



MLL

M. Sc. Light and Lighting

Team

TUM - Faculty of Architecture
Partner

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Module P 04 - Light Design I TUM

Exeter Library, Louis I. Kahn, 1971, New Hampshire - Visualization: Alex Roman

Team

TUM - Faculty of Architecture

Institute for Architectural Design and Modelling

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Chair of Spatial Design and Lighting
Prof Tina Haase
Chair of Visual Arts
Prof Frank Petzold
Chair of Architectural Information

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Module P 01 / P 02 - Lighting Technology I + II **OSRAM & We Lite**

OLED-Panel Orbeos SDW-058 - Photo: OSRAM



Team

Partner

HFF - University of Television and Film Munich

Prof Axel Block
Department VII - Camera

OSRAM

Dr. Reinhart Weitzel
Dr. Werner Jordan

Arup

Emily Dufner

ERCO

Thomas Schielke
Marc Hartings

Ingo Maurer

Axel Schmid
Bernhard Dessecker

Martin Klingler Lighting

Martin Klingler

Pfarré Lighting Design

Gerd Pfarré

We Lite Lighting Design & Consulting

Dr. Gert Wemmer

Electric Gobo

Axel Groß

Module W 05 - Light in the Arts TUM

Salonstück 3, Tina Haase, 1995, Bergisch Gladbach - Photo: Ulrich Mueller

General Information

Programme Name

Light and Lighting

Affiliation

Faculty of Architecture, TU München

Course Form

Postgraduate Studies

Eligibility

Undergraduate Degree

One year work experience

Personal Aptitude (Aptitude Test)

Starting Date

Winter Semester 2013/14

Standard course duration

4 Semesters

Degree

Master of Science (M. Sc.)

Participants

25 students per semester

Language

German / English

Workload

120 ECTS

Cost

5000 EUR per semester

Quality of Architecture

The TUM MLL has been devised in order to promote professional specialisation and scientific expansion of the architectural studies. This programme prepares for key roles in professional practice and for occupational activities in research and development on a national and international level. The MLL builds on the undergraduate programmes of architecture at the TUM or at other universities and entitles graduates to pursue a doctoral degree. This course connects lighting and architecture at an integrated, highly scientific level. The central questions addressed in the TUM MLL are how space and light - central topics in architecture - correspond and how they can be aligned and brought into a conclusive relation. Spaces are currently mostly fitted with lighting retrospectively, thus ambience is only characterised at a late stage. However, given the possibilities and perspectives of modern lighting technology, here, the planner shall prospectively and critically investigate, balance and assess the spectrum and options of a synergy of space and light at the development stage in order to reach a harmonic integral solution. We intend to address these questions from multiple perspectives through a dialogue with industry as well as with partners in art, culture and related scientific disciplines. Representatives with different occupational backgrounds and colleagues from other faculties are invited for interdisciplinary courses, covering disciplines such as construction physics, building climatology, medicine, informatics and visual media. In addition to conveying subject-specific matter, design and planning is understood as a central methodology of analytical reflection, argumentation and structuring while the necessity of creative impulses is reiterated. Comprehensive, measurable, scientifically justified parameters and associative intuitive-artistic impulses will always form a tight reciprocal connection.

Project Integration

Lighting is an integral component of architecture. Wall and light, the fundamental elements of architecture, its original and constitutive elements, begin to interact. The wall - representative for all construction materials - reflects the light and simultaneously changes it. This interplay generates diverse levels of brightness and shade, which mould the space and thus define its character. It is the function and the responsibility of the architect to coordinate the expectations and interests of all parties and to create project clarity and security in a conflict between the technically feasible and the architecturally meaningful in order to avoid misunderstandings and thereby ultimately reduce costs. Graduates of this course have learnt to connect project responsibility with interdisciplinary cooperation. They find answers to questions concerning the development and execution of design ideas against a backdrop of increasing expectations, coupled with highly technical offers from the lighting industry. Complex lighting concepts, which have to comply with architectural requirements and user demand, are analysed and elaborated to a level of detailed description and are - where possible - also tested. Students of the TUM MLL shall capture the situation in its entirety in order to develop comprehensive daylight and artificial lighting concepts. In addition, this programme opens up a broad scientific field and thus professional perspectives in the area of research and development.

