

# Exchange report

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Period of semester: feb. 2018 - jul. 2018



## Introduction

In my studies Bachelor in Architectural Technology and Construction Management at KEA I chose Politechnika Krakow as the university for having my exchange semester. With the exchange semester at another university I strived to extend my theoretical and practical knowledge in my field and to explore another culture and city by changing the place of live.

By reading previous reports of exchange students from KEA who have studied at Politechnika, I got a positive impression of university and city and decided to choose Politechnika for my exchange semester.

<b>INTRODUCTION</b>	<b>2</b>
<b>1.MY CHOICE OF COURSES</b>	<b>4</b>
1.1 Urban Design (5 ECTS)	4
1.2 Freehand Drawing - Perspective (2 ECTS)	4
1.3 Photography (2 ECTS)	5
1.4 Multi family housing design (8 ECTS)	5
1.5 Building construction system (2 ECTS)	6
1.6 Building surveying (3 ECTS)	7
1.7 Architectural design of service buildings (8 ECTS)	7
1.8 Sculpture (1 ECTS)	7
<b>2.PRACTICAL INFORMATION</b>	<b>8</b>
2.1 Public transportation	8
2.2 Getting there and around	8
2.3 Living	9
2.4 Groceries and shopping in general	9
<b>3. SOCIAL AND CULTURAL LIFE</b>	<b>10</b>
3.1 Places to visit	10
3.2 Activities	11
3.3 Trips	12
4 Conclusion	14

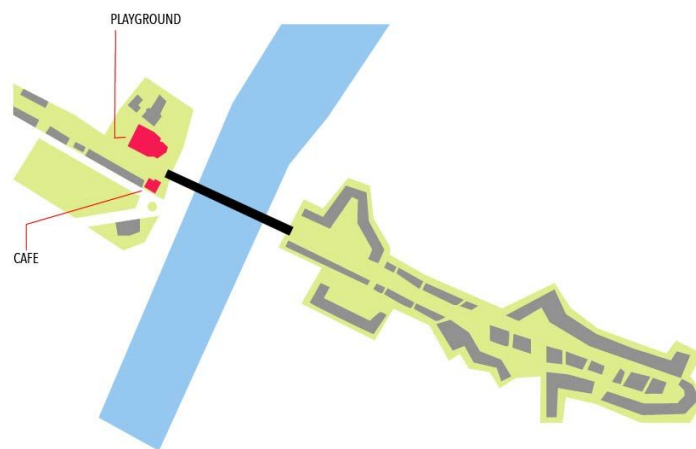
# 1. MY CHOICE OF COURSES

## 1.1 Urban Design (5 ECTS)

This course is focusing on teaching the student different ways to think regarding exploiting or renewing a part of a city - in this case a bridge crossing - in order to canal people and transportation to a central hub, and make this part of the city exiting and interesting to the public. I teamed up with two spanish girls for this course, Helena and Irene, and we made a good final product.

I learned how to implement central structures in public space and what's important in order for people to feel welcomed in a city. Moreover, there was some technical calculations and Revit drawing going on in this course.

