THIAGARAJAR COLLEGE OF ENGINEERING

(A Government Aided Autonomous Institution affiliated to Anna University)

MADURAI – 625 015

REGULATIONS

CURRICULUM AND DETAILED SYLLABI

For

M.Arch DEGREE PROGRAMME

For the students admitted from the academic year 2022-2023 onwards

THIAGARAJAR COLLEGE OF ENGINEERING, MADURAI - 625 015
(An Autonomous Institution affiliated to Anna University)

RULES AND REGULATIONS

M.ARCH. (GENERAL) DEGREE PROGRAMME

CHOICE BASED CREDIT SYSTEM

(These Rules and Regulations are applicable to the candidates admitted from the Academic year 2022-2023 onwards)

1. PRELIMINARY DEFINITIONS AND NOMENCLATURE

In these Regulations, unless the context otherwise requires:

i. "**Programme**" means M. Arch Degree Programme

ii. "**Degree**" means Post Graduate (PG) Degree that is M.Arch degree.

iii. "**Course**" means a theory, theory cum studio (skill based) and or studio subject that is normally studied in a semester, like Urban Design Theories and Methodology, Public Architecture, Integrated Architectural Design, etc.

iv. "**University**" means Anna University, Chennai.

2.0 QUALIFICATIONS FOR ADMISSION:

2.1. The candidates seeking admission to the first semester of the Post Graduate Degree programme shall require satisfying the eligibility norms prescribed by the Affiliating University and Director of Technical Education, Chennai, from time to time.

2.2. Candidates for admission for the first semester of the Post Graduate degree program shall be required to have passed an appropriate degree examination of Anna University (B. Arch./ AIIA*) or any other examination of any University or authority accepted by the University as equivalent thereto.

*Candidates who have qualified with AIIA and registered with Council of Architecture only are eligible.

3.0 STRUCTURE OF PROGRAMME:

3.1 Categorization of Courses

M.Arch. Degree Programme shall have curriculum comprising of Theory courses, Theory cum Studio (skill based) courses and Studio courses. The courses are categorized as follows:

A. Professional Core Courses (PCC) is Studio courses relevant to the chosen specialization/branch.

B. Compulsory Foundation Courses (CFC) are theory and theory cum studio (skill based) courses that provide basic foundation to the core courses or supplement the core courses like Urban Design Theories, Climate Change Adaptation and Resilience etc.

C. Elective Foundation Courses (EFC) is theory and theory cum studio (skill based) courses which lead to knowledge enhancement selected from a pool of courses under specific streams.

D. Programme Elective (PE) is theory and theory cum studio (skill based) courses which include the elective courses relevant to the chosen specialization/branch. The electives from the curriculum are to be chosen with the approval of the Head of Department.

E. Audit Courses (AC) includes the courses that help in value additions and personality development such as Constitution of India etc. Students shall register at least any one of the Mandatory Audit courses as and when offered. Courses such as Constitution of India, Essence of Indian Traditional Knowledge, Yoga, Value education, Stress Management and Personality Development through Life Enlightenment Skills, etc, which are mandated by AICTE/UGC shall be registered by the student as and when offered.

The distribution of credits for each category is given in Table 1.

Table1: Credit Distribution

S.No	Category	Credit Distribution
A.	Professional Core Courses (PCC)	62
B	Compulsory Foundation Courses (CFC)	22
C.	Elective Foundation Courses (EFC)	4-8
D.	Programme Elective Courses (PE)	2-4
E.	**Audit Courses (AC) (Not to be included in CGPA) – Mandatory**	-
	Minimum Number of Credits to be earned for the award of the degree	90

3.2 Credit Assignment

Each course is assigned certain number of credits based on the following:

Table 2: Credit Assignment

Contact period per week	Credit
1 hour Lecture Period	1
1 hour Tutorial Period	1
1 hour Studio/ Practical Period	1

3.3 Number of Courses/ Credits per semester

Curriculum of a semester shall normally have a blend of theory courses, theory cum studio (skill based) courses and studio courses. Each course may have credits assigned as per clause 3.2. However, the total number of courses per semester shall not exceed 4.

3.4 One Credit/ Two Credit Courses

3.4.1 Students can opt for one-credit courses / two credit courses offered by experts from industry/ academic /research organizations and approved by academic council. Students can register for such courses from his/her second semester onwards. A student is also permitted to register for these courses of other departments, provided the student has fulfilled the necessary pre-requisites of the courses being offered and subject to the approval of both the heads of the departments. A student can register for only one course in a semester. There is no limit to the number of one-credit or two credit courses a student can register during the programme of study. However, the maximum number of credits that can be earned from one credit / two credit courses is limited to 3. These courses are evaluated by the respective course coordinator of the programme. The category for one credit / two credit course is scheduled under Programme Elective.

3.4.2 If a student does not successfully complete the registered one-credit or two credit courses in a semester, the registration of that course will be considered as cancelled. Further, it will not be treated as arrear and no supplementary examination will be conducted; alternatively, if he/she wishes, he/she can re-register for the same course in the ensuing semesters and successfully complete it as and when it is offered subsequently

3.5 Guided Study Courses

A student who does not have arrears in the previous semesters and has CGPA greater than 8.0 may be permitted to credit utmost ONE guided study course from second semester under Programme elective courses. One faculty member approved by the Head of the Department shall be responsible for the periodic monitoring and evaluation of the course. In

guided study course, the student need not ensure minimum number of contact hours. However, the student has to appear for continuous assessment tests and submit assignments to the respective faculty-in-charge assigned by the Head of the Department. The assessment and evaluation for theory and theory cum studio guided study courses is as per vide clause 10.1 and 10.2 respectively.

