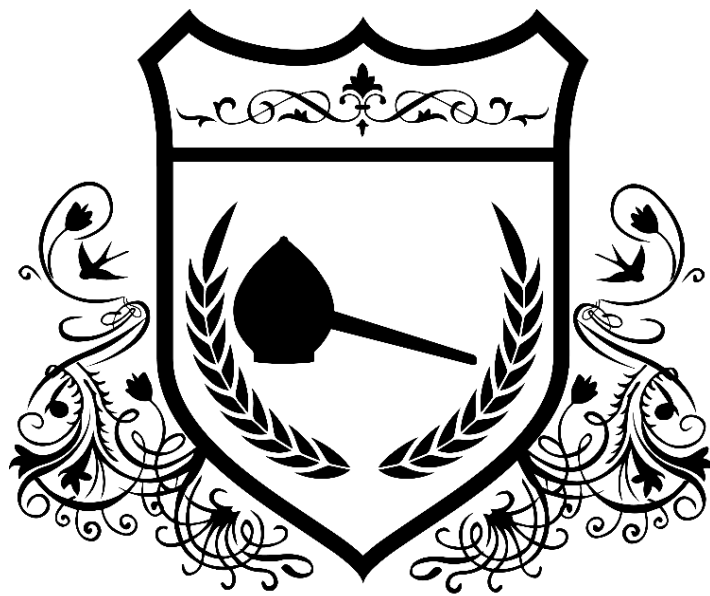


CSE minor experience guide 2020



C.T.S.G. Alembic

EST. 1965

Introduction

Dear minor-orientating student of CSE,

If you are reading this, you are probably looking for what minor you are going to do next year. This guide has been set up to assist you in this. Next to some general information about choosing minors, this guide contains the experiences with several minors that are often followed by CSE students of students that followed them this year.

General information about minors

All of the relevant general information can be found on the site of the UT, accessible via the following URL: <https://www.utwente.nl/en/education/electives/minor/>. Next to information about the different minor options, requirements and registration, this webpage also contains a minor search tool. Here you can select your study programme, after which it shows you all minors you are allowed to take. By clicking on a minor in this list, you are directed to the relevant course information. The deadline for choosing a minor is May 27 for most minors. For the minor 'leren lesgeven', the deadline is April 15.

Experiences of CSE students

In this guide, the experiences of numerous students that have done their minor in previous years can be found. You may use it in combination with the minor tool of the UT to inform yourself about minors that interest you.

Good luck with your minor choice!

Jurrie Bruggeman
Commissioner of Educational Affairs
C.T.S.G. Alembic

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M5 Mechanical Engineering – Dynamic Systems

Overview

Name: Wisse Hersbach

Organizing study: Mechanical Engineering

Module: Dynamic systems

Motivation

After my Green Team year, I decided to delve into the mechanical world. I was intrigued by some of my fellow teammates about what they learned, and specifically this module of the mechanical engineering track. Personally, I think the course had both its fun and less fun parts and offered me some challenges here and there. Partly because I sat in the classes on my own, which of course isn't the ideal situation. But also, because the courses challenged me to think differently sometimes than we do here. Originally this module also contains Math D2, so a replacement for this subject is needed. For this course, the subject Dynamic systems requires some prior knowledge: the subject statistics. This can be easily arranged with the program director of ME and our program staff. Because statistics isn't in the regular module but in the first module of ME, some lectures might overlap. However, this is no problem at all, as I will tell you below. Then on to the courses:

Dynamic systems (and statics)

To begin with statics. Statics is a subject which is really similar to the physics of forces which you followed in high school. It is a pretty easy subject which covers the beginnings of Newton's laws, like 'action = reaction'. For me I skipped a lot of lectures, but just doing the exercises gave me enough info for the exam. The general description of this subject is $F_{res} = 0$. Which makes solving equations really simple.

Dynamic systems is exactly the same as statics, but now $F = m \cdot a$. The goal of this subject is to describe movements of different things. While I found the subject quite fun, the exercises were quite challenging. The lecturer is really nice and gives really great lectures. This subject can however be quite time intensive, since you really need to make the exercises to succeed in the subject.

Design principles for precision mechanisms

DPPM is one of the easier subjects of this module. It is coupled to a project and an exam. In this course you really need to think in 3D. It is a lot about how to constrain movements of an object, without creating friction in the structure. In the project I had to make a mechanism to read CD-Rom's, and thus constrain a reader to certain movement directions. It was quite fun, as we in CSE never think about these kinds of systems.