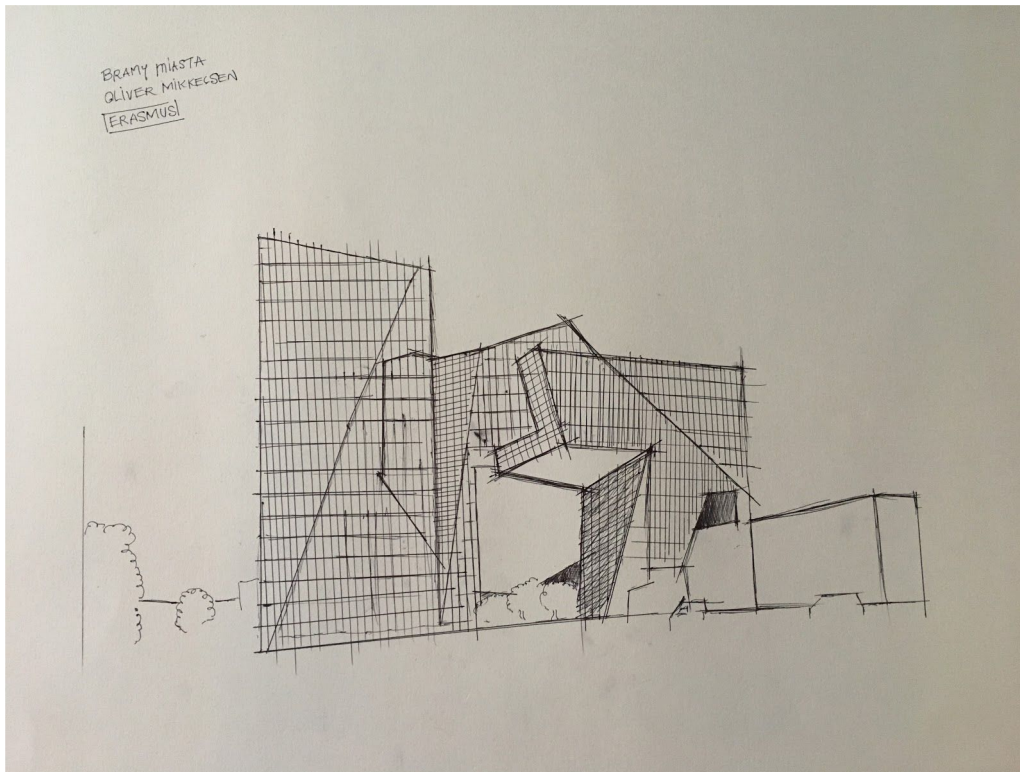
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## 1.2 Freehand Drawing - Perspective (2 ECTS)

I came with the expectation to improve my drawing skills and perspective thinking, and both was fulfilled. It's a very arty environment, where it's obvious that you're surrounded by very talented architectural students.

We had different subjects going on with this course - mostly architectural perspective drawing such as Mies van der Rohe's famous museum in Barcelona, and Bernhard Tschumi's Park de La Villette in Paris. I was challenged with perspective drawing, as I never did a proper attempt to improve this skill of drawing, but it's interesting how one's interception is turned upside-down when you're having the basics about this explained. I came out with some good drawings, and I gained a lot attending this course.



### 1.3 Photography (2 ECTS)

Photography course is mostly about being evaluated from time to time, and you're not really getting any techniques taught. Sub-courses in photography is flat-2D, abstract, portrait, cropping pictures in a certain way and still-life. The teacher is evaluating with rather sparse comments, such as 'fine', 'nice', 'could be better', 'it's not my idea of aesthetics'. I could have wished for more detail and depth in the feedback. Though, I think it was a good course.

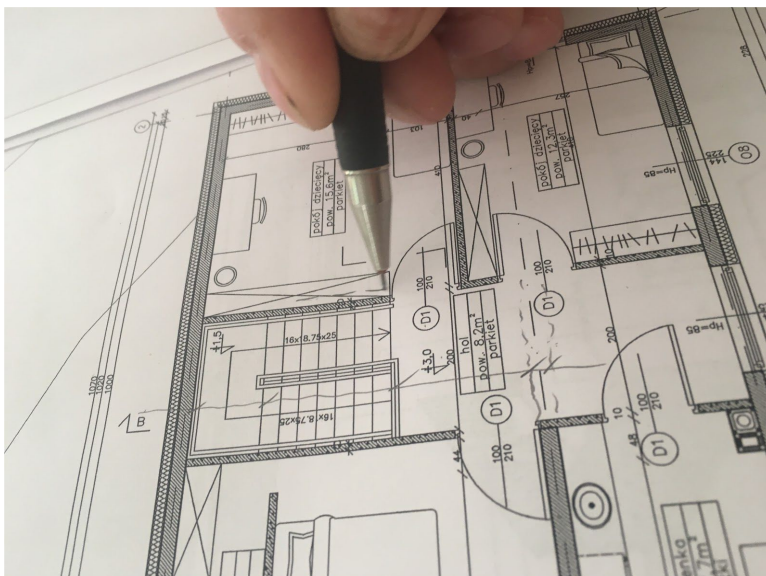
### 1.4 Multi family housing design (8 ECTS)

