ARAB ACADEMY FOR SCIENCE, TECHNOLOGY
AND MARITIME TRANSPORT

COLLEGE OF ENGINEERING
AND TECHNOLOGY

(GRADUATE STUDIES)

Master of Science Programs

STATUS REPORT

ALEXANDRIA

2012

Architectural Engineering and Environmental Design

M.Sc. Programs

M.Sc. in Architectural Engineering and Environmental Design

OVERVIEW

The increase of population in Egypt and most Arab countries has considerably increased the need for housing, public buildings, and urban services. On the other hand several problems appear, such as: upgrading, renewal, development of deteriorated areas, creation of new towns and settlements as well as problems of restoration, preservation, conservation, and enhancement of the built heritage. These problems led to a tremendous increase in the national investment in building and construction and consequently the need for professionals in this field. The preparation of engineers specialized in architecture and environmental design is necessary for the pursuit and success of the national building and construction policy .

To cope with the needs of the Egyptian and Arab societies as well as the regional and international market demands, the College of Engineering and Technology at the Arab Academy for Science, Technology and Maritime Transport, decided in 2000 to establish the Department of Architectural Engineering and Environmental Design.

Program Detailed Structure

M.Sc. Programs

M.Sc. in Architectural Engineering and Environmental Design
Program Structure

CORE COURSES:

Course Code	Course Title	Credit Hours
AR 713	Environmental Studies in Architecture and Urban Design	3
AR 715	Architectural Design—The Process	3
AR 717	Urban Design	3
AR 736	Research Methods	3
Subtotal	**4 Courses * 3 Credit Hours**	**12**

ELECTIVE COURSES:

Course Code	Course Title	Credit Hours
AR 721	Passive and Active Environmental Control Systems	3
AR 722	Environment and Behavior: Applications in Architecture and Urban Design	3
AR 723	Site Development and Landscape Studies	3
AR 724	Theory of Architecture: Advanced Topics	3
AR 726	Environmental Design Approaches	3
AR 727	Egyptian Regions and Architecture	3
AR 728	Sustainability and Urban Form	3
AR 729	Architectural Criticism	3
AR 731	Urban Development and Urban Renewal	3
AR 732	Mediterranean Cities: History, Spirit and Contemporary Architecture	3
AR 733	Computer Applications in Design and Presentation	3
AR 734	Geographic Information Systems	3
AR 737	Urban Environmental Planning	3
AR 738	Urban Landscape	3
AR 739	Conservation of Architectural Heritage	3
CB 711	Value Engineering in the Construction Industry	3
CB 712	Advanced Construction Management	3
CB 717	Project Planning and Control	3
CB 710-C	Construction Productivity	3
Subtotal	**4 Courses * 3 Credit Hours**	**12**

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RESEARCH THESIS:

Course Code	Course Title	Credit Hours
AR 701	Master's Research Thesis (Part 1)	6
AR 702	Master's Research Thesis (Part 2)	6
Subtotal	**2 Parts * 6 Credit Hours**	**12**

Total	**36**

Courses

DETAILED STRUCTURE

Course Code : **AR 713**

Course Title : **Environmental Studies in Architecture and Urban Design**

Credit Hours : **3**

Course Description

This course discuses the issue of environmentally conscious design. It consists of four main parts:

(1) the philosophy of environmental design;
(2) the Physical Environmental including Geology, Geomorphology, Energy Resources and Climate, and their influence on building and site design;
(3) the natural environment including Soils, Materials, Energy and Ecology; and,
(4) the Principles of Strategic Environmental Assessment.

Course Objectives

Upon completion of the course, student should be able to perform an environmental site analysis of various projects based on their knowledge of user requirements and different physical aspects. Student would also be able to understand natural and built environment.

Course Topics

- What is meant by the phase “environment”?
- What constitutes an Environmentally Conscious Design?
- Environmental Ethics
- The Physical Environment
- The Natural Environment
- The Social Environment

References

- BEER, Anne R. *Environmental Planning for Site Development*. E&FN Spon, London, 1990.
- MACY Christine. *Architecture and Nature: Creating the American Landscape*. Routledge, London, 2003.

Course Code : **AR 715**

Course Title : **Architectural Design—The Process**

Credit Hours : **3**

Course Description

The course focuses on how architectural graduates should be committed to the rationales of the design process, approach, and proposal. It defines, tests, and justifies how a design proposal is appropriate and relevant in a particular physical, social, cultural, economic or environmental context. It also rehearses the student's ability to deliver a well developed, ambitious and resolved design proposal which has taken into account the complex and unpredictable conditions of a particular context and embodies within its rationale, scale, scope and remit, a well developed ambition for architecture.

Course Objectives

Architecture has become more complex by the introduction of various design approaches and trends. This course discusses the nature and role of architectural design in a wide range analysis extending from thinking methods to diverse contemporary approaches to design, outlining the relationship between some current perceptions of science, art, and philosophy and their effect upon architectural design.