System analysis

System analysis is a course with signs of a bit of electrical engineering. The course is all about signals and how to analyze them. Now this may seem quite difficult, but the lecturer is really great, joking in his lectures and providing really great examples. It is quite a different way of thinking, to tackle problems.

Time-intensity and comparison to CSE

Overall, the module requires you to do put in the effort, however, when you do the total intensity will be much lower. The module is quite doable in terms of time consumption and is a nice extension on our program. This minor allows you to work with forces, which we normally don't. And if you are considering doing aircraft engineering, this is a good module to do. A part of the knowledge they expect you to have for the aircraft minor is related to ME.

Overview

Name: Job de Swart

Organizing study: Industrial Engineering and Management

Module: Finance for Engineers

Motivation

I chose this module for several reasons. First, I still had to redo a course from module 5 and I wanted to combine this within my minor. Therefore, I didn't want to do a minor with full lecture weeks and a lot of mandatory presence. Furthermore, I wanted to do something totally different than Chemical Engineering for a chance. I always liked business and economics in high school and I was eager to experience some university level courses in this field. Finance for engineers seemed to be the ideal option.

Course experiences

- *Accounting and finance* was the main course. I think we generally had one or two lectures per week, plus some self-study. These lectures also were the most crowded ones, with over a hundred attendees. Sometimes the lecturer had trouble with the volume of the crowd, because most students were less focused than you would expect with CSE lectures for instance. Besides that, the lectures were clear and good to follow.
- *Option pricing* is an interesting course, however I believe it could have been better with another lecturer. This lecturer spoke very fast with a thick accent, which made it difficult to follow. There was one exam together with *accounting and finance* which was mostly multiple choice. In preparation there was a practice exam which was quite representative.
- *Methodology* was a vague course mostly concerning the general methodology of observational research and questionnaires and such. I didn't go to many lectures, since I did not find them useful. There were some group assignments and a multiple-choice test which were all not that hard.
- The *Project* for this module was quite extensive but fun. In the beginning we participated in an investment game where the goal was to make profit of investing with fake money in the actual stock markets and you had to justify your strategies. This was an entertaining way to put the learned methods of finance and option pricing into practice. Furthermore, there were some extra assignments followed by a large written essay. Overall, a nice project to do.

Time-intensity and comparison to CSE

Compared to CSE, there were very few contact hours and the self-study was not that hard to do. Overall, I think I spent half as much time with this module as I would do with a regular CSE module. No previously obtained knowledge for CSE was that relevant, although there were some statistics exercises. And I think anyone from CSE could follow this module without having an economics background.

Relevance for your study

I mostly learned about the basics of market strategies of companies, as well as financing and accounting. Furthermore, I learned about investment strategies on the stock markets. Overall, I was very satisfied with this minor.

Lab on a Chip

Overview

Name: Job de Swart

Module: Lab on a Chip

Motivation

I chose the lab-on-a-chip module mainly to freshen up my lab skills and other relevant knowledge before doing my bachelor assignment. I previously did a board year and the finance for engineers minor, so I thought that might be necessary.

Course experiences

The setup of this module is quite interesting actually. There are no real courses, but you get taught by Problem Based Learning. You are assigned to a 'PBL' group of approx. four students of random educational backgrounds to solve an assignment (or problem) every day. In the morning there would be some introduction on the topic and some literature background and then you had to solve the problem yourselves and present the result to the group at the end of the day. The topics were in the field of pumping and mixing, mass transport, microfabrication, electrochemical and optical sensing, cell biology and some statistics. This was guided by the staff of BIOS, who are all very fun and involved people.

After a few weeks the project started, where you and your group had to design a chip after doing some literature research. Then guided by your supervisor you had to fabricate and test this chip and make a final report and presentation about your findings. In essence, it is very much like a bachelor assignment which you do with a group instead of on your own.

Furthermore, there was a written exam at the end of the module, which was quite extensive, but very well to do with the knowledge from the PBL sessions.

Time-intensity and comparison to CSE

The module was very time intensive. Essentially the whole module follows a 9 to 17 mentality with mandatory presence every day. However, outside of college hours you didn't have to worry about studying for exams or doing assignments. But be prepared that you are going to spend a lot of time on campus with this module.

The content of the module relates very well to CSE, but now mostly focused on micro scale. You also learn some new topics in the field of cell biology.