The most challenging course of them all was without a doubt Multi Family Housing Design. With a very sparse architectural knowhow I was attending a course with 3rd and 4th year architectural polish students. Instead of designing a multi family house, the professor was of that perception that it was sufficient to give me a single family house designing task (a simple weekend house) - though, after all showed that it was not that simple at all. Multiple advanced factors and a good portion of Revit drawing is going in to the works of finishing this subject. The final submission consists of prints in 70x50, a scale model house in 1:100, an essay and all the works on a CD-ROM. I've spent many, many hours delivering a proper submission in MFH.



## 1.5 Building construction system (2 ECTS)

This course is getting very close to what we normally do at KEA on a daily basis, so I felt most at home in Building Construction System. We could choose a project, either a new or existing one, and develop and do some detailing on the construction to show progress during the semester. A lot of technical drawing and depth going research should be expected. The final submission is printed in A3 and ends with a final conversation with the professor.



## 1.6 Building surveying (3 ECTS)

I did not know what to expect from this course given it's very loose and (almost too) independent character - basically we could choose a subject based on your own choice, whether it being technical, sociological, work environmentally or some very different subject. The common denominator was that it should be of construction wise character, and should be 8-12 pages with models, footnotes and references.

Which building materials are suitable for a construction of a low carbon emission building?

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Table of Contents

1. Introduction
2. Low carbon emission materials
  1. Raw materials CO2 vs. fuel-derived CO2
  2. Wood
  3. Cement and concrete
  4. Bricks
  5. Rammed earth
3. Low carbon apartment design in South-Korea
4. Conclusion

### 1. Introduction

CO2 emissions has been considered to be a main cause of global problems in recent years, being finally targeted in 2005 in the Kyoto Protocol of the United Nations Framework Convention on Climate Change. Many nations focusing therefore on reducing CO2 emissions to cope with climate change. Especially much effort has been paid in the construction industry, that is using a lot of energy and has a high emission of CO2 (Kim, Tae & Roh, 2017). The approach of building low carbon houses goes beyond the operational phase of a building, it also includes the constructional phase and takes the production of materials into account. The construction industry has therefore acknowledged its role by building low-emission buildings, green buildings, and changing the life-cycle of construction materials to ones that are produced with less CO2 emissions. According to Cabeza et al. (2013) the energy consumed during the process of raw materials and the transportation of the original materials until the construction of the building is now viewed as equally important in reducing CO2 emissions in the context of building. This energy is called the embodied energy. Moving from natural materials, such as stone, timber and soil to modern materials (such as metals, inorganic binders and plastic) materials are becoming already energy intensive before being used in the construction. Embodied energy is depending on the materials used, on the manufacturing process, the availability of raw

materials, the efficiency in production and the quantity of materials used in the construction (Cabeza et al., 2013). Some types of building element embodies higher energy than others (see Figure 1). Effects of material substitution in embodied energy of a building have been conducted in several studies, focusing on either specific materials or component and all included radical innovation. In the Netherlands a step of traditional Dutch construction and a shift towards sustainable building materials towards wood, could possibly reduce CO2 emissions by nearly 50%. Another rather new concept besides the minimization of embodied energy is to produce buildings that have a high recycling potential in order to reduce the resources needed over an extended period of time.

### 2. Low carbon emission materials

Striving to reduce CO2 emissions several aspects should be implied in the design planning and construction process when using modern building materials: energy intensities of materials, natural resources, consumed raw materials, recycling and disposal and the impact on environment.

Table 1  
Embodied energy in various wall, floor and roofing systems [32].

Type of building element	Energy per unit (kJ)
Burnt clay brick masonry (m <sup>2</sup> )	2.00-3.80
SMB masonry (m <sup>2</sup> )	0.50-0.60
Fly ash block masonry (m <sup>2</sup> )	1.00-1.35
Stabilised rammed earth wall (m <sup>2</sup> )	0.40-0.60
Non-stabilised rammed earth wall (m <sup>2</sup> )	0.00-0.18
Rammed concrete slab (m <sup>2</sup> )	0.80-0.85
Composite SMB masonry Jack-arch (m <sup>2</sup> )	0.65-0.55
SMB filler slab (m <sup>2</sup> )	0.60-0.70
Non-reinforced masonry vault roof (m <sup>2</sup> )	0.40-0.60

Figure 1 - Embodied energy in type of building elements. Source: Cabeza et al. (2013).