Course Topics

- Design Thinking
- Approaches to Architectural Design
  - Architectural Design and Information Technology
  - Architectural Design and Sustainability
  - Architectural Design and Identity
- Researches and Projects

References

- Rowe, P. (1987) *Design Thinking*, The MIT Press
- Lawson, B. (2001) *How Designers Think: the design process demystified*, The Architectural Press
- Baker (1996) *Design Strategies in Architecture*, Van Nostrand Reinhold, E&FN Spon
- Steele (2001) *Architecture and Computers*, Laurance King Publishing
- Kolarevic (2003) *Architecture in the Digital Age – Design and Manufacturing*, Spon Press
- Sassi, P. (2005) *Strategies for Sustainable Architecture*, Routledge
- Williamson, T; A. Radford and H. Bennetts (2002) *Understanding Sustainable Architecture,* Spon Press
- Bay, J. and B. Ong (2006) *Tropical Sustainable Architecture, Social and Environmental dimensions*, The Architectural Press

- Stang, A. and C. Hawthorne (2005) *The Green House: New Directions in Sustainable Architecture*, Princeton Architectural Press
- Abel, C. (1997) *Architecture and Identity*, The Architectural Press
- Butina-Watson, G. and I. Bentley (2007) *Identity by Design*, The Architectural Press

Course Code : AR 717

Course Title : Urban Design

Credit Hours : 3

Course Description

The Egyptian city and the Global city

Urban design is mainly concerned with cities. It focuses on the creation of places where buildings relate to each other in a meaningful way to enhance and inspire the human lives. Cities are places where human civilizations were made in the first place. It is the place where writing was invented, the rule of law manifested and where architecture was established, meeting with others (civilizations, foreigners) was possible.

In a world that is growing with more than 50% of the population already living in cities rising to 75% in the near future, cities become the prime destinations for human beings. Cities are also the place where the major advances in science and technology occurs causing an unprecedented development since the industrial revolution. This comes with a high price of environmental degradation that threatens the very existence of the humankind.

Cities are not bound to their local conditions, in fact history and current situation points to the importance and the amount of influence that other cultures, places inflict in every aspect of our cities. Cities are now competing in a global scale to attract not only tourists, but rather to attract investments.

In such circumstances it is important that any attempts to intervene in our cities and especially the public places to be grounded on a solid understanding of the urban context. This proper understanding has to explore the origins of urban form, the relevant theories dealing with urban places and spaces and appreciate the amount of challenges facing the human beings in our cities and how are they driven by the political, social and economical situation. It is also important to examine the most recent trends in urban design to critically review the possible scenarios of the urban future being lead before us.

Course Objectives

- To be aware of contemporary urban design theories.
- To be able to critically examine and review contemporary urban design theories.
- To relate urban design realities to the global and theoretical context.
- To be able to identify challenges of urban design in the Egyptian city.
- To develop personal views regarding these urban challenges

Course Topics

- Urban Origins
- Modern Urbanism
- An Integrative Theory of Urban Design
- Theories of Urban Spatial Design
- Cities in Evolution and Urban Scale
- Cairo 2050: A vision, From Walled city to gated communities

- Challenges of urban growth in Cairo.
- Public spaces in Cairo
- Cairo: Political, Social and Economical context
- Cairo's Urban Déjà vu: Globalization and Urban Fantasies
- New Urbanism
- Avant Garde Urbanism (The Junk space)
- Applications

References

- TRANCIK, ROOGER. *Finding Lost Space: Theories of Urban Design*. Van Nostrand Reinhold, 1986.
- TIBBALS, FRANCIS. *Making People-Friendly Towns: Improving the Public Environment in Towns and Cities*. Spon Press, 2001.
- Kostof, Spiro, '*The City Shaped: Urban Patterns and Meanings Through History*', Bulfinch Press, 1991
- Trancik, Roger, '*Finding lost space: Theories of Urban Design*', Van Nostrand Reinhold, 1986
- Lynch, Kevin, '*The Image of the City*', The MIT Press, 1960
- Jacobs, Jane, '*The Death and Life of Great American Cities*', 1961
- Ernest Sternberg, '*An Integrative Theory of Urban Design*', APA Journal, Summer 2000, Vol. 66 No. 3
- Eduardo E. Lozano, '*Community Design and the Culture of Cities: The Crossroad and the Wall*', Cambridge University Press, 1990
- Khaled Adham, "*Cairo's Urban Déjà vu: Globalization and Urban Fantasies*", Planning Middle Eastern cities an urban kaleidoscope in a globalizing world, Yasser Elsheshtawy, Eds., London ; New York : Routledge, 2004
- David Walters and Linda Brown, "*Design First: Design-Based Planning for Communities*", Architectural Press, Jun 2004
- Rem Koolhaas, "*Junkspace*", MIT press Journals, Spring 2002, No. 100

Course Code : **AR 721**

Course Title : **Passive and Active Environmental Control System**

Credit Hours : **3**

Course Description

This course deals with a number of passive and active environmental systems topics. First, it presents empirical environmental design guidelines in literature and their applications. Second, it introduces methods of calculating thermal loads and ways of minimizing these loads in buildings. Third, the course then introduces the concept of energy consumption software as a design tool. Finally, it looks at active energy generation opportunities and how to integrate them in building and site design.