Relevance for your study

I really liked the Problem Based Learning in this module. It requires you to immediately dive into the learning aims of the topics in a fun and competitive way that is way more interesting than boring lectures. You also get used to the time scheme very quickly, but it can be annoying to sit in the same room with the same small group of people day in, day out.

Overall, I really enjoyed the minor and learned a lot about micro chip fabrication with BIOS.

Leren Lesgeven

This minor is Dutch only.

Overzicht

Naam: Emilie Dubbelman

Q9 - Leren Lesgeven basis module (15EC)

Q10 - Leren lesgeven vervolg module (15EC)

!Let op deadline inschrijven is 15 April!

In het college jaar van 2019-2020 heb ik de minor leren lesgeven gevolgd. In deze minor kan je te weten komen hoe het is om scheikunde (of Nask onderbouw) te geven op het middelbare onderwijs. Na een half jaar kan je zo ook je 2^{de} graad onderwijsbevoegdheid halen. Na je bachelor zou je dan al voor de klas kunnen beginnen. Deze minor kan je opdelen in twee kwartielen. Zonder het eerste kwartiel kan je niet het tweede kwartiel volgen. Je kan wel stoppen na 1 kwartiel. In het eerste kwartiel krijg je ook een vervolg advies voor het tweede kwartiel. Ben je niet geschikt om voor de klas te gaan, dan merkt je dat snel genoeg in deze minor. Wel kan je dan alsnog de EC voor de module halen, maar kan de opleiding ervoor kiezen om je geen onderwijsbevoegdheid te geven.

Ik heb gekozen voor deze minor, omdat ik graag wilde weten of lesgeven iets voor mij is. Naast kijken of ik genoeg plezier in het lesgeven kan hebben denk ik dat het hebben van een onderwijsbevoegdheid nooit kwaad kan. Stel dat ik later toch niks in de chemische industrie wil doen, of als ik er geen baan in kan vinden kan ik altijd nog het onderwijs in.

In de basis module heb je drie onderdelen van elk 5 EC:

Onderwijskunde 1, dit vak gaat in op de relatie tussen de leraar en de leerling. Hoe kom je over op de leerlingen en hoe je dit kan verbeteren. Voor dit vak heb je 1x per week college en moet je meerdere verslagen voor schrijven. Tijdens dit vak zit je met alle studenten van de minor en de master in college. Inleiding vakdidactiek geeft je een basis voor het voorbereiden van je lessen en focust zich vooral op vakinhoudelijke dingen. Hier komen opdrachten bij kijken die je toe moet passen in je lessen. Daarnaast komt er didactiek bij kijken. Hiernaast is er ook een deel intervisie. Hier kan je dingen bespreken waar je tegen aanloopt in je lessen.

Schoolpracticum 1 (SP1), je krijgt een stageschool toegewezen waar je lessen moet gaan verzorgen. Daarnaast maak je kennis met een school.

In de vervolg module heb je nog maar twee onderdelen: 10EC aan schoolpracticum 2 en 5EC aan vakdidactiek. De docenten van het vak vakdidactiek zijn geweldig. Ze zijn betrokken bij je voortgang en je kan er snel terecht met vragen. Daarnaast hebben ze zelf een achtergrond in de scheikunde, maar ook in het onderwijs. Ze weten daarom ook waar ze het over hebben.

De meeste studenten vinden onderwijskunde helemaal niks. Daarentegen wordt vakdidactiek als nuttig ervaren. Dit krijg je alleen met scheikunde minor en master studenten. Hier moet je denken aan ongeveer 6 studenten op 1 docent. Het persoonlijk contact in deze opleiding is vrij groot. De ervaringen van het schoolpracticum zijn heel verschillend. Zelf had ik een erg leuke stageschool waar ik een half jaar lang 2 4 VMBO klassen met veel plezier heb mogen lesgeven.

Tijdens deze minor heb je alleen op donderdag college, de rest van de week heb je tijd om les te geven op je stage school. In de praktijk ben je ongeveer 2 dagen op je stageschool en ben je in totaal zo'n 3 dagen bezig met ergens aanwezig zijn. Daarnaast moet je je verslagen schrijven en je lessen

voorbereiden. Ik zelf heb tijdens de minor geen (hoge) werkdruk ervaren. Je hebt weinig contacturen en je kan jezelf vrij makkelijk door de verslagen heen werken. Stop je er meer tijd in, zal je ook hogere cijfers halen. Heel veel tijd in mijn verslagen stoppen was ook niet helemaal mijn instelling. Ik vond het leuker om meer tijd in mijn lessen te steken en bijvoorbeeld een scheikundige escaperoom puzzel voor de leerlingen te maken.