### 2.1 Raw materials CO2 vs. fuel-derived CO2

There are two categories in which CO2-emissions would be divided: (1) Those being converted to CO2 during the manufacturing process from the carbon compounds in the raw material and (2) those being produced in the process of driving the manufacturing process, the combustion of fossil fuel, also being called "fuel-derived CO2". It is easier to predict the CO2 emissions deriving from the raw materials, than the actual manufacturing process.

Looking at the CO2 emissions of building materials, so it can be seen that they are made of direct and indirect carbon emissions. The direct carbon emission of building materials includes carbon emissions of the raw material and the building materials during the process. The indirect carbon emission of building materials is connected to the manufacturing building, the management in each link, the environmental garbage processing and the transportation. (Cabeza et al., 2013).

## 1.7 Architectural design of service buildings (8 ECTS)

Given the highly technical and architectural nature of this course, I was suspended as the professor decided that the course was too advanced for my skill level. 3rd and 4th year architectural students was attending this course, and came with a much higher level and understanding of the task.

## 1.8 Sculpture (1 ECTS)

I did not attend this course, as I was in Denmark during this period, because of some important family issues.

## 2. PRACTICAL INFORMATION

### 2.1 Public transportation

It's very easy and convenient to get around Krakow in public transportation, whether the preferred choice is tramway or bus. It's also cheap; a single ride in the tram is around 2,50 PLN (4,25 DKK), and is valid for 60 minutes.

If you're too busy (or too lazy) to get on one of the two above mentioned ways of transportation, another possibility is getting a taxi, which is approximately 16 PLN (equivalent to 27 DKK) for a 10 kilometer ride, which is more than fair.

Though, to get rid of the masses, I bought a bike at a flea market (see photo below) - this is by far my personal choice of transportation, and I will strongly encourage others to do the same.

## 2.2 Getting there and around

Since Norwegian Airlines are offering direct flights to Krakow, it is very convenient and affordable to travel from Copenhagen to Krakow. The flight takes 1,5 hours from Krakow airport it takes another 40 minutes with public transportation to go to the city centre. Arriving in Krakow you can easily go around with public transportation such as busses, which are cheap in price. Also very common, especially when going out in larger groups is to call an uber car.

To bring some biking culture to Krakow one of my first actions after arriving was to organise a bike. This turned out to be fairly easy and cheap, I bought one for 200 Zloty (around 340 Kr.).

Biking in Krakow can be considered to be dangerous, since the infrastructure of the city is not planned for cars and bicycles equally. There are no biking lanes in the inner city and people in general drive reckless in traffic. Having your own bike is definitely something I would highly recommend, it allows you to explore the city to a greater extend and you can do some bicycle tours in the area of greater Krakow.



Photo of my temporary bicycle in Krakow, 2018



## 2.3 Living

Through contacts and facebook I was lucky to find a 120 sqm. central located apartment in ulica Długa (approx. 900 meter from the main square). It was monthly 1700 PLN plus use of gas and electricity, 50 PLN.

I lived there with three other ERASMUS students, two french girls and a german guy.

I've developed friendships and future contacts with these people, so I'm very thankful that I chose this place to live during the semester. We spend a lot of time together; going it for dinner, partying, shopping, travelling, skating - just having fun.

Another option is going for a dormitory, which is fairly cheaper, but does not offer the same options regarding location, cooking opportunities, social life, silence and public transportation. If the student can afford living in a regular apartment like I did, I would recommend doing so.