Course Objectives

On completion of the course, student should be able to perform computerized load calculations and utilize ways of reducing energy consumption. They should also be able to analyze energy consumption components and choose the best solution out of a list of alternatives.

Course Topics

- Human Comfort and Health Requirements
- Thermodynamic Principles
- Thermal Dynamics of Buildings
- Load Calculations: Heating Load Calculations, Cooling Load Calculations
- Selecting Design Temperatures and Humidity Conditions
- Solar Gain Through Fenestration
- Transmission through the Envelope
- Internal Loads, Outside Air
- Annual Energy Use Calculations
- Hourly Computer Simulations
- Active HVAC Systems, Load Reductions

References

- BRADSHOW, Vaughn. *Building Control Systems*. New York: Wiley, 1993.
- BAKER, Nick. *Energy and Environment in Architecture*. E&FN Spon, London, 2000.

Course Code : **AR 722**

Course Title : **Environment and Behavior: Applications in Architecture and Urban Design**

Credit Hours : **3**

Course Description

This course introduces graduate students to the field of human behavior. The course draws from theories of environmental psychology and environmental ecology. Perception, cognition, evaluation and attitudes are examples for some topics to be explored at different scales and settings.

Course Objectives

The course aims at getting students acquainted with terms and theories of environment and behavior, and deepening their understanding to human behavior in multi-cultural settings. It also works to bridge a presumed gap of theory and practice; and enhances students' performance and understanding in relation to design discourse.

Course Topics

- Environmental psychology, focus and fields of interest.
- Behavior as a response to physical characteristics of the environment.
- Spatial behavior: personal space, territoriality, privacy and place attachment.
- Image of the city.
- The physical environment and urban living in cities.
- Public spaces and human behavior.
- Cultural aspects of environment and behavior.
- Environment-disturbing behavior: environmental stress, light, noise and temperature.
- Personality and the environment
- Environmental attitudes
- Evaluating environmental qualities
- Environmental perception, cognition and evaluation.
- Cognitive mapping and spatial organisation of the physical environment.

References

- Bechtel, R. (1997) *Environment and Behavior: An Introduction*. CA: Sage.
- Bechel, R. (2002) *Handbook of Environmental Psychology*. New York: John Willy and Sons.
- Holahan, C. (1982) *Environmental Psychology*. New York: Random House.
- King, A. (Ed.) (1980) *Buildings and Society: Essays on the Social Development of the Built Environment.* London: Routledge and Keegan Paul.
- Krupat, E. (1999) People *in Cities: The Urban Environment and its Effects*. Cambridge: Cambridge University Press.

- Lang, J. (1987) *Creating Architectural Theory: The Role of the Behavioral Sciences in Environmental Design.* New York: Van Nostrand Reinhold.
- Lynch, K. (1960) *Image of the City*. Cambridge: MIT Press.
- Moore, K. D. (2000) *Culture, Meaning, Architecture: Critical Reflections on the Work of Amos Rappaport*. Aldershot: Avebury.
- Preiser, W. F. E. (Ed.) (1985) *Programming the Built Environment*. New York: Van Nostrand Reinhold.
- Rappaport, A. (1969) *House Form and Culture*. NJ: Prentice-Hall.
- Stokols, D. and Altman, I. (Eds.) (1987) *Handbook of Environmental Psychology*. New York: Wiley
- Readings are separately available for each week.

Course Code : **AR 723**

Course Title : **Site Development and Landscape Studies**

Credit Hours : **3**

Course Description

This course places an emphasis on the rehabilitation, redevelopment and conservation of urban environments. Projects include the application of urban ecology, environmental psychology and historic evolution. The course also encourages students to generate ideas regarding the transformation of our ailing cities into thriving and efficient urban environments.

Course Objectives

The main objective of landscape is to improve the quality of life through learning the knowhow of planning and designing the natural and built environment from gardens and plazas to national parks. Such an objective is achieved through the understanding of the relation between people and place and the human uses of landscapes. The course aims to:

- Teach the skills of landscape design through a comprehensive understanding of the historical, technical, cultural and practical aspects of successful landscape design,
- Equip student with the theoretical skills to carry out successful research in the area of landscape,
- Provide students with a theoretical view on the human use of space and the role of place in people's lives. This will result from a series of related subjects e.g., environmental psychology, sociology, urban design, and
- Enable students to apply the gained knowledge through a design project and a written report.

Course Topics

- Part I: From gardening to landscaping
  - Evolution of modern landscape (a foot in the past)
  - Visions of landscape design (into the future)
- Part II: The used vocabulary (with reference to human activities)
  - Landscape designing process
  - Ecological landscape design
- Part III: Sharpening design skills in practice:
  - Undertaking a dissertation/design project usually includes design work and a written report. Projects range from national parks to city streets and squares and up to gardens

References

- THOMPSON, J. William and SORVIG, Kim, *Sustainable Landscape Construction*. Island Press, USA, 2000.