Uiteindelijk heb ik mijn minor voldoende afgerond en kijk ik terug op een leuke minor. Ik denk dat ik vooral indirect praktische vaardigheden heb geleerd en weinig inhoudelijke kennis. Daarnaast heb ik een goed beeld gekregen van een baan in het voortgezet onderwijs en de werking van een middelbare school. Ik heb geen spijt van mijn minor keuze en overweeg om een dubbele master te gaan doen, waar ik in een half jaar ook mijn eerste graad onderwijs bevoegdheid kan halen.

Verder nog een paar praktische dingetjes. De inschrijf deadline voor de minor is eerder dan normaal, zodat de opleiding genoeg tijd heeft om stagescholen te regelen voor iedere student. Daarnaast heeft de opleiding ook een eigen studievereniging, Onwijs. Het is alleen mogelijk om het schoolvak scheikunde te geven (en nask).

Veel succes met jullie minor keuze!

Groetjes,

Emilie

M6 Advanced Technology – Materials Science and Engineering

Overview

Name: André Pul

Organizing study: Advanced Technology (AT)

Module: M6 – Materials Science and Engineering

As I had followed the process design track in module 8 of CSE, and I was not sure how the material track would be and had kind of bad insight into what to expect from that anymore, I chose to follow the Materials Science and Engineering module of AT as my second minor module. This allowed me to leave the option to choose the materials or nanotechnology track in the master open, if I would prefer the materials part of the study over the process part.

This module had not a lot of class sessions, and only for the Semiconductor Devices and project courses there was some self-study besides the planned tutorial sessions. Most of the free time can be spend on the project, but as the project consists of two parts, exploring the material properties and the chemistry, and only the material properties directly can be applied after the first few lectures, it was not very easy to start on the chemistry part. For the project you need to investigate a certain material it's material properties and the chemical techniques that are used in industry to make this material. The chemistry part is equally weighed as the materials part, but only in the later sessions of Chemistry and Technology of Materials (CTM) it really starts becoming relevant.

The Advanced Materials course is focused on the material properties, like magnetism, the dielectric effect, mechanical failure of materials. The thermal properties part of this course is where it gets abstract with the diagrams that are discussed only during the lecture (not in the book), with the dimensions in the reciprocal space. Personally, I had a hard time trying to understand it very thoroughly, as I also took the liberty to work this out for the properties of the material of our project. The schedule is well made for this course, as after the lecture there is a tutorial planned where you can practice on the subject learned.

In Fundamentals of Solids (FoS) you delve into the phase diagrams and learn about how to read them. In the second part you learn about the diffusion processes that happens in solids, the different structures possible in ceramics and certain surface analysis techniques. Some of this was already treated in the first year of CSE, but it is a nice recap of how it worked again. This course is doable if you just keep up with the tutorials that you get.

Now for the CTM part of the module, the first 6 lectures were given by Mark Hempenius, which some of you might already know from your previous classes. He treats the polymers part of this course, and this was mostly a recap from the CSE Polymers course, but I think part of the Polymers course got changed the last few years. After Mark Hempenius' lectures, you will get lectures about different chemical deposition techniques and ways to create ceramic materials. This is usually given at the same time you get the ceramics part of FoS, which makes it more interesting. However, as this is important for your project, as already mentioned, the way of scheduling seems a bit off. So, I would recommend having made some progress with the materials part of the project so more time can be put in the depositional chemistry of your material.

Last but not least, there is the subject of choice: Semiconductor Devices (SD) or Physical Chemistry of Interfaces (PCI). However, there was some uncertainty about which subject you must follow as a student from CSE, as PCI is comparable with the course Colloid Chemistry. SD is something you did not

have before at CSE, but it is doable, and maybe even requires less time investment than PCI, as there is only 1 exam and 1 essay that need to be done, while at PCI there are 3 exams and a practical.

If I had to compare this AT module with a CSE module, I felt it was less time consuming than most modules. There is a lot of free time, of which some you should spend on your project, but still there is plenty of time left. Some courses that are given are partially a recap of previous CSE modules, which makes it easier to get grasp of the initial concepts. Overall, this module is structured alright with quite some internal coherence here and there, although the chemistry part of the project is given a bit late. The lecturers really try to help you understand the subjects.

