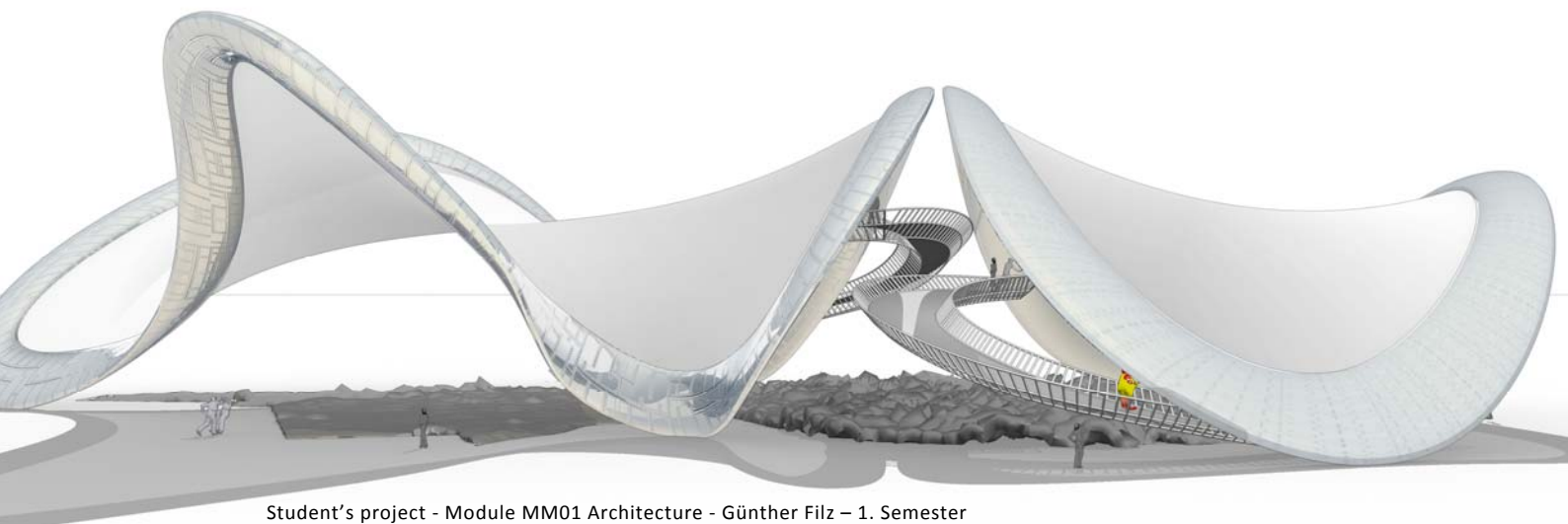


**Master of Engineering  
in Membrane Structures  
and  
Archineer® Membrane Structures**  
(M.Eng. Membrane Structures, Archineer® Membrane Structures)



Student's project - Module MM01 Architecture - Günther Filz – 1. Semester

Anhalt University of Applied Sciences, Dessau-Rosslau, Germany  
IMS e.V. – Associated Institute for Membrane and Shell Technologies



## Study Course “Master of Engineering in Membrane Structures and Archineer® Membrane Structures”

Accredited by the accreditation board AQAS

### Intended Audience

The Master and Archineer® program is targeting on graduates of bachelor or master courses of generally 8 semester study period (equivalent to 240 ECTS), in

- Architecture,
- Civil Engineering,
- Geo-Informatics,
- Mechanical engineering,
- Textile Engineering
- Other studies or programs with only 6 semester period of study can also be accepted after successful checking by the admission board.

Further requirement is a professional experience of at least 1 year.

Students without study background have also the possibility to participate in the program. These students will be registered as guest students of the Anhalt University of Applied Sciences and will receive the protected title **Archineer® Membrane Structures** granted by the Institute for Membrane and Shell Technologies.

Regular students with academic background will be enrolled as normal students in the Anhalt University of Applied Sciences and will receive the academic Degree **Master of Engineering in Membrane Structures, (M.Eng.)** granted by the Anhalt University of Applied Sciences.

The Master and Archineer® program is a distance learning course in English language only, parallel to professional life. It is established to create a reliable standard of education in the field of textile building. The information of this building method are concentrated, as well as the information about research and development. Safe standards of application can be created worldwide. The aim is to educate architects and engineers to design, build, erect, calculate and maintain wide span light weight structures.

The Master and Archineer® course started in 2006 for the first time. With more than 100 students now in the 6<sup>th</sup> year it became very successful.

### Structure of Study Course

The study course consists of three terms each containing of phases of attendance and additional support via internet for the phases of distant learning. The fourth semester is dedicated to the master thesis. During the phases of attendance basics and skills will be taught as basis for phases of distant learning where project have to be prepared in teamwork and in individual work.

The entire study is characterized by a strict practical orientation enforced by the members of the teaching staff which are specialists working in the field of study.