3.6 Online Courses

Students may be permitted to register for online courses approved by the Department committee (which are provided with certificate after evaluation of the performance), during first to third semester of his/her study. On successful completion of the course, he/she has to submit the copy of the certificate to the Head of the Department for exemption from registering for an elective course. Based on the recommendation by the team of faculty members nominated by the Head of the Department, the student will be awarded grade and credits, maximum 3, in Programme Elective category. The recommendation will be sent to The Controller of Examinations after the approval by the Head of the Department.

3.7 The medium of instruction, examinations and Dissertation report shall be in English.

4.0 DURATION OF THE PROGRAMMES

4.1 The minimum period for completion of the Programme is 2 years (4 semesters) and maximum period for completion of the Programmes is 4 years (8 semesters).

4.2 Each semester normally consists of 90 working days. In any contingent situation, the number of working days per semester shall not be less than 65 days. The Principal is given the discretionary power to decide the number of working days. In such contingencies, the Principal shall ensure that every faculty member imparts instruction as per the number of periods specified in the syllabus and that the faculty teaches the full content of the specified syllabus for the course being taught.

4.3 For the purpose of regulations, the academic year will be divided into two semesters, the odd semester normally spanning from June to November and the even semester from December to May.

4.4 The total duration for completion of the programme reckoned from the commencement of the first semester to which the student was admitted shall not exceed the maximum duration specified in Clause 4.1 irrespective of the period of Break of Study (vide clause 16) or prevention in order that the student may be eligible for the award of the degree (vide clause 14).

4.5 The courses in the curriculum of the Odd semesters will be conducted only in odd

semesters and that of the even semesters only in even semesters

5.0 COURSE REGISTRATION

5.1 Each student, on regular admission shall be assigned to a Faculty Mentor (vide clause 7) who shall advice and counsel the student about the details of the academic programme and the choice of courses considering the student's academic background and career objectives.

5.2 Each student on regular admission has to register courses in the range between 20 to 24 credits, including the courses for which the student has done reappearance registration and supplementary examination.

5.3 A student has to earn the minimum number of 90 Credits specified in the curriculum of the chosen programme of study in order to be eligible to obtain the degree. However, a student can earn more than the number of credits, if he/she wishes. In such case, the highest grades in the relevant category would be considered for CGPA calculation.

5.4 The registration for the courses from II Semesters will commence three days after the declaration of the examination results of the preceding semester. The student shall register for the courses with the guidance of the student's Faculty Mentor. If the student wishes, the student may drop or add courses (vide clause 5.2) within five working days after the commencement of the concerned semester and complete the registration process.

5.5 No course shall be offered by a Department unless a minimum of 8 students register for that course.

5.6 After registering for a course, a student shall attend the classes, satisfy the attendance requirements (vide clause 6), earn Continuous Assessment marks and appear for the Terminal Examinations.

5.7 The student shall register for the Dissertation in the III semester and Thesis in the IV semester.

5.8 Reappearance Registration

5.8.1 If a student fails in a theory course or theory cum studio (skill based) course they shall do reappearance registration for that course in the subsequent semester by retaining the continuous assessment marks already earned.

5.8.2 a) If a student fails in Programme electives or Elective Foundation categories, he/she may register for the same course or any other course in the respective category in the subsequent semesters. If a student registers for other course, he/she has to satisfy all the requirements in Clauses 6 and 9.

b) If a student is prevented to take the Terminal Examination in the form of viva-voce of a Professional Core Course (Studio courses) due to lack of attendance, the student cannot register for the Professional Core Course of the subsequent semester until he/she registers for the course again when offered next, attend the classes & fulfill the attendance requirement as per clause 6.

c) The student who fails in any Professional Core Course (Studio courses), his/her Continuous Assessment Marks is valid for only one subsequent attempt. After one subsequent attempt (clause 11.4.3) the student shall register for the same, when offered next, and repeat the course. In this case, the student shall attend the classes, satisfy the attendance requirements (vide clause 6), earn Continuous Assessment Marks and appear for the Terminal Viva -Voce Examinations. The facility of Reappearance Registration is not available for such courses.

5.8.3 If a student is prevented from taking the Terminal examination of a course (theory / theory cum studio / studio) due to lack of attendance, student has to register for that course again, when offered next, attend the classes and fulfil the attendance requirements as per clause 6.

5.8.4 If the course, in which student has lack of attendance, is a Programme Elective or an Elective Foundation Courses, student may register for same or other Programme Elective or Elective Foundation course respectively in the subsequent semesters.

5.8.5 A student who has already appeared for a course in a semester and passed the examination is not entitled to reappear the same course for improvement of Grade/Marks.

6.0 REQUIREMENTS FOR APPEARING FOR THE TERMINAL EXAMINATION OF A COURSE

6.1 A student who has fulfilled the following conditions shall be deemed to be eligible to appear for the Terminal examination.

- Ideally, every student is expected to attend all the classes and earn 100% attendance. Students who have earned not less than 75% attendance in all the courses taking into account the number of periods required for that course as specified in the curriculum.
- Students who have earned attendance less than 75% will not be permitted to appear for terminal examinations for that course. The student has to register and repeat that particular course in a subsequent semester when it is offered next. However, exemption may be given for the students who earned attendance between 65% and less than 75% in a particular course from the prescribed attendance requirement based on medical leave (hospitalization / accident / specific illness) and On Duty leave for participation in the

College / University / State / National / International level Sports events (Vide clause 6.3) with prior approval from the Principal / competent authority. Such student shall be permitted to apply for Condonation to the Principal through the Head of the Department. After the approval from the principal, the student shall be permitted to appear for the terminal examinations for that course by paying the prescribed fee. However, the students who have represented the college in NCC/NSS/Sports are exempted from the Condonation fee.