Technological Development

An average Central European spends 90% of his or her time indoors. Frequently, daylight is substituted or even replaced by artificial light. Daylight, determined by geographical position and the sun's path, cannot directly be influenced; however the way by which daylight affects building space can be modulated. Space can open up towards daylight or light can be limited or even excluded by building materials. Initially, the impact of daylight is determined once construction has been completed. By cont-

First, artificial lighting can support and enhance its effect later on, but can also change, improve or even completely contradict. Ideally, artificial lighting is an integral, prospectively considered and planned element of the entire light concept. Otherwise, artificial light can generate concealing, superfluous or glaring effects. Increasingly, industry and light designers are evaluated according to their virtuosic handling of such effects. They have to respond to the expectations of a society that has dedicated itself to the primacy of the visualisation. What cannot be visualised, what thus generally cannot be interpreted as spectacular, is hardly noticed in the public discourse or even in public space. In the context of this general visualisation, the city turns into a stage and the wall into a screen, on which shapes, colours and contrast appear, disappear, and change at will. Light architecture and lighting design are relatively novel disciplines in Europe. They utilise the technological development of light sources, which have progressed enormously in the last decades, particularly regarding light intensity and yield. However, this development is not without problems. Modern light sources generally do not produce a harmonious characteristic of the entire light spectrum equivalent to daylight, but only contain accentuated patterns of discrete light colours.

Ecology

Ecological criteria and normative specifications, which may not merely be passively acknowledged by the architect but need to be actively revised and constructively expressed using his or her specific professional expertise, also feature in this course. For example, expensive technologically oriented solutions, which can emerge to be simpler, more cost-effective and aesthetically superior when thoroughly analysed and planned, are investigated. Here, students autonomously and independently weigh up options guided by their own authority and competently steer the planning process. A natural need is opposed by an extreme development, since energy saving is by no means sufficient to compensate for the increasing use of

artificial lighting. The term 'light pollution' accompanies this development and requires a change of attitude. 99% of the population in the US and Europe live under a light-polluted night sky, with dramatic consequences. 20% of the world population, among them two thirds of all US citizens and half of all Europeans have lost the ability to detect the Milky Way in the night sky. The vision of every third American and every sixth European can no longer adapt to unlighted darkness.

Interdisciplinary

The illumination of the earth has increased around 500-1000% in the last 30 years. 'Dark Sky', an international initiative, fights against light pollution, not just because of the physiological consequences to humans, animals and plants but also because of the imminent emotional atrophy. Light is of fundamental importance for mankind. Light is not just the prerequisite for visual perception, but much more: It determines and regulates vitality as well as the physical, mental and emotional state of humans and influences vital biological processes, such as release of the hormones melatonin and serotonin. Hence, different disciplines are conducting research into light and its effect and discuss their findings in their teachings. The integration of these disciplines in the context of building projects is one objective of the TUM MLL. The cooperation and exchange with colleagues from other faculties is going to be intensified.

Module P 08 - Light Design II Martin Klingler Lighting

Artificial Sky, TUM - Photo: TUM Chair for Spacial Design and Lighting

Skills Profile

Basis

The function of engineers in the building trade comprises the development of technically impeccable and innovative solutions. This applies to the entire spectrum of planning and construction across all project stages as well as to managing the building project. Graduates of the TUM MLL have acquired an additional professional qualification; a specialisation, which is awarded for advanced design and modelling skills. This course thus supports the key skills of an architect and concomitantly promotes an interdisciplinary future-orientated approach that forms the basis for a novel professional perspective. The TUM MLL focuses on the continuing education of designers and planners with project responsibility who wish to expand their expertise in the area of lighting technology. The distinctive characteristic of this programme originates from the combination of two disciplines. Projects are developed according to design principles of architectural concepts and those form the basis for light technological challenges. The master thesis associates the fundamentals of light technology with the requirements of a comprehensively planned design project while complying with building regulations and connecting materiality and detail. This approach aims to secure the professional competence of architects. The architect is responsible for the building design all the way from the first sketch up to project completion. Usually, the architect carries project responsibility and coordinates every planning and realisation stage. This is why specialised professional training in lighting technology, an element that substantially influences the entire design, is extremely valuable. Graduates of the TUM MLL have acquired the necessary skills to plan and execute complex projects, requiring bespoke artificial light concepts and corresponding technological fittings.

