| Course Specification | |
|---|---|
| **Course Code: ARC 252** | **Course Title:** Environmental Control Systems in Architecture and Urbanism |

## (1) Basic information

| | |
|---|---|
| **Program Title** | Architecture Engineering |
| **Department offering the program** | Department of Architecture Engineering |
| **Department offering the course** | Department of Architecture Engineering |
| **Course Code** | ARC 252 |
| **Year/level** | Second term 2023/2024 / 2nd Level |
| **Specialization** | Major |

| **Teaching Hours** | Total | Practical | Tutorial | Lectures |
|---|---|---|---|---|
| | 3 | 0 | 0 | 3 |

| **Date of approval of Bylaw** | **2021** |
|---|---|

## (2) Course Aims

| No. | Aims |
|---|---|
| 1. | The course deals with the sun path and wind direction and their impacts on the design and arrangement of buildings – Architectural building treatments in different climatic zones – Building cluster patterns based on climatic considerations. (aim PEO1 of the program). |

## (3). Learning Outcomes of Course (LOs)

| | |
|---|---|
| A3.1 | Practice architectural design processes with consideration for environmental aspects and within the principles and contexts of sustainable design. |
| A4.1 | Utilize environmental principals, contemporary software, related codes and standards in design process. |
| A61 | Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements. |
| B3.1 | Generate ecologically responsible design through understanding of building location and its environmental context. |
| B4.1 | Transform design concepts into buildings and integrate plans into overall planning within the constraints of: project financing, project management, cost control and methods of project delivery; while having adequate knowledge of industries, organizations, regulations, and procedures involved. |

## (4). Course Contents

| Week No. | Topics | Lecture | Tutorial | Practical | Total |
|---|---|---|---|---|---|
| 1 | Introduction to environmental control in architecture | 3 | | | 3 |
| 2 | Site and natural context | 3 | | | 3 |
| 3 | Passive & active solar design | 3 | | | 3 |
| 4 | Sun-path diagram and radiation | 3 | | | 3 |
| 5 | Climatic design & human comfort | 3 | | | 3 |
| 6 | Physics of Heat | 3 | | | 3 |
| 7 | **Midterm Exam** | | | | |
| 8 | Natural ventilation and architectural design | 3 | | | 3 |
| 9 | Light in architecture | 3 | | | 3 |
| 10 | sound in architecture | 3 | | | 3 |
| 11 | Environmental simulation software | 3 | | | 3 |
| 12 | Environmental control between traditional and | 3 | | | 3 |
| 13 | Different climatic zones | 3 | | | 3 |
| 14 | Designing with different climatic zones | 3 | | | 3 |
| 15 | Project and research submission | | | | |
| 16 | **Final exam** | | | | |
| | Total | 39 | | | 39 |

## (5). Teaching and Learning methods

| No. | Teaching Method |
|---|---|
| 1 | Lectures |
| 2 | Brainstorming sessions |
| 3 | Educational presentations |
| 4 | Self-learning |
| 5 | Case study |

## (6). Teaching and Learning methods of Disabled Students

| No. | Teaching Method | Reason |
|---|---|---|
| 1. | Specific enhancement lectures are provided | |

## (7). Matrix of course Los with teaching and learning methods

| No. | | Teaching and Learning method | | | |
|---|---|---|---|---|---|
| | | lectures | Educational presentation | Interactive learning | Self-learning |
| LO | B1.1 | √ | | | √ |
| | C1.1 | √ | √ | √ | |
| | C1.2 | √ | √ | √ | √ |
| | C5.1 | √ | | √ | √ |

## (8). Students Assessment

### (8.1) Students Assessment Method

| No. | Assessment Method | Los |
|---|---|---|
| 1 | Attendance | |
| 2 | Reports | A3.1, A4.1, A6.1, B3.1, B4.1 |
| 3 | Quiz 1 / Quiz 2 | A3.1, A4.1, A6.1, B3.1, B4.1 |
| 5 | Mid-term Exam | A3.1, A4.1, A6.1, B3.1, B4.1 |
| 6 | Final oral Exam | A3.1, A4.1, A6.1, B3.1, B4.1 |
| 7 | Final Exam | A3.1, A4.1, A6.1, B3.1, B4.1 |

### (8.2) Assessment Schedule

| No. | Assessment Method | Weeks |
|---|---|---|
| 1 | Attendance | Weekly |
| 2 | Reports | 5, 12 |
| 3 | Quiz 1 / Quiz 2 | 4, 9 |
| 5 | Mid-term Exam | 7 |
| 6 | Final oral Exam | 15 |
| 7 | Final Exam | 16 |