## Academic Degree

After successful completion of the study the graduate receives the academic degree **Master of Engineering in Membrane Structures, (M.Eng.)**, issued by the Anhalt University of Applied Sciences.

Students without study background have also the possibility to participate in the program. These students will be registered as guest students of the Anhalt University of Applied Sciences and will receive the protected title **Archineer® Membrane Structures** issued by the Institute for Membrane and Shell Technologies.

## Attendance Weeks – Active Weeks

In the beginning of each semester, except the last one, a lecture period at the Anhalt University of Applied Sciences in Dessau-Rosslau, Germany will take place. All lectures, seminars and workshops will be held during the phase of attendance.

The following periods are scheduled:

1. Semester: 05.03.2012 to 17.03.2012
2. Semester: 10.09.2012 to 15.09.2012
3. Semester: 11.03.2013 to 16.03.2013
4. Semester: presumably 10.03.2014 to 15.03.2014 presentation of master thesis

For the phase of distance learning some project work / homework will be given which has to be presented in the following active week. The students and lecturers will communicate by using our internet platform Moodle and on fixed times by Skype.

## Study Schedule Active Week – Mandatory Modules

### Mandatory Modules

#### Introduction 1 (IM1) – Basics on Membrane Structures

Content:

- membrane examples ▪ structural principles ▪ form finding by physical modeling

#### Introduction 2 (IM2) – Basics on Software

Content:

- introduction into membrane software ▪ form finding by computational ▪ modeling ▪ patterning ▪ load calculation

#### Introduction 3 (IM3) – Basics on Structural Engineering

Content:

- forces ▪ structure ▪ stress and strain ▪ dynamics ▪ laws ▪ type of structures ▪ torsion of structures ▪ cables and arches ▪ structural design ▪ steel work design

#### Module 1 (MM1) – Architecture

Content:

- architectural history/ theory ▪ design process ▪ methods for visualization ▪ form finding by computational modeling ▪ form finding by physical modeling ▪ physical patterning ▪ concept of utilization and applications

#### Module 2 (MM2) – Numerical Theory

Content:

- mechanics of membranes and cables (differential geometry and continuum mechanics (overview) ▪ form finding (what is form finding?, historical background, cable element, membrane element for form finding, examples

### **Module 3 (MM3) – Membrane Program**

Content:

exercises by using especial software (ixFORTEN) ▪ computational simulation of interaction of loads and large deformations ▪ cable structures ▪ ...

### **Module 4 (MM4) – Structural Design and Detail**

Content:

structural design ▪ cables, cable Structures ▪ detailing ▪ interaction of main structure, substructures and membrane ▪ retractable systems and movement mechanisms

### **Module 5 (MM5) – Mechanical and Physical Properties**

Content:

material properties ▪ materials (woven fabric, coated woven fabric, film) ▪ mechanical properties of membrane materials ▪ evidences of fire protection, hail stone ▪ ...

### **Module 6 (MM6) – Dimensioning (Structural design Concepts)**

Content:

exposures and its super position for load assumptions of membrane structures ▪ wind tunnel investigations for soft structures ▪ reduction factors for fabrics and films ▪ mechanical characteristics of membrane materials ▪ static concepts for membrane structures ▪ international approvals, safety levels and norms

### **Module 7 (MM7) – Building Physics**

Content:

thermal insulation ▪ sound insulation ▪ fire protection ▪ moisture proofing ▪ sustainable building

### **Module 8 (MM8) – Internship Theory – Fabrication and Project Management**

Content:

confection and fabrication ▪ connections ▪ welding techniques and machines ▪ transportation and erection ▪ quality assurance ▪ create a quotation ▪ calculation of costs ▪ service and maintenance ▪ quantity survey

## **Optional Modules**

### **Optional Module 1 (OM1) – Pneumatic Structures**

Content:

▪ basics on pneumatic structures ▪ structural principles ▪ design and form finding

### **Optional Module 2 (OM2) – Studio Detailing and Patterning**

Content:

optimization of the final design ▪ patterning ▪ compensation ▪ membrane details with steel construction

### **Optional Module 3 (OM3) – Bionics and Experimental Structures**

Content:

introduction ▪ cell membrane in microbiology ▪ pneumatic constructions ▪ growth and stiffening in biology and technology ▪ convertible systems ▪ developments of ideas of experimental structures ▪ prototype development and realization ▪ analysis and optimization on prototypes

### **Optional Module 4 (OM4) – Foldable and Umbrellas**

Content:

introduction ▪ design process in architectural context ▪ form finding by computational modeling

### **Optional Module 5 (OM5) – Membrane Surveying**

Content:

measurement techniques ▪ measurement tools ▪ basics on measurements on deformations on membrane structures ▪ deformation analysis

### **Optional Module 6 (OM6) – Visualization**

Content:

construction kit for the environment of the membrane ▪ construction principles, import- / export techniques ▪ picture-editing, Photoshop-functions ▪ price-conscious rendering techniques ▪ presentation techniques for the results

