriate	8 (44,4%)
	0 (0,0%)
Unnecessarily high focus	0 (0,0%)
Total	18 (100,0%)



	Mean	Standard Deviation
is able to describe all parameters in the standard model and give examples of how these can be measured.	2,4	0,5

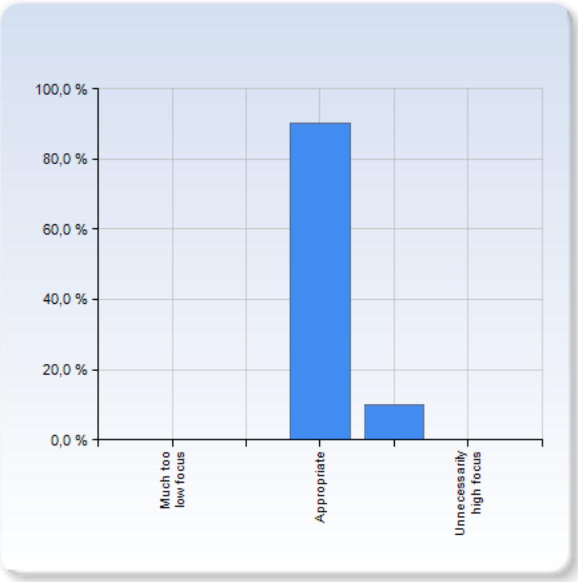
understand the basic assumptions underlying Grand Unification and supersymmetry.

understand the basic assumptions underlying Grand Unification and supersymmetry.	Number of Responses
Much too low focus	0 (0,0%)
	3 (17,6%)
Appropriate	13 (76,5%)
	1 (5,9%)
Unnecessarily high focus	0 (0,0%)
Total	17 (100,0%)



	Mean	Standard Deviation
understand the basic assumptions underlying Grand Unification and supersymmetry.	2,9	0,5

	Number of Responses
Much too low focus	0 (0,0%)
	0 (0,0%)
Appropriate	9 (90,0%)
	1 (10,0%)
Unnecessarily high focus	0 (0,0%)
Total	10 (100,0%)

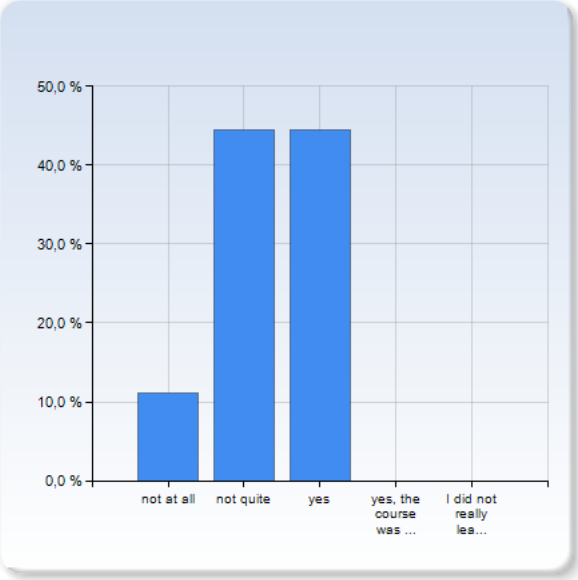


	Mean	Standard Deviation
	3,1	0,3

Comment
To little focus on why 3x3-matrices cannot be made real.
The reason I have put that there could be more focus on gauge symmetry and the Higgs mechanism is because these were rather hard concepts to understand in the beginning of the course and they are also quite essential for understanding everything else.
Several of these topics felt quite rushed and I think it would be better to put more focus on a couple of them. As it was, a lot of derivations were just scetched, or the results were simply quoted.

Did you have enough prior knowledge for this course?

Did you have enough prior knowledge for this course?	Number of Responses
not at all	2 (11,1%)
not quite	8 (44,4%)
yes	8 (44,4%)
yes, the course was a bit easy	0 (0,0%)
I did not really learn anything new	0 (0,0%)
Total	18 (100,0%)

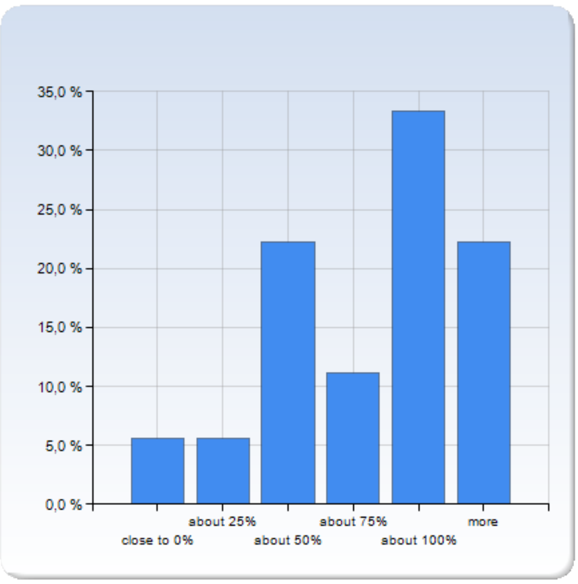


	Mean	Standard Deviation
Did you have enough prior knowledge for this course?	2,3	0,7