### (8.3) Weighting of Assessments

| No. | Assessment Method | Weights % | Weights | |
|---|---|---|---|---|
| 1 | Attendance | | | |
| 3 | Quiz 1 / Quiz 2 | 10% | 10 | |
| 4 | Assignments | 10% | 10 | 50 |
| 5 | Reports | 10% | 10 | |
| 6 | Mid-term Exam | 10% | 10 | |
| 7 | Final oral Exam | 10 % | 10 | |
| 8 | Final Exam | 50% | 50 | |
| | Total | 100% | 100 | |

## (9). List of References

| 1 | شفق العوضي الوكيل، محمد عبد الله سراج ، "المناخ وعمارة المناطق الحارة" ، دار المعرفة، القاهرة ،الطبعة الرابعة، ٢٠١٦. |
|---|---|
| 2 | عادل يس محرم، جورج باسيلي، مراد عبد القادر،... ، "دليل الطاقة والعمارة "، جهاز تخطيط الطاقة، القاهرة، ١٩٩٨ |
| 3 | الكود المصري للعزل الحراري – مركز بحوث البناء والإسكان |
| 4 | الكود المصري لتحسين كفاءة استخدام الطاقة في المباني السكنية –مركز بحوث البناء والإسكان |
| 5 | Givoni, Baruch, "Climate Considerations in Building and Urban Design", Van Nostrand Reinhold Press, New York, 1998. |
| 6 | Watson, D., Kenneth Labs, "Climatic Design", Energy- Efficient Building Principles and Practices, McGraw–Hill Book Company, New York, 1976. |

## (10). Facilities required for teaching and learning

| 1 | Data show |
|---|---|
| 2 | Computer lab |
| 3 | Environmental lab |
| 4 | White Board |

## (11). Matrix of Aims and LOs of the Course

| No. | Topics | Aim | LOs |
|---|---|---|---|
| 1. | Introduction to environmental control in architecture and the need for | | A3.1, A4.1, A6.1, B3.1, B4. |
| 2. | Site and natural context | | A3.1, A4.1, A6.1, B3.1, B4. |
| 3. | Passive & active solar design | | A3.1, A4.1, A6.1, B3.1, B4. |
| 4. | Sun-path diagram and radiation | 1 | A3.1, A4.1, A6.1, B3.1, B4. |
| 5. | Climatic design & human comfort | | A3.1, A4.1, A6.1, B3.1, B4. |
| 6. | Physics of Heat | | A3.1, A4.1, A6.1, B3.1, B4. |
| 7 | Natural ventilation and architectural design | | A3.1, A4.1, A6.1, B3.1, B4. |
| 8 | Light in architecture | | A3.1, A4.1, A6.1, B3.1, B4. |
| 9 | sound in architecture | | A3.1, A4.1, A6.1, B3.1, B4. |
| 10 | Environmental simulation software | 1 | A3.1, A4.1, A6.1, B3.1, B4. |
| 11 | Environmental control between traditional and contemporary solutions | | A3.1, A4.1, A6.1, B3.1, B4. |
| 12 | Different climatic zones | | A3.1, A4.1, A6.1, B3.1, B4. |
| 13 | Designing with different climatic zones | | A3.1, A4.1, A6.1, B3.1, B4. |

## (12). Matrix of Competencies/ Program LOs with Course LOs

| No. | Competences/ Program LOs | No. | Course LOs |
|---|---|---|---|
| A3 | Practice architectural design processes with consideration for environmental aspects and within the principles and contexts of sustainable design. | A3.1 | Practice architectural design processes with consideration for environmental aspects and within the principles and contexts of sustainable design. |
| A4 | Utilize environmental principals, contemporary software, related codes and standards in design process. | A4.1 | Utilize environmental principals, contemporary software, related codes and standards in design process. |
| A6 | Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements. | A61 | Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements. |
| B3 | Generate ecologically responsible design through understanding of building location and its environmental context. | B3.1 | Generate ecologically responsible design through understanding of building location and its environmental context. |
| B4 | Transform design concepts into buildings and integrate plans into overall planning within the constraints of: project financing, project management, cost control and methods of project delivery; while having adequate knowledge of industries, organizations, regulations, and procedures involved. | B4.1 | Transform design concepts into buildings and integrate plans into overall planning within the constraints of: project financing, project management, cost control and methods of project delivery; while having adequate knowledge of industries, organizations, regulations, and procedures involved. |

| Title | Name | Signature |
|---|---|---|
| Course Coordinator | Dr. Mahmoud Elghawaby | |
| Head of Department | Assoc. Prof. Faysal Abou ElAzm | |
| Date of Approval | 2023/ 2024 | |