- NEWMAN, Peter and KENWORTHY, Jeffrey. *Sustainability and Cities,* Island Press, USA, 2000.
- SIMONDS, John O. *Garden Cities 21*, McGraw- Hill, Inc. USA, 1994.
- HUGH, Michael. *City Form and Natural Process*. Croom Helm, London and Sydney, 1984.
- McHARG, Ian L. *Design with Nature*, Natural History Press, 1971.
- POWELL, Kenneth. *City Transformed*. Laurence King, London, 2000.
- Austin, R. *Designing with plants*, Van no strand Reinhold, New York.
- Bell, S, 1993, *Basic elements in visual landscape design*, E&FN Spons, USA.
- Bell, S, 1999, *Landscape: pattern, perception and process*, E&FN Spons, USA.
- Dee, K.2001 *Form and fabric in landscape architecture*, Spons press. London
- Hobhouse, Penelope, 2002, *The Story of Gardening*, Dorling Kindersley
- Lyall, Sutherland, 1991, *Designing the New Landscape*, Thames and Hudson Ltd
- Pierceall, G.1990, *Sitescapes: outdoor rooms for outdoor living*, Prentice Hall, NJ
- Treib, Marc, 1993, *Modern Landscape Architecture*, the MIT Press, Cambridge
- Walker, Peter and Melanie Simo, 1994, *Invisible Gardens, the search for modernism in the America landscape*, Massachusetts Institute of Technology
- Walker, Peter and partners, 2005, *Landscape Architecture Defining the Craft*, Thomas and Hudson
- Waymark, Janet, 2005, *Modern Garden Design, innovation since 1900*, Thames and Hudson

Course Code : **AR 724**

Course Title : **Theory of Architecture**

Credit Hours : **3**

Course Description

This course introduces students to the era of modernism and the master designers of these schools. It provides a critical viewpoint for several architectural ideological trends and approaches which have evolved since the 1960s, until modern times. This course leads to a better understanding of the late 20th Century and the beginning of the 21st Century.

Course Objectives

This course increases the understanding of new architectural trends and their founders in the very recent past, the running present and the coming future.

Course Topics

- Theories of architecture and design approaches
- Approaches to analysis and synthesis of forms
- New trends and architectural design theories
- The role of symbolism in architectural forms
- Architectural theories between culture and environment
- Articulation of functions, forms and technology
- Analytical studies of the latest projects

References

- NESBITT Kate. *Theorizing a New Agenda of Architecture*. Princeton Architectural Press, 1996.

Course Code : **AR 726**

Course Title : **Environmental Design Approaches**

Credit Hours : **3**

Course Description

In this course the students will develop an understanding of the relationships among the ecosystem, energy, resource flows and human social and cultural values. Various methods of preserving, protecting and improving the quality of the environment through rational utilization of natural resources will be discussed as well as protecting human health by reducing air pollution through better design and urban development.

Course Objectives

The course introduces graduate students to the principles of environmental design and how the site, form, materials and structure can be used to design comfortable, healthy and energy efficient buildings.

Course Topics

- Comfort, health, environmental physics
- Energy strategy method:
- Building planning and design
- Energy sources
- Services design
- Energy conservation:
- Active and passive methods
- New technologies,
- Intelligent building
- Waste minimization and recycling technology
- Case studies of environmental buildings

References

- EDWARDS Brian, *Sustainable Architecture*. Architectural Press – Oxford 1996.
- PORTEOUS Colin, *The New Eco-Architecture*. Spon Press – London and New York 2002.
- RANDALL Thomas, *Environmental Design*. E&FN Spon – London and New York 1999.

Course Code : AR 727

Course Title : Egyptian Regions and Architecture

Credit Hours : 3

Course Description

The course discusses a variety of regions in Egypt (Sinai, Nubian Regions, Delta, Western Desert, and Eastern Desert) by presenting the evolution, transformation and the development of architecture in each of these regions. A group of students will choose a region to be studied according to their scope of interest in the field. The chosen topic will be dealt with, on two stages. The First Stage is theoretical background of the chosen subject, which would be prepared by the lecturer. Through Second Stage, the Student will make a research work of a Case Study on which to apply the theories and criteria extracted from the theoretical background of stage one. The students will present their work for discussion and criticism.

Course Objectives

The course aims to enhance the students' understanding of Egyptian regions by focusing upon several aspects related to various scopes of interest in several areas (historical, climatic, construction, etc…).

Course Topics

- Dwellings and Settlements in African Architecture
- Dwellings and Settlements in the Egyptian Regions
- Historic Building in Egyptian Regions (Methods and Techniques)
- Building Cultures and Sustainable Developments
- Vernacular Architecture
- Traditional Environments

References

- According to the topic to be addressed.

Course Code : **AR 728**

Course Title : **Sustainability and Urban Form**

Credit Hours : **3**

Course Description

This course highlights various sub-ecological approaches. It helps provide a clear understanding of the urban form and its different types. Students will develop knowledge about the factors affecting energy consumption and consequently affecting the urban form.

Course Objectives

The course aims to elaborate the concept of sustainable development and energy consumption and their direct influence on the urban form.