- His / her conduct has been satisfactory.

6.2 A student shall be permitted to appear for the terminal examinations only if,

a. he/she satisfies the attendance requirements
b. the student's conduct has been satisfactory
c. He/she has paid the examination fees and registered for the examinations for all the courses of that semester by paying the prescribed examination fees within the due date specified by the Office of the Controller of Examinations. If any student fails to register and pay the examination fees within the due date, he /she shall not be permitted to attend the terminal examinations. However, he/she will be permitted to continue their studies in the next higher semester, provided that the student should satisfy the requirements as stipulated in this clause of this regulations and to write the current semester courses and arrear courses if any, in the next supplementary examination as arrear courses on registration and payment of fees. It will be counted as an attempt for the student.

6.3 The students who are consistently good in academics ONLY be considered for the grant of ODL under co-curricular / extra-curricular activities by the competent authorities. The following activities shall be considered for the award of ODL:

- Sports and Games: TIES, Inter collegiate, Inter Zonal, Inter University, State level, National level and Open Tournaments.
- NCC: Camps and expeditions, NSS camps
- Cultural Programs at State, National and International level
- Seminar / Symposia: Paper presentation / Quiz
- Leadership course organized by other organizations & Alumni Association activities, Association Activities, Placement Activities
- NASA(National Association of Students of Architecture)
- Zonal NASA Conventions.
- Training Programs/internship at Industries and Higher Learning Institutions
- Personal damages incurred during the extra-curricular activities.

- The ODL requisition letter shall be forwarded to the Principal through the Head of the Department of the student by the staff-in-charge of the respective activities before completion of every activity.
- The ODL sanctioned letters shall be submitted to the Department office. The faculty-in-charge of the department office will check the eligibility for the award of attendance at the end of semester and the same may be submitted to the Head of the Department for approval.

6.4 Those students who are not deemed to have completed the semester with reference to the conditions specified above shall undergo the semester again in all the courses in the respective semester during next academic year.

7.0 FACULTY MENTOR

To help the students in planning their courses of study and for general advice on the academic programme, the Head of the Department will assign a faculty member of the Department. He /she shall function as Faculty Advisor for these students throughout their period of study. The faculty advisor shall

- Advise the students in registering and reappearance registering of courses
- Monitor their attendance, academic progress and discipline of the students
- Counsel periodically or during the Faculty Advisor/Tutor/Proctor-ward meeting scheduled in the class time table.
- Inform the students about the various facilities and activities available to enhance the student's curricular and co-curricular activities.
- If necessary, the faculty mentor may also discuss with or inform the parents about the progress of the students through the Head of the Department or in the Parent –Teacher meeting.

8. 0 ACADEMIC COMMITTEES

8. 1 CLASS COMMITTEE

- The objective of the Class Committee is to improve the teaching-learning process. The functions of the class committee include:
- Resolving difficulties experienced by students in the classroom and in the studio/ laboratories.
- Clarifying the regulations of the degree programme and the details of rules therein.
- Discussing the progress of academic schedule and deviations if any.

- Evaluating the performance of the students of the class after each test and finding the ways and means of improvement.
- From I semester onwards, Class committee comprises of all the faculty members who are handling courses in that particular semester and comprising minimum of five student representatives. A chairperson who is a faculty not handling course for that particular semester, nominated by the Head of the Department shall coordinate the activities of this committee.
- The class committee shall be constituted by the Head of the Department/Chief Tutor on the first week of commencement of the semester.
- The class committee shall meet three times in a semester as specified in the academic calendar:
- The Principal/ Dean/ Head of the Department may participate in any class committee of the institution.
- During these meetings, the representative of the class shall meaningfully interact and express the opinions and suggestions of the other students of the class to improve the effectiveness of the teaching-learning process.
- The Chairperson is required to prepare the minutes of the meeting, signed by the members and submit the same to Head of the Department within five working days of the meeting. Head of the Department will in turn consolidate and forward the same to the Principal, within 10 working days of the meeting.
- In each meeting, the action taken report of the previous meeting is to be presented by the Chairperson of the class committee.

8.2 PERFORMANCE ASSESSMENT COMMITTEE

The Performance Assessment Committee comprises of the Head of the Department / Course Coordinators / Course faculty members and Programme Coordinator, nominated by the Head of Department. This committee shall meet to assess the attainment of Course Outcomes and Program Outcomes, progress and status of the students of the semester concerned at the beginning and end of the semesters. The committee can invite Faculty mentors and students as invitees

9.0 SYSTEM OF EXAMINATION:

9.1 M.Arch. Programme consists of Theory Courses, Theory Cum Studio (skill based) Courses and Studio Courses.

Performance in each course of study shall be evaluated based on (i) Continuous Assessments throughout the semester and (ii) Terminal Examination at the end of the semester.

9.1.1 For Theory courses including Programme elective courses and Elective Foundation Courses, out of 100 marks, the maximum marks for Continuous Assessment is 40 and the Terminal Examination will be conducted for 100marks which will be reduced to 60 marks.