After all the courses, I realized that the materials track was not something for me, as it is mostly abstract thinking, and not very much calculations that need to be done. Therefore, it is useful if you are struggling with your choice of master's track.

André Pul

M1 Technical Computer Science – Pearls of Computer Science

Overview

Name: André Pul

Organizing study: Technical Computer Science (TCS)

Module: M1 – Pearls of Computer Science

In my first minor module I followed the Pearls of Computer Science minor. The first lecture sessions we had were in the cinema off-campus, as a lot of first years choose to follow the Technical Computer Science study. Normally, if there is no conference on-campus, you will have college in the Waaier 1 and 2. In total there were around 300 people attending the course, which is huge compared to Chemical Science and Engineering.

The reason why I wanted to follow this minor was because I wanted to develop some of my programming skills and see whether a more programming related study would have been something for me. I already had some basic programming knowledge, as using Matlab is part of CSE, and I also had messed around with Python and C++ before. This came in handy after the first week.

The first module of TCS is mostly focused on using Python as a programming language, but it first starts with messing around and programming your own Arduino kit (which is provided to you). For this Arduino kit you end with programming a song on a buzzer (e.g. Darude Sandstorm), as you have learned a lot about the architecture during the lectures and the way the Arduino is controlled by commands from a script during the tutorial.

As every week is about an almost completely different subject - a pearl of computer science - I am not going to elaborate on the other weeks, as the general description of each week is provided on the TCS utwente website for prospective students. On a more general note, I can say that every week is filled with new knowledge of computer science, and you really need to get hold of the concepts within the week. Some subjects will suite your interests more than others, so some of them will be easier to follow than others, but you need to finish all of them with a passing grade. This can take quite some of your time if you are really struggling with a certain concept, but luckily you also have a partner with which you can work together to get hold of the subject.

Every week you work in a group:

- In the first 7 weeks, you work with one other student, which is randomly assigned to you, on the tutorial exercises. The tutorial exercises fit the two/three lectures you get usually quite well, but if not, you can always ask one of the teaching assistants for help if you are stuck. Every week you get the chance to improve your exam grade by 1 point by some extra exercises, which really test your knowledge. Some of the tutorial assignments need to be signed off, and it is important to get these done before the end of the last tutorial session. This puts some pressure behind your performance, but it also keeps you more motivated to finish it early. Every week is concluded with an exam.
- In the last 2 weeks, you work together with five other students of your own choosing on a project. Most students work on making a twitter dashboard for a certain event like the Batavierenrace, but you can also decide to choose a project that is about the use of RFID tags which is related to security. However, only the twitter dashboard has a good description of what should be done, and the security dashboard is more open.

The last week is open for repairs, but if you manage to successfully complete all the previous weeks, this is a week off. The time intensity in general is very situated in the working days, and you usually have not much you can do during the weekends, which is quite nice.

Besides these general groups, the students are sorted into different 'houses', which is mainly used to distribute the students over different rooms for tutorials and exams. As a minor student we got assigned to the blue house, but the communication towards us was not very clear, as the houses are mainly for the first-year students.

A main disadvantage of following this course was that you need to do a replacement course for Mathematics, as the math the TCS students get is already treated in the first year of CSE. This is a course about proving statements, which is quite abstract and is almost completely self-study, which can consume quite an amount of time. Also, as your partner for the tutorials during the first weeks are randomly assigned to you, it can sometimes happen that your partner is either very good in programming, or you will have to carry the main load of the week to finish it successfully. Something I want to add to this is that it can happen that your partner shares his code with someone else, and this can get you both screwed up. My own partner in the first week shared his code for the bonus assignment with one of his friends, for which we 'only' received a warning and got tagged by the staff and also lost our bonus point.

Finally, I want to make a note that you get to learn a lot about programming and computer science in just this one module. Personally, I got to know how to work better in Python and got better insights in how computers and programs work in general. This module is doable if you go to all the lectures and tutorials that are given, as most of the exercises can be finished within these planned hours, but this is also due to it being a first-year's module, so everything is still very basic. I also learnt that I like programming, but it is not something I want to do all week, so I made the right choice for my study.

If you have any questions about some specific parts of this module, for example the other weeks which I did not describe, feel free to contact me.

André Pul