Target groups

The TUM Master of Light and Lighting is directed at graduates of bachelor and master programmes (or those holding an equivalent degree) who wish to specialise in the scientifically oriented architectural area of light design. Evaluation of the impact of daylight and artificial light on our living space, and thus on architectural concepts and their implementation, is based on fundamental knowledge in the disciplines of architecture and design, physics and building technology. Hence, a professional university degree or equivalent degree awarded by a national or international academic institution, are the entry requirements for this master programme. Furthermore, applicants need to prove a minimum of one-year professional experience. Architects and interior architects are the main target groups of this course. However, the following occupational fields are also considered:

- Urban planners (Urban Lighting)
- Electrical Engineers (Project Planning)
- Product Designers (Light Fixtures)
- Mechanical Engineers (Daylight Systems)
- Scenographers (Film, Television, Theatre, Opera)

This course has a modular structure and enables intimate international exchange. One objective is to set up contacts with additional partners and academic institutions. The established Hochschule für Fernsehen und Film (University of Television and Film) in Munich will also be integrated into this master programme. A professional network is secured through cooperation with the internationally leading manufacturer OSRAM and the global planning office Arup as well as other renowned industrial partners.

Module P 03 / P 07 - Lighting Design I + II Arup Deutschland

Bahnhofstraße, Zurich, Switzerland, Christmas Lighting 2003 - 2005 - Photo: Roman Keller Gramzio & Kohler

Skills Profile

Students of the TUM MLL acquire a multifaceted skills profile. Physical, technological, physiological, ecological, social and cultural expertise is gathered and applied to development and design. Multiple methods for concept development, design and planning are acquired and reiterated. The conceptual design of lighting and illumination of objects, buildings and urban spaces is developed exemplarily. Personal and interdisciplinary skills are improved.

Expertise

Fundamental knowledge of different light sources, their effect, and the complex interrelations and processes of visual perception are essential. This basis is built up continuously through practical experiments and applications. Graduates of this programme have intensively studied the following key topics: The complete spectrum of modern light sources, their particular attributes, their neutral, vitalising or calming effect, the impact on health and well-being and the resulting possibilities and limits for their application in differentially devised and utilised buildings and spaces. Therefore, students gather fundamental and advanced skills, which they can use for future project-related and scientific work.

Methodology

Graduates of the TUM Master of Light and Lighting have acquired the essential knowledge and methodology in order to manage the impact of daylight and artificial light on architectural design in an integrated approach. They comply with internationally acknowledged planning standards and have gained application-oriented experience, which they draw on to develop solutions for complex architectural and light planning related issues raised during the respective planning and construction stages of a building project. They have the ability to develop a concept or elaborate concept parts considering aesthetical and light technological requirements. Students adopt established

presentation and communication tools, which are essential for the complex coordination of many different project stakeholders. Graduates of this course understand that the architectural space represents the central topic in this interplay. The interdisciplinary composition of the teaching team and the confrontation with current issues in the area of light planning will inspire students to develop novel approaches. Enhancing and elaborating such approaches with respect to methodology and content opens up a wide architectural research field. Once graduated from this course, students are able to autonomously discover research approaches and will lay the foundation for further scientific discussions in this sector.

Personality

This course advances personal skills and attitude in addition to methodological and technological competencies. Especially after 4 semesters of project work completed in teams of 2 to 4 people, requiring extensive communication and cooperation, graduates are able to efficiently complete project-related or scientific tasks autonomously and as part of a team.

Module W 04 - Light and Space **Ingo Maurer**

Showroom Ingo Maurer, Munich - Photo: Tom Vack



01. Semester - 30 ECTS

Winter Semester

Compulsary Modules

P 01 - Project I - 12 ECTS

Prof Hannelore Deubzer / Axel Groß
Course 01 - Project
Course 02 - Workshop

P 02 - Lighting Technology I - 6 ECTS

Dr Weitzel / Dr Jordan / Dr Wemmer
Course 01 - Lecture
Course 02 - Exercise

P 03 - Lighting Design I - 6 ECTS

Emily Dufner
Course 01 - Lecture
Course 02 - Exercise

P 04 - Light Design I - 6 ECTS

Martin Klingler
Course 01 - Lecture
Course 02 - Exercise

02. Semester - 30 ECTS

Summer Semester

Compulsary Modules

P 05 - Project II - 12 ECTS

Prof Hannelore Deubzer / Axel Groß
Course 01 - Project
Course 02 - Workshop

P 06 - Lighting Technology II - 6 ECTS

Dr Weitzel / Dr Jordan / Dr Wemmer
Course 01 - Lecture
Course 02 - Exercise

P 07 - Lighting Design II - 6 ECTS

Emily Dufner
Course 01 - Lecture
Course 02 - Exercise

P 08 - Light Design II - 6 ECTS

Prof Hannelore Deubzer
Course 01 - Lecture
Course 02 - Exercise

03. Semester - 30 ECTS

Winter Semester

Compulsary Modules

P 09 - Project III - 12 ECTS

Prof Hannelore Deubzer / Martin Klingler
Course 01 - Project
Course 02 - Workshop