9.1.2 For Theory Cum Studio (Skill Based) courses out of 100 marks, the maximum marks for Continuous Assessment is 50 and the Terminal Examination (Viva Voce) will be conducted for 100marks which will be reduced to 50 marks.

9.1.3 For Studio Courses out of 100 marks, the maximum marks for Continuous Assessment is 60 and the Terminal Examination (Viva Voce) will be conducted for 100marks which will be reduced to 40 marks.

The maximum marks assigned to different courses shall be as given in Table 3.

Table 3: Assessment Pattern

S. No	Categorization of courses	Continuous Assessment	Terminal Examinations/Viva	Total marks
1.	Theory Courses	40	60	100
2.	Theory Cum Studio Courses (Skill Based)	50	50	100
3.	Studio Courses, Dissertation and Thesis Project	60	40	100

9.2 Students are prohibited from entering into the Examination Hall / Laboratories with any book or portion of book, manuscript, or paper of any description or Communicating with or copying from each other or communicating with anyone outside the Examination Hall / Laboratories. Programmable calculator and mobile phone shall not be permitted inside the Examination hall / Laboratories. However, any required codebooks and data sheets / books as specified in the question paper will be supplied inside the Examination hall / laboratories by the office of the Controller of Examinations. The students are warned that any form of Malpractice will be dealt with severely. The punishment may be cancelling all the examinations registered by the student in that semester and debarring permanently from all the examinations and disciplinary action will be taken by the college authorities after conducting enquiry.

9.3 Identity card of the college must be produced at the time of terminal examination. Any student fails to produce Identity card / Hall ticket shall be levied a spot fine by the Chief superintendent/ Examiners.

A student can apply for revaluation of his/her semester examination answer paper in theory within three working days from the declaration of results, on payment of a prescribed fee as specified by the Controller of Examinations from time to time. The Controller of Examination will arrange for going through the answer scripts by the students and to make appeals. The reassessment results will be published before the commencement of supplementary examinations. Reassessment is not permitted for Studio Courses, Theory cum Studio (Skill Based) Courses, One credit/ Two credit Courses and Online Courses.

10 PROCEDURE FOR AWARDING MARKS FOR CONTINUOUS ASSESSMENT

10.1 Assessment for Theory Courses

10.1.1 The internal assessment of Theory courses will be carried out in the form of two assessments: written test and Assignments (Individual assignments/tutorials/seminars/mini projects/site study/ field visit report / working model / evaluation report / test report / drawings/construction yard exercises).

Each internal assessment is to be conducted for 100 marks and will have to be distributed in two parts Assignments (Individual assignments /tutorials /seminars /mini projects/site study/ field visit report / working model / evaluation report / test report / drawings/construction yard exercises) and tests with each having a weightage of 40% and 60% respectively.

a. Two internal tests each carrying 60 marks shall be conducted during the semester for Duration of 2 hours. The tests shall be in written mode.

b. Two internal assignments each carrying 40 marks shall be conducted as a part of continuous assessment.

The total marks obtained in all assessments put together out of 200*, shall be proportionately reduced for 40 marks and rounded to the nearest integer (This also implies equal weightage to the two assessments).

*The weighted average shall be converted into 40 marks for internal Assessment.

10.1.2 A student who is absent or has failed in the Terminal Examinations in any theory course is permitted to appear for supplementary examination by retaining the Continuous Assessment already earned in the next two attempts of his/her choice. For further attempts, only the marks earned in the supplementary examination will be considered for passing the course as prescribed in the Scheme of Examinations (Minimum Marks for Pass).

10.2 Assessment for Theory cum Studio (Skill Based) Courses

10.2.1. The internal assessment of Theory cum studio (Skill Based) courses will be carried out in the form of two assessments. Each internal assessment is to be conducted for 100 marks

in the form of assignments (Individual assignments /tutorials /seminars /mini projects /site study/ field visit report / working model / evaluation report / test report / drawings/construction yard exercises etc. for a maximum of 100 marks. The total marks obtained in the assessments will be conducted as internal viva voce. The weightage of first assessment shall be 40% and the second assessment is 60%.

*The weighted average shall be converted into 50 marks and rounded to the nearest integer for internal Assessment.

10.2.2. For the Theory cum studio (Skill Based) courses Terminal Examination shall be conducted in the form of a viva-voce examination at the end of the semester by an internal and external examiner appointed by the Controller of Examination from a panel recommended by the Head of the Department.

10.2.3 A student who is absent or has failed in the Terminal Examinations viva voce in any Theory cum studio (Skill Based) courses is permitted to appear for supplementary examination by retaining the Continuous Assessment already earned in the next two attempts of his/her choice. For further attempts, only the marks earned in the supplementary examination will be considered for passing the course as prescribed in the Scheme of Examinations (Minimum Marks for Pass).

10.3 Assessment for Studio Courses

The Continuous Assessment evaluation for Studio Courses will be carried out for 60 marks for the performance of the candidate in the studio projects throughout the semester. The total marks obtained in the continuous assessments put together shall be reduced to 60 marks and rounded to the nearest integer. The number of projects and evaluation weightage for the studio projects shall be discussed and recommended by the Department Committee constituted by the Head of the Department.

10.4 Assessment for Dissertation

Every candidate shall submit at the end of the II semester a topic approved by a Dissertation review committee, which shall comprise of the Dissertation Coordinator, Supervisor and one External member/Visiting faculty, constituted by the Head of the Department. The dissertation shall be evaluated for 100 marks by the Dissertation review committee, through continuous assessment with a minimum of 4 reviews (including one topic selection review which will not be evaluated) throughout the semester. The total marks obtained in the three assessments put together shall be reduced to 60 marks and rounded to the nearest integer. The External Review member /Visiting faculty will be appointed by the Controller of Examination from a panel recommended by the Head of the Department.