Course Topics

- Definition of sustainability
- The built environmental and sustainability
- Ecological dimension of sustainability
- Sustainable urban form
- Different approaches of achieving sustainable urban form

References

- Godchild, Barry, *Housing Design, Urban Form and Sustainable Development*, Third world planning Review, 62 N 2, 1994.
- Hildebrand Frey, *Designing the city towards a more sustainable urban form*, E&FN Spon, London, 1999.
- Katie Williams, Elizabeth Burton and Mike Jenks, *Achieving Sustainable Urban Form,* E&FN Spon, London, 2000.
- Josef Leitmann, *Sustainable Cities, Environmental Planning and Management in Urban Design,* McGraw-Hill, 1999.
- PETER Smith. *Sustainability at the Cutting Edge*. Arch. Press, London, 2003.

Course Code : **AR 729**

Course Title : **Architectural Criticism**

Credit Hours : **3**

Course Description

This seminar-like course introduces graduate students to the realm of architectural criticism. Students' curiosity to the subject is based on their experience with architectural design classes and instructors' evaluations. The course deals with the topic as a methodology and expression of ideology.

Course Objectives

Criticism is judgment flavored by one's sphere of interaction. Students should learn how to look and interpret behind-the-scene phenomena, and not to be biased by tempting forms or presentations. The objectives that students should gain: knowledge about criticism and its importance for theory and practice of architecture, curiosity, Suspicion, Link knowledge in different fields (art, science, …etc.), the ability to view things as "wholes", the way of Developing a "theoretical" model for understanding architectural form as synthesis for a multiplicity of forces or factors (socio-cultural, political, environmental, technological…etc.), learning about development of architectural theory and practice of the twentieth century, learning that architecture goes hand in hand with urban design as concrete formulations to prevailing discourses.

Course Topics

- Introduction to criticism in the fields of the social sciences, and art (art, music, and architecture)
- Architectural theory and practice I
- Language of architecture I
- Modernity, Positivism and the post-positivism era I
- A model for understanding criticism

References

- KANIN, Blair. *Why Architecture Matters: Lessons from Chicago*. University of Chicago Press, 2001.

Course Code : **AR 731**

Course Title : **Urban Development and Urban Renewal**

Credit Hours : **3**

Course Description

This seminar-like course introduces graduate students to different philosophies of urban development and renewal. The course initiates discussion and different concepts of development and renewal in different areas of the world with various world views.

Course Objectives

Following the philosophical background of this specific degree (Master in Architecture and Environmental Design), the course tackles a cornerstone of policy and action that affects the surrounding environment. Dealing with developmental issues raises the student's awareness toward the environment and furnishes solid ground for future research.

Course Topics

- Development vs. Growth Conceptualization, epistemology and philosophies
- Meanings of urbanity and urbanization theories
- Dimensions of development: social, economic, political, environmental, etc…
- Scales and contexts of urban development
- New towns policy and implementation
- Urban renewal programs
- International and national examples, critique
- Ecological perspectives of development

References

- TUNG, Anthony M. *Preserving the World's great Cities: The Destruction and Renewal of the Historic Metropolis*. Clarkson Review, London, 2001.
- COHEN, Nahoum. *Urban Planning Conservation and Preservation*. McGraw Hill, NY, 2001.
- Readings are assigned for each week and selected from journals and textbooks dealing with the topic of development.

Course Code : **AR 732**

Course Title : **Mediterranean Cities: History, Spirit and Contemporary Architecture**

Credit Hours : **3**

Course Description

The aims of this course are to understand the different physical, social and temporal aspects that have shaped the different common characteristics of Mediterranean cities. Detailed analysis of one Mediterranean city will take place as a case study. The analysis will include the different geographic, historical, social, political and cultural factors that have shaped the physical aspects of the city. Relationships between economic growth and urban development will be introduced. General and common physical characteristics of Mediterranean cities will be emphasized.

Course Objectives

To understand the different physical, social and temporal aspects which have shaped the different common characteristics of the Mediterranean cities. Also to understand the applications of the different spatial design theories.

Course Topics

- Choice of the case study
- Urban development through different periods
- Physical characteristics of the city
- Detailed analysis of key sites of the city
- General identity of the city and specific identity of its parts
- Contemporary issues of conservation
- Expectations and future directions

References

- GUPTA, Avijit, *Environment and the developing world: Principles, Policies and Management*, Wiley, 1998
- HAWKES, *The Environmental Tradition: Studies of the Architecture of the Environment,* Thames and Hudson, London, 1996
- KOSTOF, Spiro. *The City Shaped: Urban Patterns and Meaning through History*, Thames and Hudson, London, 1991

Course Code : AR 733

Course Title : Computer Applications in Design and Presentation

Credit Hours : 3

Course Description

This course provides students with advanced knowledge in the use of computers in architecture. It introduces them to new concepts and software applications beyond traditional CAD and common 3D modeling. Examples of such software include Sketchup, Piranesi, and Revit.