Elective Modules

W 01 - Light and Lights - 6 ECTS

Dr Thomas Schielke / Marc Hartings
Course 01 - Workshop
Course 02 - Exercise

W 02 - Interior Lighting Design - 6 ECTS

Gerd Pfarré
Course 01 - Seminar
Course 02 - Exercise

W 03 - Daylighting Systems - 6 ECTS

Prof Tina Wolf
Course 01 - Seminar
Course 02 - Exercise

W 04 - Light and Space - 6 ECTS

Axel Schmid / Bernhard Dessecker
Course 01 - Seminar
Course 02 - Exercise

W 05 - Light in the Arts - 6 ECTS

Prof Tina Haase
Course 01 - Seminar
Course 02 - Exercise

04. Semester - 30 ECTS

Summer Semester

Compulsary Modules

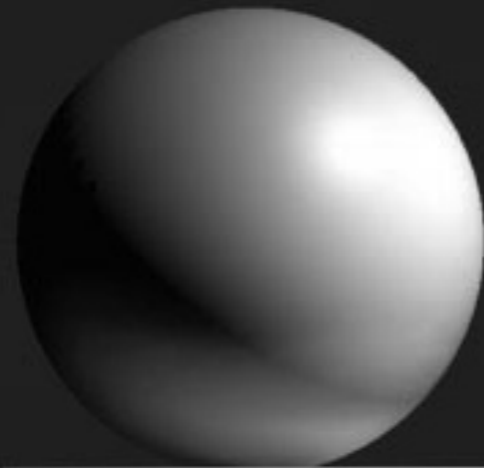
P 10 - Master's Thesis - 30 ECTS

Prof Hannelore Deubzer / Mentor TUM AR
Course 01 - Thesis
Course 02 - Colloquium

Module W 02 - Interior Lighting Design **Pfarré Lighting Design**

Small Olympic Hall, Munich - Photo: Andreas J. Focke





Staff

The registry, two academic staff (architect/light planner) as well as two members of supporting student staff are available for content-related and organisational questions and weekly supervision of project and seminar work. A highly qualified team, formed by staff with different professional backgrounds, has been assembled for the implementation of the teaching modules. Teaching staff from the faculty of architecture lead and supervise the project modules, the master thesis as well as the light design topic area. In particular, professors from the Institute for Architectural Design and Modelling are available as project mentors in this context. Highly qualified teaching staff from industry are called in for the topic areas lighting technology and planning and offer project-supporting workshops and elective modules. No other academic institutions are involved yet, however, cooperation with the Hochschule für Fernsehen und Film (University of Television and Film) is envisaged for the near future, and the creation of an elective 'Scenography' module is intended to complement the elective catalogue for the third semester.

Schedule

Almost all courses are offered in a weekly schedule within the standard term time of summer and winter semester. In order to optimise use of time, all lectures and seminars have been allocated to Wednesday afternoons, Thursdays and Fridays. In-between times are explicitly being avoided. Merely the project-supporting workshops and the elective modules in the third semester are taught in block schedules. Due to this firm organisation we are able to offer students and staff a joint teaching, learning and communication platform, restricted to half a week. This allows university and external staff to meet their occupational and family commitments while students have the possibility to remain largely financially independent and continue to grow their professional network through part-time jobs. Supplementing the coursework, symposia, company vi-

sits and attendance at the worldwide biggest exhibition for lighting technology and planning, the 'Light & Building' in Frankfurt, are also scheduled. Extracurricular internships or experience abroad are not required.

Venue

The TUM MLL is coordinated by the chair of Spatial Design and Lighting. All coursework takes place in the premises on the TU München campus. This includes studio space for project work. Please note that two of the five elective modules, workshops and lectures in the third semester are going to take place on external premises.

Equipment

Students are provided with an artificial sky including light measuring devices required for their investigations and data collection. The technical centre (TZ) of the faculty of architecture with its wood, metal, and plastic workshops as well as the CAD pool can be used by the MLL students for real and virtual model studies. Course scripts and material for modelling are provided.

Publisher

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