10.5 Assessment for Architectural Thesis

Every candidate shall submit a synopsis at the end of III Semester to be approved by the Department Committee constituted by the Head of the Department. The thesis review committee constituted by the Head of the Department shall comprise of the Coordinator of the Thesis, the Supervisor and one External Review member/Visiting faculty. The Thesis shall be evaluated for 100 marks by the Thesis review committee through continuous assessment with a minimum of 5 reviews (including one topic selection review which will not be evaluated) throughout the semester. The total marks obtained in the five assessments put together shall be reduced to 60 marks and rounded to the nearest integer. The External Review members will be appointed by the Controller of Examination from a panel recommended by the Head of the Department. Terminal Examination shall be conducted in the form of a viva-voce examination at the end of the IV semester by the External Examiners appointed by the Controller of Examination from a panel recommended by the Head of the Department.

10.6 Assessment for Guided Study Course

The syllabus of the course and mode of assessments shall be approved by the Department Committee constituted by the Head of the Department, Academic Council and forwarded to the Controller of Examinations before the commencement of the semester. One Faculty member approved by the Head of the Department shall be responsible for the periodic monitoring and evaluation of the course.

10.7 Revaluation is not permitted for Studio Courses; Skill based Theory cum Studio Courses and One credit / Two credit course Supported Courses.

11.0 ELIGIBILITY FOR PASS IN EACH COURSE

The Passing requirement for a student in a course is determined statistically based on the analysis of the marks obtained both in Continuous Assessment and Terminal Examinations put together.

11.1 Theory Courses

For Theory courses (including Programme Elective and Elective foundation courses) a candidate shall be declared to have passed the examination, if he / she secures minimum of 45 marks out of 100 in the Terminal Examination with a minimum aggregate of 50 marks out of 100 in continuous assessment and Terminal Examination put together.

11.2 Theory cum Studio (Skill Based) Courses

11.2.1 Terminal Examination shall be conducted in the form of a viva-voce examination at the end of the semester by an internal and external examiner appointed by the Controller of Examination from a panel recommended by the Head of the Department for 100 Marks which shall be reduced to 50 Marks.

11.2.2 For Theory cum Studio (Skill Based) courses a candidate shall be declared to have passed the examination, if he / she secures minimum of 45 marks out of 100 in the Terminal Examination (viva voce) with a minimum aggregate of 50 marks out of 100 in continuous assessment and Terminal Examination put together.

11.2.3 If a student fails to secure a pass in a theory cum studio course (Skill Based) the student shall do reappearance registration for the Terminal Examination.

11.3 Dissertation

The Continuous Assessment evaluation for Dissertation will be carried out for 60 marks for the performance of the candidate throughout the semester. The total marks obtained in the assessments put together shall be reduced to 60 marks and rounded to the nearest integer. Terminal Examination shall be conducted in the form of a viva-voce examination at the end of the semester by an internal and external examiner appointed by the Controller of Examination from a panel recommended by the Head of the Department for 100 Marks which shall be reduced to 40 Marks. A candidate shall be declared to have passed the examination if he / she secure an aggregate of 50 marks out of 100 obtained in the Continuous Assessment and Terminal Examination (Viva Voce) put together.

11.4 Studio Courses

11.4.1 For studio courses, a candidate shall be declared to have passed the examination if he / she secure an aggregate of 50 marks out of 100 obtained in the Continuous Assessment and Terminal examination put together. The Terminal Examination (Viva Voce) will be conducted for the portfolio submitted by the candidate.

11.4.2 For Architectural Thesis, a candidate shall be declared to have passed if he / she secure an aggregate of 50 marks of the total of 100 marks in the Continuous Assessment and the Terminal Examination (Viva Voce) put together.

11.4.3 If a student fails to secure a pass in examinations of studio courses, the student shall resubmit portfolio/report within 30 calendar days of publishing of the results. In case the 30th day happens to be a public holiday, the next working day can be considered for the date of submission. The resubmission of the portfolio/report and the subsequent viva-voce

examination will be considered as arrears with payment of exam fee.

11.4.4 In case, a student fails in the resubmission of the portfolio/report and subsequent viva-voce examination, the student shall repeat when the course is offered next, attend classes, secure continuous assessment marks and submit the portfolio/works/sheets as in the case of a regular student as per vide clause 6 and 9.

11.5 Award of Grades

The award of letter grades will be decided using relative grading principle. The performance of a student will be reported using letter grades, each carrying certain points as given in Table 4:

Table 4: Grade Classification

Letter Grade	Grade Point (GP)
O (Outstanding)	10
A + (Excellent)	9
A (Very Good)	8
B + (Good)	7
B (Average)	6
C (Satisfactory)	5
RA (Re-appearance)	0
SA (Shortage of Attendance)	0
W (Withdrawal)	0

A student is deemed to have passed and acquired the corresponding credits in a particular course if he/she obtains any one of the following grades: “O”, “A+”, “A”, “B+”,“B”, “C”.

‘SA’ denotes shortage of attendance (as per clause 6.1) and hence prevented from writing the Terminal examination. ‘SA’ will appear only in the result sheet.

“RA” denotes that the student has failed to pass in that course. “W” denotes withdrawal from the exam for the particular course. The grades RA and W will figure both in the Grade Sheet as well as in the Result Sheet. In both cases, the student has to appear for the Terminal examination as per the Regulations.

