

Study Plan

Faculty **Architecture and Design**
Department **Architectural Engineering**
Semester **Second**
Academic Year **2019/2020**

Course Name **Environmental Control**
Course Number **090401317**
Pre-requisite **Architecture Lighting and Acoustics, 1101331**

Each student shall receive a copy of the syllabus to be kept for future reference.

1. Instructor Information

1. Instructor: Dr. Omaimah Al Arja
2. Office: 351
3. Office Telephone: +962 6 4790222, ext. 447
4. Email: oalarja@meu.edu.jo
5. Office Hours: Mon., Wed. 11:00-13:00

2. Course Details

1. Meeting Times: 15:30-17:00 Mon., Wed.
2. Location: B015
3. Course Laboratory (if any): ----

3. Sources and References

1. Required Readings:

Introduction to ARCHITECTURAL SCIENCE, The Basis of Sustainable Design, Steven V. Szokolay, Second edition, Elsevier, 2008, ISBN: 978-0-7506-8704-1

2. Additional Readings:

1. Givoni, B. Man – Climate & Architecture
2. Evans, M. Housing Climate & Comfort
3. Olgyay, V. Van, Norsrand Rienhold, Design with Climate, New York, 1992, ISBN 0-442-01110-5.
4. Marks T.A. & Morrisc E. N. Buildings climate & Energy.
5. Szokolay S.V. Environmental Science Handbook for Architects and Builders, the construction press New York, 1990.
6. Fuller Moor, Environmental control System.
7. Building Services Engineering By David V. Chadderton, 6th Edition, 2013, Taylor and Francis.
8. ASHRAE – The American Society of Heating, Refrigerating and Air-Conditioning Engineers.
9. United States Green Building Council, (2009), **Leadership in energy and environmental Design, Building Design and Construction Version 3 Reference Guide.**
10. Jordan National Building Council (2010), **Energy Efficient Building Code**, Ministry of Public Works and Housing, Jordan.

11. Rosenlund, H. (2000), **Climate design of buildings using passive techniques**, Lund University, Housing Development & Management, Sweden, Building issues, No 1/2000 Volume 10
12. Lund University and Royal Scientific Society, (2009), **Climate Conscious Architecture and Urban Design in Jordan, towards energy efficient buildings and improved urban microclimate**. HDM publications, Sweden
13. Smith, P. (2006), **Architecture in a climate of Change, a guide to sustainable design**, Architectural Press, Elsevier, England.
14. **Energy Manual Sustainable Architecture**, Birkhäuser, Edition Detail Hegger, Fuchs, Stark, Zeumer, ISBN: 978-3-7643-8764-8
15. **Traditional Domestic Architecture of the Arab Region**, Friedrich Regette, 2003, American University Sharjah, ISBN:3-932565-30-4
16. **Insulating Materials Principles**, Materials, Detail Practice 2008 Birkhäuser Pfundstein, Gellert, Spitzner, Rudolphi, ISBN: 978-3-7643-8654-2
17. **Faustformel Gebäudetechnik** für Architekten, Hayner/Ruoff/Thiel, 2010, DVA, ISBN 978-3-421-03739-8
18. **Traditional Domestic Architecture of the Arab Region**, Friedrich Regette, 2003, American University Sharjah, ISBN:3-932565-30-4.
19. Osman Attmann, (2009), **Green Architecture**, Advanced Technologies & Materials, Edition 1, Advanced Technologies & Materials, McGraw-Hill's GreenSource.
20. Mendler, Odell and Lazarus, (2006), **The HOK Guidebook to Sustainable Design**, Second Edition, John Wiley & Sons, Inc, Hoboken, New Jersey, USA.
21. United States Green Building Council, (2009), **Leadership in energy & environmental Design, Building Design & Construction**, Version 3 Reference Guide.
22. Jordan National Building Council (2010), **Energy Efficient Building Code**, Ministry of Public Works and Housing, Jordan.

Websites:

1. www.ashrae.org.
2. www.southface.org, Southface Energy Institute.
3. www.geoexchange.org, Geothermal heat pump consortium.
4. www.buildingscience.com.
5. www.energycodes.gov.
6. www.energy.gov.on.ca

4. Course Description

Analytical Review of the main weather elements affecting the life of man and his comfort; the mutual relationship between architecture and its environment, the responsibility of the architect towards the environment during and after design; the international laws relevant to the protection of the environment and natural resources; the effects of natural lighting and ventilation, winds, and sunrays on buildings

5. Aims and objectives:

- To concentrate on the importance of integration of building design and planning process, with the environmental responsible planning process so as to have a sustainable building construction and environmentally friendly architecture.
- To acquire the students with the essential knowledge about developing an advanced, climate-responsible building design with a minimal energy consumption; using principles of passive solar design, implementing standards related to the design of building envelop and their impact on cooling and heating,
- To acquire the students with understanding the importance of indoor environment quality; thermal comfort, etc.
- To create a multidisciplinary team environment for students to participate and understand the rationales and requirements of buildings` technical system design process.
- To enable students to investigate and learn various skills for interdisciplinary design.
- To develop students' knowledge and skills in building services design with a focus on creative, sustainable and appropriate solutions.
- To enhance students' awareness and sensitivity to the benefits of research.