Module	90 minutes lectures		Credits (ECTS)
	attendance	home seminar	
<b>Semester 1</b>			
IM 1 Basics on Membrane Structures	9	-	-
IM 2 Basics on Software	9	-	-
IM 3 Basics on Structural Engineering	9	-	-
MM 1 Architecture	9	14	4
MM 2 Numerical Theory	9	14	4
MM 3 Membrane Program	9	14	4
OM 1 Optional Module	9	14	4
<b>Semester 2</b>			
MM 4 Structural Design and Detail	9	14	4
MM 5 Mechanical and Physical Properties	9	14	4
MM 6 Dimensioning	9	14	4
OM 2 Optional Module	9	14	4
<b>Semester 3</b>			
MM 7 Building Physics	9	14	4
MM 8 Internship Theory – Fabrication and Project Management	18	Internship	5
OM 3 Optional Module	9	14	4
<b>Semester 4</b>			
Master Thesis and Colloquium		Master Thesis	15
	Colloquium		2

## Admission

The admission requirements are as follows:

- Bachelor or Master degree in Architecture, Civil Engineering, Geo-Informatics, Mechanical Engineering, Textile Engineering, or comparable academic programs of generally 8 semesters study period (equivalent to 240 ECTS)
- Other studies or programs with only 6 semester period of study can also be accepted after successful checking by the admission board.
- One year of professional experience
- Certificate of English language skills (TOEFL or IELTS is not necessary)
- Statement and description of work including drawings

For students without study background the admission requirements are:

- One year of professional experience
- Certificate of English language skills (TOEFL or IELTS is not necessary)
- Statement and description of work including drawings

## Tuition fees

The following list of fees has been agreed for the 2012 enrollment. All fees are excluding traveling and accommodation. Please ensure that the additional fee for the bank transfer is paid at your home credit institution.

Item	Price
Processing fee	100 €
Fee for the first semester	2500 €
Fee for the second semester	2100 €
Fee for the third semester	2100 €
Fee for the fourth semester	--- €
<b>Total Fee</b>	<b>6800 €</b>

## Advice and Application

### Application Deadline

**January 15, 2012**

Required application documents:

- Personally signed and filled in application form
- Certified copies of the First Degree Certificate and Examination Certificate, complete academic transcript (subjects with grades) (*applicable for students without study background*)
- Copy of the High School Report
- Curriculum Vitae and photo
- Certificate of English Language skills (e.g. school report)
- Description of your work
- Short statement of reasons for participation in the course

### Contact

Heike Kleine  
Phone: +49 340 5197 3745  
e-Mail: [heike.kleine@ims-institute.org](mailto:heike.kleine@ims-institute.org)  
<http://www.membranestructures.de>

HS-Anhalt / IMS e.V.  
FB 3, Geb. 05  
Franz-Mehring-Straße 21  
06846 Dessau Rosslau  
Germany



- Prof. Dr.-Ing. **Bernd Baier**, Essen University, Germany  
 Prof. Dr.-Ing. **Mike Barnes**, University of Bath, UK  
 Prof. Dr.-Ing. **Kai-Uwe Bletzinger**, TU-Munich, Germany  
 Dr.-Ing. **Rainer Blum**, Laboratorium Blum, Stuttgart, Germany  
 Dr.-Ing. **Heidrun Bögner-Balz**, Laboratorium Blum, Stuttgart, Germany  
 Prof. em. Dr.-Ing. **Ewald Bubner**, University Essen, Germany  
 Prof. Dipl.-Ing. **Andreas Bunge**, M.Eng. Membrane Structures, University Francisco Marroquin, Guatemala  
 Dipl.-Ing. **Gerry D'Anza**, T.S.I s.r.l., Caltanissetta, Italy  
 Dipl.-Ing. **Horst Dürr**, IF Group, Germany  
 Prof. Dr.-Ing. **Josep de Llorens Duran**, Barcelona School of Architecture, Spain  
 Dr.-Ing. **Switbert Greiner**, ArtEngineering GmbH, Leinfelden-Echterdingen, Germany  
 Dr. Ali H. Khan, **Ali Khan & Associates Ltd**, UK  
 Prof. Dipl.-Ing. **Einar Kretzler**, Anhalt University of Applied Sciences, Bernburg, Germany  
 Prof. Dr.-Ing. **Marijke Mollaert**, Vrije University Brussels, Belgium  
 Dr.-Ing. **Karsten Moritz**, Seele-Cover, Germany  
 Prof. Dr.-Ing. **Robert Off**, Anhalt University of Applied Sciences, Bernburg/Dessau, Germany  
 Prof. Dipl.-Ing. **Göran Pohl**, HTW Saarland, Germany  
 Dipl.-Ing. **Alfred Rein**, Alfred Rein Ingenieure GmbH, Stuttgart, Germany  
 B.Eng. **Atisit Sabmeethavorn**, M.Eng. Membrane Structures, Fastech Co.,Ltd. Thailand/ New Zealand  
 Dr.-Ing. **Lars Schiemann**, TU-Munich, Germany