If the grade RA or W is given to Theory courses (including Elective Theory Courses) and Theory cum Studio (Skill Based) Courses, it is not required to satisfy the attendance requirements (vide clause 6) but the student has to appear for the Terminal examination and fulfil the norms specified in Clause 14 to earn a pass in the respective courses.

If the grade RA or W is given to Studio Courses, Dissertation and Thesis, the procedure to be followed will be as per Clause 14.

12.0 REQUIREMENTS FOR MOVING TO A HIGHER SEMESTER

12.1 A student of the M.Arch shall move to the higher semester if he/she satisfies Semester completion requirements as per vide clause - 6 and the following conditions.

i. To enroll in II semester 22GA240 - Energy Efficient Building Design, a pass is required in 22GA140 - Public Architecture (Sem I)

ii. To enroll in III semester 22GA320 - Integrated Architectural Design, a pass is required in 22GA240 - Energy Efficient Building Design (Sem II)

iii. To enroll in IV semester 22GA410 - Thesis, a pass is required in 22GA320 - Integrated Architectural Design (Sem III)

13.0 ISSUE OF GRADE CARD

13.1 The consolidated grade card will be issued, through the head of the department, when the student is declared to be eligible for the degree. The consolidated grade card will contain the following information:

(i) The courses for which credits are earned

(ii) Grade obtained in each course

(iii) Cumulative grade point average earned during the course

(iv) Month and year of successful appearance

(v) Course code and title

13.2 Grade Card will be issued at the end of each semester examinations. The Grade Card will contain the following information:

(i) The credits registered and earned in the particular semester

(ii) Grade obtained in each course

(iii) Grade point average earned in the particular semester

(iv) Cumulative grade point average earned until the semester.

(v) Course code and title

14.0 ELIGIBILITY FOR THE AWARD OF DEGREE

A student shall be declared to be eligible for the award of the M.Arch. Degree provided

a. A student seeking M.Arch degree shall be required to undergo the prescribed courses of study and evaluation in the college for the specified duration and to pass all the examinations prescribed therefore.

b. He/ she should register for all the courses prescribed in the curriculum of the respective degree programme fulfill the requirement of credits in each category of credit distribution, pass in all mandatory courses in the curriculum and earn the minimum number of 90

credits.

c. The maximum time limit for the completion of the M.Arch Degree programmes will be 4 (FOUR) years from the date of admission to the first semester of the programme

d. No disciplinary action pending against the student

15.0 CLASSIFICATION OF THE DEGREE AWARDED

15.1. First class with Distinction

A student who qualifies for the award of degree (vide clause 14.0) having passed the examination in all registered courses in his / her first appearance, within THREE years including the authorized Break of Study of One Year, and securing a CGPA of not less than 8.50 shall be declared to have passed in First class with distinction and should not have been prevented from writing Terminal examination due to lack of attendance in any of the courses. The authorized break of study (vide clause 16.0) and withdrawal from the examination (vide clause 17.0) will not be counted as an attempt.

15.2. First Class

A student who qualifies for the award of degree (vide clause 14.0) having passed the examination in all the courses within THREE years including the authorized Break of Study of One Year and securing a CGPA of not less than 6.50 shall be declared to have passed in First class and should not have been prevented from writing Terminal examination due to lack of attendance in any of the courses. The authorized break of study (vide clause 16.0) and withdrawal from the examination (vide clause 17.0) will not be counted as an attempt.

15.3. Second Class

All other students (not covered under clause 15.1 and 15.2) who qualify for the award of degree having passed the examination in all the courses and fulfilling the requirements given in clause 14.0 above shall be declared to have passed in Second Class.

A student who is absent for Terminal examination in a course / Architecture Thesis after having registered for the same shall be considered to have appeared in that (except approved withdrawal from Terminal examination) for the purpose of classification.

16.0 TEMPORARY BREAK OF STUDY FROM A PROGRAMME

16.1. A student is not normally permitted to break the study temporarily. However, if a student intends to temporarily discontinue the programme in the middle for valid reasons (such as accident or hospitalization due to prolonged ill health) and to rejoin the programme, he/she

shall apply in advance to The Principal, through the Head of the Department stating the reasons, in any case, not later than the last lecture day, provided he/she fulfills the requirement in Clause 6.0.

16.2 The student permitted to rejoin the programme after the break shall be governed by the rules and regulations in force at the time of rejoining.

16.3 The duration specified for passing all the courses for the purpose of classification vide Clause 15.1 and 15.2 shall be increased by the period of such break of study permitted.

16.4 The total period for completion of the programme reckoned from the commencement of the first semester to which the student was admitted shall not exceed the maximum period specified in clause 14.0 irrespective of the period of break of study in order that he/she may be eligible for the award of the degree.

16.5 If any student is detained for want of requisite attendance, progress and good conduct, the period spent in that semester shall not be considered as permitted 'Break of Study'.

17. 0 PROVISION FOR WITHDRAWAL FROM THE EXAMINATIONS

17.1 A student will be permitted to withdraw in any one of the semesters except first semester during the entire duration of the degree programme for valid and genuine reasons by making an application in the office of the Controller of Examinations through the Head of the Department for withdrawal at least one day in advance of the last theory examination in that semester. When he / she appear subsequently, he / she have to appear for all the courses of that semester on registration and payment of fees. Subsequent appearance will not be counted as separate attempt.

17.2 Those students who withdraw are eligible for the award of First Class and First Class with Distinction as per the requirement in this regard. However he / she will not be considered for ranking.