6. Course Learning Outcomes (CLOs):

Upon successful completion of this course, the student should be able to:

1. Know and understand the essential basic concepts of climate, human thermal comfort.
2. Have a clear understanding of building envelopes, heat transfer and heat exchange in buildings, thermal insulation, and energy-efficiency in buildings and climatic control in buildings.
3. Have a clear understanding of systems; passive and active design, solar techniques.
4. Understand the effect of natural lighting and ventilation, winds, and solar radiation on buildings.
5. Understand and apply a wide range of sustainable building design principles with a focus on creative, sustainable and appropriate solutions.

6. Give technical presentation suitable for the time, place and audience.

7. Programme Learning Outcomes (PLOs):

1. Implement concepts of architecture with high proficiency.
2. Keep pace with intellectual and practical developments to fulfill the varying needs of society.
3. Understand the importance of local heritage and preserve it.
4. Understand the diverse civilizations of the world and boost cultural exchange.
5. Apply innovation and critical thinking on various fields of Architecture.
6. Find creative and innovative solutions for various design dilemmas.
7. Use high skills in expressing and communication.
8. Continuously learn how to conduct research and apply it in professional practices.
9. Adhere to professional ethics and principles of practice.

8. Teaching Methods

- Lectures supported with PowerPoint presentations
- Students will work in an interactive learning environment supported by lectures and discussions.
- Teaching and learning aids include bibliography, survey of web resources
- Student will be assigned a topic to research, prepare a paper, and give a presentation.
- Application throughout the semester based on group performance.

#	Description	Weight	Description
1.	Exams	30	Multiple choice questions True/ False Essay Questions Problem solving
2.	Final Exam	40	Questions about theoretical and practical material
3.	Assignments	20	Homework and Practical Project
4.	Participation	10	Quizzes and classroom
Total		100	

9. Course Schedule:

Week	Topics to be covered	Readings (Pages)	CLOs	PLOs
1	Introduction to the course	---		
2	Climate & weather	---		
3	Basic concepts; Temperature, pressure, fluid flow, energy, heat and psychrometry.	---		
4	Heat Transfer.	---		
5	climatic elements, microclimate	---		
6	Human thermal comfort; Metabolism, live body heat transfer and conditions for thermal comfort.	---		
7	Indoor environment quality, heat exchange in buildings. Mid Term Exam 3/12/2019	---		
8	Climatic control in buildings; Heat loss and gain in the buildings, Thermal insulation	---		
9	Passive and active solar design,	---		
10	Applications on Passive and active solar design,	---		
11	Shading devices, solar effect on heating and cooling loads	---		
12	Natural lighting	---		
13	Ventilation	---		
14	Seminars presented by students	---		

10. Course Policies

- Course policies are determined by Undergraduate and Postgraduate Degree Regulations and Student Guide

- Policies should be announced during the first meeting.

1. Attendance:

Students are expected to attend all classes of this course (without exception). A prior approval is required for class absence except for emergencies. However, any student with 15% short attendance will be not be allowed to attend the final exam, and may better drop the course.

2. Tardiness:

Students are not allowed to come late to class. Any student coming more than 5 minutes late will be marked absent. However, he/she may still be allowed to attend the class in spite of being marked absent if he/she wishes to do so, on the condition that the student does not make a habit of it, and that the number of tardy students is limited to a little number of very special cases.

3. Exams: Failure in attending a course exam will result in a zero mark unless the student provides an excuse acceptable to the instructor, the Head of the Department, and the Dean who approves a re-sit exam. It is the student's responsibility to attend the exam at the correct time and place. The first and second exam papers will be returned to the students.

4. Assignments and Projects: Exercises will take place in the class room and will be continued at home.

5. Attending Exams and Meeting Deadlines: In the event that a student shows up late for the 1st or 2nd exam, he/she will be permitted to attend the exam on the condition that none of his/her has already left the room; also he/she will not be allowed any extra time. In the event that a student is more than 30 minutes late for the final exam, he/she will not be permitted to attend the exam.

6. Penalties for Cheating: Cheating is an attempt to gain marks dishonestly and includes: Copying from another student's work, using materials not authorized by the institute or instructor, collaborating with another student during a test without permission, knowingly using, buying, selling, or stealing the contents of a test, getting help from outside during a test by using any kind of electronic device, etc.