If your prior knowledge was not fairly appropriate, please comment! What prior knowledge was missing/overlapping? What is your background (year of higher education, relevant courses)?
I did not hear any lecture about relativity or quantum field theory or particle physics before. So virtually any concept or computation was new to me, following the computations sometimes was hard. But nevertheless I would hear the course again because it is worth a lot to just know what particles there are and what they typically do, even if one can not derive it mathmatically. So I would not recommend to generally require the lectures mentioned above as prerequrement for hearing the course.
I was lacking knowledge for chapter 2. Haven't had any electrodynamics or field theory.
I had no prior knowledge of field theory (QED) or Lagrangian mechanics, which would have been good to be able to understand everything better. I would be nice with some introductory text on the webpage considering these topics which you could read if you hadn't encountered them before. Also, the group theory was kind of confusing in the beginning and it would have been nice with some more in depth lecture on that topic.
i.e. FYTA12
Exchange student - hadn't done any particle physics before
4th year of studying physics I already heard an introductory course to particle physics
I had no knowledge in group theory, did not know how to read a Feynmann diagram and no knowledge of field lagrangian and classical or quantum field theory

How much time have you spent on this course? (100% means 9-10 weeks, 20 hours per week, adding up to roughly 25 work-days or 200 hours working time)

How much time have you spent on this course? (100% means 9-10 weeks, 20 hours per week, adding up to roughly 25 work-days or 200 hours working time)	Number of Responses
close to 0%	1 (5,6%)
about 25%	1 (5,6%)
about 50%	4 (22,2%)
about 75%	2 (11,1%)
about 100%	6 (33,3%)
more	4 (22,2%)
Total	18 (100,0%)



	Mean	Standard Deviation
How much time have you spent on this course? (100% means 9-10 weeks, 20 hours per week, adding up to roughly 25 work-days or 200 hours working time)	4,3	1,5

Comment
about 200% ... more or less..
at least 50 hours per week.
Even though I enjoyed this course very much it was very very time consuming, especially since I didn't have any prior course in field theory or Lagrangian mechanics.
One of the toughest courses I've taken, but a very interesting one. Worth the hard work!

What did you particularly like with the course?

What did you particularly like with the course?
The lectures: interesting topics presented in a good way.
How much you can understand of the Standard Model without involving too much QFT.
*I got an overview over what particle physics and the standard model is *Several recent topics of research, theoretical as well as experimental, were mentioned.
The content! So interesting! And the book was exciting!
I think most of it was good.
The overview one could gain from this cours about this topic.
A good course book even though it is quite old that complemented the lecture notes very well. Interesting subject, especially the fundamentals (first part).
It is an interesting course about an interesting subject.
I especially liked the rather close connection between the second part of the course (cross sections, decay widths etc.) and experimental particle physics. Also, the structure with weekly hand-in exercises is good, since it forces you to study well from the beginning of the course (which is needed when taking the exams).
Felt like a good introduction, with a wide variety of material (from true theoretical parts to accelerators etc)

What in the course do you think could improve? If you have found additional material that you found very useful, please mention it.

What in the course do you think could improve? If you have found additional material that you found very useful, please mention it.
I have found "Quantum field theory in a nutshell" by A.Zee very helpful as an introduction to QFT.
*It would be nice to have a more up-to-date book
A clearer explanation why the Lagrangian is written as currents + see the other comments.
As I've said above, maybe add some basic texts on Lagrangian mechanics and basic electrodynamics (to understand the field theory aspect and gauge invariance better) on the webpage and also something more about group theory would be good.
See comments to question 1
I found the strategy of not calculating anything exactly and only estimating everything irritating. I did not have the feeling that everybody knew what really happens when one calculates a cross section. For example the concept of propagators, what they are and how they arise was not presented properly.
I think it would be better if the course would give a more thorough treatment of a couple of the topics, instead of just scetching derivations and citing results for all the topics covered. As it was I felt I had some general idea about how lots of things work, without really having a detailed understanding of them.
The Lagrangian and Higgs part in the beginning was not explicitly enough. Johan Bijnens only wrote equations and did not interpret and explain them sufficiently. I did not read the Kane, but instead I read the Griffiths. Although I liked the book very much, the lecture was very much guided by the Kane. Therefore I cannot recommend to read (only) the Griffiths during this course.
My main problem with this course is that it was much too time consuming. I probably spent around 150% on it, leading me to partly neglect another course. The material covered was fairly interesting, but there is simply too much of it for a 7.5 hp course.