17.3 Withdrawal is permitted ONLY ONCE during the entire duration of the degree programme.

17.4. Withdrawal is not permitted to the student who has not satisfied the conditions prescribed in clause 6.0 as requirements for appearing in the Terminal examination.

17.5. Withdrawal is permitted for the Terminal examinations in the final semester only if the period of study the student concerned does not exceed 3 years as per clause 15.1.

18.0 DISCIPLINE

18.1 Every student is required to observe discipline and decorous behavior both inside and outside the college and not to indulge in any activity, which will tend to bring down the prestige of the college. The Principal shall constitute a disciplinary committee to enquire

into acts of indiscipline and notify the institution about the disciplinary action recommended for approval. In case of any serious disciplinary action which leads to suspension or dismissal, then a special committee shall be constituted by the Head of the Institution for taking the final decision.

18.2 If a student indulges in malpractice in any of the Examinations, the student shall be liable for punitive action as prescribed by the College from time to time.

19.0 REVISION OF REGULATIONS AND CURRICULUM

The standing committee/Academic Council of the College reserves the right to revise or change or amend the regulations, the scheme of examinations, the curriculum and the syllabi from time to time if found necessary.

20.0 SPECIAL CASES

In the event of any clarification in the interpretation of the above rules and regulations, they shall be referred to the Standing Committee. The Standing Committee will offer suitable interpretations/ clarifications /amendments required for special case on such references and get them ratified in the next meeting of the Academic Council. The decision of the Academic Council is final.

Annexure: Amendment to M.Arch 2022 Regulation

<table>
<tr><th>Ref. No</th><th>Existing</th><th>To be changed as</th></tr>
<tr><td>3.1 Table 1</td><td>
<table>
<tr><th>S. No</th><th>Category</th><th>Credit Distribution</th></tr>
<tr><td>A.</td><td>Professional Core Courses (PCC)</td><td>62</td></tr>
<tr><td>B</td><td>Compulsory Foundation Courses (CFC)</td><td>22</td></tr>
<tr><td>C.</td><td>Elective Foundation Courses (EFC)</td><td>4-8</td></tr>
<tr><td>D.</td><td>Programme Elective Courses (PE)</td><td>2-4</td></tr>
<tr><td>E.</td><td>Audit Courses (AC) (Not to be included in CGPA) – Mandatory</td><td>-</td></tr>
<tr><td></td><td>Minimum Number of Credits to be earned for the award of the degree</td><td>90</td></tr>
</table>
</td><td>
<table>
<tr><th>S. No</th><th>Category</th><th>Credit Distribution</th></tr>
<tr><td>A.</td><td>Professional Core Courses (PCC)</td><td>58</td></tr>
<tr><td>B</td><td>Compulsory Foundation Courses (CFC)</td><td>21</td></tr>
<tr><td>C.</td><td>Elective Foundation Courses (EFC)</td><td>4-8</td></tr>
<tr><td>D.</td><td>Programme Elective Courses (PE)</td><td>2-4</td></tr>
<tr><td>E.</td><td>Audit Courses (AC) (Not to be included in CGPA) – Mandatory</td><td>-</td></tr>
<tr><td></td><td>Minimum Number of Credits to be earned for the award of the degree</td><td>85</td></tr>
</table>
</td></tr>
<tr><td>5.3</td><td>A student has to earn the minimum number of 90 Credits specified in the curriculum of the chosen programme of study in order to be eligible to obtain the degree. However, a student can earn more than the number of credits, if he/she wishes. In such case, the highest grades in the relevant category would be considered for CGPA calculation.</td><td>A student has to earn the minimum number of 85 Credits specified in the curriculum of the chosen programme of study in order to be eligible to obtain the degree. However, a student can earn more than the number of credits, if he/she wishes. In such case, the highest grades in the relevant category would be considered for CGPA calculation.</td></tr>
<tr><td>14 b</td><td>He/ she should register for all the courses prescribed in the curriculum of the respective degree programme fulfill the requirement of credits in each category of credit distribution, pass in all mandatory courses in the curriculum and earn the minimum number of 90 credits.</td><td>He/ she should register for all the courses prescribed in the curriculum of the respective degree programme fulfill the requirement of credits in each category of credit distribution, pass in all mandatory courses in the curriculum and earn the minimum number of 85 credits.</td></tr>
</table>

THIAGARAJAR COLLEGE OF ENGINEERING

DEPARTMENT OF ARCHITECTURE

VISION

Impart excellence in architectural education and nurture socially responsible professionals.

MISSION

M1. Evolve and inculcate experiential and effective teaching learning processes.

M2. Strive to instill professional ethics and excellence through effective industry-institute collaboration.

M3. Lead and coordinate the profession's involvement in socio-cultural and environment related issues in architecture.

M4. Engage in environmental conscious research and scholarly activities in Architecture and Interdisciplinary fields.

M5. Promote the department into a centre of excellence through inter disciplinary associations and team work.

Programme Educational Objectives (PEO's)

PEO1: Graduates will acquire interdisciplinary interaction in the field of Architecture/City design/ Research

PEO2: Graduates will adopt new interpretation of creativity, new demarcations in the fields of knowledge through rich theoretical pursuits and publications

PEO3: Graduates will develop specialized knowledge and skills in the domain of architecture design, teaching and research with social and environmental consciousness.