Course Objectives

The course aims to raise the student's expectations and understanding of the role of computers in architectural design. It explores new concepts such as Building Information Models (BIM), 3D sketching, and non-realistic rendering. Hands-on experiments provide in-depth knowledge of cutting edge software.

Course Topics

- The role of computers in the design stage
- 2D and 3D sketching
- Realistic and non-realistic rendering techniques
- Building Information Models (BIM)

References

- The course relies on handouts and online resources as needed.

Course Code : **AR 734**

Course Title : **Geographic Information Systems**

Credit Hours : **3**

Course Description

This course provides graduate students with an opportunity to gain advanced knowledge of the application of geographical information systems (GIS) on environmental problems with particular reference to planning and resource management. Students will become familiar with the strengths and limitations of this rapidly developing approach to the analysis of spatial data.

Course Objectives

By the end of that course, student will gain an understanding of the concept of GIS and its applications. (S)He will be able to deal with different types of data and know the way to transfer this data to the language of GIS and, finally, how to obtain different results using that package.

Course Topics

With application on a case study, the following topics would be introduced:

- Overview of Geographic Information System
- Maps, Map Projection and Coordinate System
- Spatial Data Model
- Data Quality, Sources, Input and Output
- Database Concept
- Spatial Analysis
- Making and Producing Maps
- Implementation
- The Future of GIS

References

- DEMERS, Michael N., *Fundamentals of Geographic Information Systems*, Wiley, New York. 1997.
- ESRI, *Getting to Know Arc View GIS*, 2nd Ed, 1997.
- ERSI, *Understanding GIS, the Arc/Info Method*, Environmental Systems Research Institute, New York, 1998.
- Menno-Jan Kraak and Ferjan Ormeling. *Cartography: Visualization of Geospatial Data*, 2nd Edition. Prentice Hall, 2003. www.cartographybook.com
- Ian Heywood, Sarah Cornelius and Steve Carver. *An introduction to Geographical Information Systems*. www.booksites.net/heywood , Prentice Hall, 2002.

Course Code : AR 736

Course Title : Research Methods

Credit Hours : 3

Course Description

The course provides graduate students with an overall understanding of the nature of academic research. It highlights the principal basics of doing research, its requirements and logic. Students would develop their skills in carrying out research work in different situations, address diverse topics, formulate research questions, and design research programs that suit particular contexts.

Course Objectives

The course aims to present a brief overview of the field of academic research. It introduces various methods and techniques for conducting research and producing complete research documents. The seminar-like course helps post-graduate students develop their ability to devise specific research programs, tackle different problems throughout the stages of work, analyze data, induce statements and conclusions, and finally organize findings into thoroughly written dissertations and theses. The course presents further insight into research methodologies, critical investigations, qualitative and quantitative methods, and provides a broad understanding of the research fundamentals, standards, and common procedures.

Course Topics

1. Academic Writing and Reading Research
   - Reading Research
   - Academic/Scientific Writing
   - Documenting Sources: Alternative Styles
   - Research Communication
2. Science and Architectural Research
   - The Nature of Science and Scientific Research
   - Research in Architecture
   - Academic Research: Concepts and Keywords
   - Logical Reasoning in Research
3. Systems of Inquiry
   - Frameworks of Systems of Inquiry
   - Standards of Research Quality
4. Research Planning
   - The Research Problem and the Research Question
   - The Review of the Related Literature
5. Research Designs
   - Experimental and Quasi-Experimental Research Designs
   - Survey/Correlational Research Designs
   - Qualitative Research Designs

- Interpretive-Historical Research
- Simulation and Modeling Research
- Logical Argumentation
- Case Study Research and Combined Strategies

6. Research Procedures and Techniques
   - Sampling
   - Data Collection (interviews, questionnaires, observations, …)
   - Data Analysis (descriptive and inferential statistics, qualitative data analysis, etc, …)

7. Applied Research Methods

References

- DEES, Robert. *Writing the Modern Research Paper*. Boston, Allyn and Bacon, 2000.
- Groat, L. and Wang, D. (2002). *Architectural Research Methods*. New York: John Wiley and Sons.
- Huck, S., Cormier, W., and Bounds, W. (1974). *Reading Statistics and Research*. New York: Harper and Row.
- Judd, C., Smith, E., and Kidder, L. (1991). *Research Methods in Social Relations.* New York: Holt, Rinehart, and Winston.
- Leedy, P. (1993). *Practical Research: Planning and Design*. New York: Macmillan.
- Miles, M. and Huberman, A. (1994). *Qualitative Data Analysis*. Thousand Oaks, CA: Sage.
- Patton, M. (2002). *Qualitative Research and Evaluation Methods*. Thousand Oaks, CA: Sage.
- Rosa, A. and Escholz, P. (1999). *The Writer's Brief Handbook*. Boston: Allyn and Bacon.
- Sommer, B. and Sommer, R. (1991). *A Practical Guide to Behavioral Research: Tools and Techniques.* New York: Oxford University Press.
- Wehrli, R. (1986). *Environmental Design Research: How to Do It and How to Apply It.* Melbourne, FL: Krieger.
- Zeisel, J. (1990). *Inquiry by Design: Tools for Environment-Behavior Research*. New York: Cambridge University Press.
- ZEISEL, John. *Inquiry by Design*. New York, Cambridge University Press, 1990.
- Readings from journal articles and chapters from other books will be made available to students as needed.