## 2.4 Groceries and shopping in general

Groceries and shopping is what I would consider as very cheap in Krakow (53,67% cheaper than Copenhagen)\*

[https://www.numbeo.com/cost-of-living/compare\\_cities.jsp?country1=Denmark&country2=Poland&city1=Copenhagen&city2=Krakow+%28Cracow%29](https://www.numbeo.com/cost-of-living/compare_cities.jsp?country1=Denmark&country2=Poland&city1=Copenhagen&city2=Krakow+%28Cracow%29)

So it is no problem to be on a budget in this city. For around 50 DKK you could maintain a proper lifestyle and still be happy with a full stomach. There's a broad variety of supermarkets (Zabka, Carrefour, LIDL, ALDI) in Krakow, and it's even topped up with some high-end delicacy supermarkets as well. Always fresh greens on the shelves and big variety of meats, cheese and bread. Moreover, Krakow has a tradition for housing some of Europe's best chocolatiers, so if you have a sweet tooth, this is a city for chocolate lovers.

Non-food shopping is also worth considering here, as clothing and shoes are cheap here too.

## 3. SOCIAL AND CULTURAL LIFE

### 3.1 Places to visit

There are many great places to visit in Krakow, listing them now here would not be sufficient. In general there are different flairs you can experience in Krakow connected to different parts and neighbourhoods of the city. The inner city is very majestic in its architecture, with very beautiful architecture and big squares. This part is also always busy and very touristically.

Then there is the very cultural and arty neighborhood of Kasimir, the old jewish district in Krakow. Here you can dive into the cities history, that is very much connected to the jewish movements during the second world war and get an idea of jewish food. The so called "chimney cake" is a cinnamon cake on a stick, that should definitely be tasted. Today this district is full with bars and nice places to eat, so it is also a famous place for going out on the weekend, having a relaxed atmosphere.



Photo of main square in Krakow city centre, 2018

### 3.2 Activities

Krakow is a student city and therefore therefor the bar culture and is well developed. This makes is easy to connect with people and build a network of people around you. There are also several events organized by the local erasmus office, that can be attended such as a boat tour on the Vistula or other small events.



Photo of main square in Krakow city centre, 2018

Polish cuisine is from my perspective now a highly recommendable culinary experience. The food is really enjoyable and it is possible to eat traditional polish meals as well as meals from other countries. Polish food also comes always with traditional folklore interior accessories, as well as polish folk music. And if you are really experimental you try to taste highly salty water or warm beer.



Photo of a traditional polish meal, 2018

More places to visit can be found here:

<https://theculturetrip.com/europe/poland/articles/20-must-visit-attractions-in-krakow/>

### 3.3 Trips

Also greater Krakow and the surrounding area are highly recommendable for day trips to get out of the city and explore Poland from a less touristy perspective. Being in Krakow in february allowed me to also do wintersport. Beforehand I was not aware of the possibility of skiing in Poland, so I planned a one-day skiing trip to Zakopane, a mountain three hours south of Krakow.

Since we had no overnight stay in Zakopane village, we had to travel to Zakopane and back to Krakow on the same day. We were therefore skiing around 4-5 hours. It could also be nice to stay over the weekend in one of the holiday residences in order to ski for a few days in a row.



Photos of skiing trip to the Zakopane mountains, 2018

Krakow as a city of extreme weather, really cold winters and really hot summers, allowed me to do enjoyable trips along the Vistula river. I can highly recommend a day trip to the Piaskach Lakes, which are around 15 kms away from Krakow. Following the curves of the Vistula river, you can enjoy the beautiful landscape along the way and reward yourself with a sandwich on the lakes - and in my case a short nap in my hammock. Even though it was a saturday with 30 degrees, the lakes were not packed with people (see photos below).





Photos of day trip to the Piaskach Lakes, 2018

## 4 Conclusion

Now looking back at the exchange semester in Krakow I was happy that I chose this way of studying this semester, as it widened my perspective of how the way of teaching subjects influences the quality of the studies. So I am thankful that I am studying regularly in Denmark, where quality of education means a constant dialog based conversation between students and teachers.

Structurally wise, there are certain aspects that need to be improved in my perspective. The care of ERASMUS students is not optimal at all - be prepared to research and do everything on your own; you will not get any information for 'free' here. It is also your job to be primus motor in all communication with the university - the initiative lies on your shoulders alone.