Course Code : AR 737

Course Title : Urban Environmental Planning

Credit Hours : 3

Course Description

Urban environmental planning is planning that includes environmental criteria in decision making, as well as filtering steps that lead to a completion of a design. To achieve environmental planning it is imperative that the entire planning method, approach and discipline be overhauled. Every component, guideline and mark of the pen must consider the implications of the environmental objective. As such, the course deals with different aspects related to the planning of urban areas. It explains how uncontrolled urbanization has altered the natural and social systems, and how it is possible through evolving environmentally conceived concepts in planning, to formulate a better urban environment.

Course Objectives

The aim of the course is to prepare graduates for lifelong learning and professional careers in environmental planning; provide the knowledge and skills required to obtain professional entry level positions in environmental planning; promote land use and environmental planning as a social learning process; and provide graduates with a critical perspective of the legislation, policies and practices affecting land use and the environment.

Course Topics

- Background
- Environmentally Oriented Planning: Sectoral Aspects
- Land Suitability Assessment
- Environmental Management Systems (EMS)
- Case Studies

References

- Marsh, W. M. *Landscape Planning: Environmental Applications*. Addison-Wesley Publishing Company, Inc., Reading, Massachusetts, 1983.
- Lyle, J. T. *Design for Human Ecosystems*. Van Nostrand Reinhold, New York, 1985.
- Hough, M. *Cities and Natural Process*. Routledge, London, 1995.
- Lyle, J. T. *Regenerative Design for Sustainable Development*. New York: Wiley, 1994.
- McHarg, I. L. *Design with Nature*. New York: Natural History Press, 1969.

Course Code : **AR 738**

Course Title : **Urban Landscape**

Credit Hours : **3**

Course Description

This course explores landscape design theories and application in the urban context. It looks at site structure relationships for private buildings, urban open spaces, plazas, pedestrian malls and other public spaces. Case studies will be used to apply and develop these principles under the supervision and guidance of the instructor.

Course Objectives

The course aims to introduce students to the concept of landscape architectural design theories and applications on different scales of urban environments.

Course Topics

- Perception of urban landscape
- Structure of urban space
- Development of spatial order
- Radial and Neoclassic form

References

- CLIFF Loughton, JAMES C. Moughtin. *Urban Design: Green Dimensions*. 1996.
- GARRET Eckbo (Editor). *People in a Landscape*. 1997.
- CROSBIE, Michael J. *Green architecture: A Guide to Sustainable Design*. - Rockport, Massachusetts, ROCKPORT PUB. INC., 1994.
- DUTTON John A., *New American Landscape*. Skira, Italy, 2000.
- SPENS Michael. *Modern Landscape*. Phaidon Press, 2003.

Course Code : **AR 739**

Course Title : **Conservation of Architectural Heritage**

Credit Hours : **3**

Course Description

The course introduces the students to the field of historic preservation covering issues from the history of the field, the development of its theories, the different levels of intervention. It also provides an overview on the technical conservation matters covering a brief on the traditional building techniques, and the compatible approaches to conserve historic buildings. It develops a critical approach towards the current practice, and opens a discussion on the means to enhance and to appropriate conservation methods according to the cases.

Course Objectives

This course enhances the understanding of the complex characteristics of heritage structure, values, authenticity, and opens up discussions to evaluate frameworks for planning and managing heritage conservation. The course also tackles the problem of cultural discontinuity and demonstrates contemporary trends towards re-assuring local cultural continuum development.

Course Topics

- Introduction and definitions
- Historic preservation as a profession
- Readings in classical sources on preservation
- Theories and levels of preservation
- Ruins and archaeological sites
- Heritage and development
- Building and urban conservation in Cairo
- Conservation terminology
- Waqf as a preservation institution
- Cities: museums and archives
- Methodologies and regional experiences in conservation

References

- TYLER, Norman. *Historic Preservation: An Introduction to its History Principles and Practice.* W.W. Norton, New York, 1999.
- FEILDEN, M Bernard. *Conservation of Historic Building*. Arch. Press, London, 2000.
- Getty, "*Nature of Conservation, a Race Against Time*"
- Getty. "*Historical and Philosophical Issues*," (ARCE/n8555H57, 1996)
- Massari (ARCE/TH9031M2813, 1977)
- *Conservation of Historic Stone Buildings and Monuments* (ARCE/TH3411C65, 1982)

- *Static Restoration of Monuments* (ARCE/TH1095L59, 1982)
- David Dean, *Museum Exhibition*, (ARCE/AM151D43, 1994)
- Aga Khan (ARCE/NA109T9C65, 1980).
- Meinecke (ARCE/NA109E39I84, 1980)
- Mahdy, *A Glossary of Arabic Terms for the Conservation of Cultural Heritage*. A downloadable PDF from www.iccrom.org

Course Code : **CB 711**

Course Title : **Value Engineering in the Construction Industry**

Credit Hours : **3**

Course Description

Development of value engineering concept: its history, definitions, incentive provisions and applications. Value engineering methodology and tools: functional analysis; level of abstraction and alternative evaluation techniques. The process and procedures of a value study. Whole life cycle costing and its effect of value engineering. Case studies and applications.

Course Objectives

To provide students with and understanding of the concepts of value engineering and its applications in the construction industry.

Course Topics

- Value engineering concepts and definitions
- Value engineering study process and procedures
- Function analysis
- Level of abstraction and selection of alternatives
- Evaluation techniques
- Presenting value studies
- Whole life cycle costing
- Construction case studies and applications

References

- Dell'Isola, A. "*Value Engineering: Practical Applications for Design, Construction, Maintenance and Operations*", MRS. Means Company Ltd, 1997.
- Kelly, J., Male, S. and Graham, D. "*Value Management of Construction Projects*" Blackwell Sciences, 2004.
- Parker, D. E., "*Management Application of Value Engineering: For Business and Government*", The Value Foundation, Washington D.C., 1994.
- Kumar, S., "Val*ue Engineering: A Fast Track to Profit Improvement and Business Excellence*", Narosa Publishing House, 2004.
- Barrie, D. S. and Paulson, B. C., "*Professional Construction Management*", McGraw-Hill, 1992.

Course Code : **CB 712**

Course Title : **Advanced Construction Management**

Credit Hours : **3**

Course Description

General characteristics of the construction industry and the general aspects and nature of construction management. Further management and business topics include: strategic management; risk management; human resources management; health and safety in construction; organizational behavior; business performance management; quality management, environmental management and process management.

Course Objectives

To develop an understanding of general management and business topics relating to construction.

Course Topics

- Characteristics of the construction industry
- Aspects and nature of construction management
- Strategic management
- Risk management
- Human resources management
- Health and safety in construction
- Organizational behavior
- Business performance management
- Quality management
- Environmental management
- Process management

References

- Ellis, R. and Fryer, B. G., "*The Practice of Construction Management*", Blackwell Publishing, 2004.
- Ritz, G. J., "*Total Construction Project Management*", McGraw Hill Co., New York, 1994.
- Harris, F. and McCaffer, R. "*Modern Construction Management*", Blackwell Sciences, Oxford, 2001.
- Coble, R. J., Haupt, T, C. and Hinze, J. "T*he Management of Construction Safety and Health*", Balkema, Rotterdam, 2000.
- Cooper, R. et al., "*Process Management in Design and Construction*", Blackwell Publishing, Oxford, 2004.

Course Code : **CB 717**

Course Title : **Project Planning and Control**

Credit Hours : **3**

Course Description

Advanced planning and scheduling methods in construction. Scheduling with resource constraints and under uncertainty, and line-of-balance. Cost planning in projects and design of costing systems. Acceleration of construction projects. Control of time and costs in construction projects. Forecasting and controlling cash flows of projects. Earned-value systems in controlling construction projects.

Course Objectives

To provide students with advanced knowledge and skills concerned with planning and control of construction projects.

Course Topics

- Advanced planning and scheduling methods in construction
- Resource constrained scheduling, probabilistic scheduling and line-of-balance.
- Cost planning and design of costing systems in construction projects
- Acceleration of construction projects
- Tracking project progress – time and costs
- Forecasting and controlling project cash flows
- Earned-value systems in controlling construction projects

References

- Oberlender, G. D., "*Project Management for Engineering and Construction*", McGraw-Hill, New York, 2000.
- Hinze, J., "*Construction Planning and Scheduling*", Prentice Hall, New York, 2003.
- Cooke, B. and Williams, P. "*Construction Planning, Programming and Control*", Blackwell Publishing, Oxford, 2004.
- Halpin, D. W., Woodhead, R. W. "*Construction Management*", Wiley, New York, 1997.
- Barrie, D. S. and Paulson, B. C., "*Professional Construction Management*", McGraw-Hill, 1992.

Course Code : **CB 710-C**

Course Title : **Construction Productivity**

Credit Hours : **3**

Course Description

Factors affecting productivity. Productivity engineering and management. Productivity measurement. Work study. Method study. The total productivity model. Optimum allocation of resources. Productivity improvement techniques, technology based, material based, employee based, product based, and task based.

Course Objectives

To provide a knowledge of the productivity concepts and in the construction industry.

Course Topics

- Productivity engineering and management
- Factors of productivity
- Productivity measurement methods
- Total productivity model
- Optimum allocation of resources
- Productivity improvement techniques

References

- Adrian, J., "*Construction Productivity: Measurement and Improvement*", Stipes Pub., 2004.
- Olomolaiye, P., Jayawardane, A., and Harris, F. C., "*Construction Productivity Management*", Longman and Chartered Institute of Building, 1998.
- Oglesby, P. and Howell, G. "*Productivity Improvement in Construction*", McGraw Hill, 1994.
- Pilcher, R., "*Principles of Construction Management*", McGraw-Hill, 1992.

Faculty Members

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