PEO- Mission Mapping

PEO	M1	M2	M3	M4	M5
PEO1	M	S	S	S	S
PEO2	M	L	L	S	M
PEO3	S	S	S	S	M

1 – Low; 2 – Medium; 3 – Strong

Program Outcomes (PO's)

PO1: Specialized and Integrative Knowledge: Employ an understanding of the complex interactions between design, environment, social, economic, political and cultural phenomena in historical and contemporary contexts.

PO2: Modalities of Thinking: Research and critically analyze historic and contemporary humanistic conditions related to the built environment in local, regional and global geographies

PO3: Problem solving: Model complex problems in architecture and evaluate a wide range of potential optimal solutions after considering cultural, societal and environmental factors.

PO4: Research skills: Conduct intense literature reviews and appropriate research using state of the art technologies for complex problem in architecture and allied fields.

PO5: Usage of modern tools: Create, select, learn and apply appropriate techniques, resource and modern tools to complex activities.

PO6: Collaborative and multidisciplinary work: Value and integrate interdisciplinary as well as diverse disciplinary approaches in the realm of design.

PO7: Communication: Communicate complex ideas and concepts through a mastery of graphic, verbal, physical and digital means to a wide range of stakeholders.

PO8: Lifelong learning: Recognize the need for, and have the preparation and ability to engage in lifelong learning independently, to improve knowledge and competence continuously.

PO9: Ethical practices and social responsibility: Value the ethics of the profession of architecture and the role of an architect in a society.

PO10: Independent and reflective learning: Observe and examine critically the outcome of one's action and make corrective measures without depending on external feedback.

PEO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
PEO1	L	L	L	M	S	S	S	S	M	S
PEO2	M	M	L	S	S	S	S	S	M	S
PEO3	S	M	S	S	S	M	S	S	S	S

Credit Distribution

S.No	Category	Credit Distribution
A.	Professional Core Courses (PCC)	58
B	Compulsory Foundation Courses (CFC)	21
C.	Elective Foundation Courses (EFC)	4-8
D.	Programme Elective Courses (PE)	2-4
E.	Audit Courses (AC) (Not to be included in CGPA) - Mandatory	-
	Minimum Number of Credits to be earned for the award of the degree	85 (from A to D) and the successful completion of Mandatory Courses

- General electives are courses offered by different departments that do not have any prerequisites and could be of interest to students of any branch.
- All students have to undertake co-curricular and extra-curricular activities that include activities related to NCC, NSS, Sports, Professional Societies, participation in identified activities which promote the growth of Departments and the College.

THIAGARAJAR COLLEGE OF ENGINEERING, MADURAI- 625 015
(A Govt. Aided, Autonomous Institution affiliated to Anna University)
Department of Architecture
(For the candidates admitted from 2022-2023)
Scheduling of Courses

SEM	THEORY			THEORY CUM STUDIO (SKILL BASED)		STUDIO		
	Foundation Courses			Foundation Courses		Professional Core Courses		
I	22GA110 Urban Design Theories (2)			22GA120 Computational Processes Lab (5)	22GA130 Performance Evaluation of Built Environment (5)	22GA140 Public Architecture (12)		24
	THEORY Foundation Courses		Foundation Elective / Programme Elective Courses	THEORY CUM STUDIO (SKILL BASED) Foundation Courses		STUDIO Professional Core Courses		
II	22GA211 Integrated Building Systems (2)	22GA220 Climate Change Adaptation and Resilience (2)	**Credits are to be earned Foundation Elective / Program Elective that could be chosen are as in Annex1 (2)	22GA230 Geographical Information Systems for Built Environment (5)		22GA240 Energy Efficient Building Design (12)		23
III	-	-	**Credits are to be earned Foundation Elective / Program Elective that could be chosen are as in Annex1 (2)	-		22GA310 Dissertation (8)	22GA320 Integrated Architectural Design (10)	20
		Foundation Elective / Programme Elective Courses						
IV	-	-	**Credits are to be earned Foundation Elective / Program Elective that could be chosen are as in Annex1 (2)	-		22GA410 Thesis (16)		18
TOTAL CREDITS								**85**

Program Core Courses+ Compulsory Foundation Courses =58+ 21 =79 credits; ** Elective Foundation Courses + Program Elective = 4 (min) to 8 (max) +2 (min) to 4 (Max) =6 (min) to 12 (max) credits; (Audit Courses will be offered from 2nd semester); **TOTAL CREDITS = 85 CREDITS MINIMUM**

Board of Studies Meeting approved on 05.12.2022

Approved in 64th Academic Council Meeting held on 11.01.2023

THIAGARAJAR COLLEGE OF ENGINEERING, MADURAI- 625 015
(A Govt. Aided, Autonomous Institution affiliated to Anna University)

SUBJECTS OF STUDY

CHOICE BASED CREDIT SYSTEM **Annexure – I**

Degree: M. Arch **Programme: General Architecture**

1. Compulsory Foundation Courses: **Total Credits to be earned: 21**

a. Architecture

S. No	Course Code	Name of the Course	Number of Hours / Week			Credit	Semester/ Pre-Requisite
			L	T	P		
THEORY							
1.	22GA110	Urban Design Theories	2	-	-	2	I SEM ONLY
2.	22GA210	Integrated Building Systems	2	-	-	2	II SEM ONLY
3.	22GA220	Climate Change Adaptation and Resilience	2	-	-	2	II SEM ONLY
THEORY CUM STUDIO							
4.	22GA120	Computational Processes Lab	2	-	3	5	I SEM ONLY
5.	22GA130	Performance Evaluation of Built Environment	2	-	3	5	I SEM ONLY
6.	22GA230	Geographical Information Systems for Built Environment	2	-	3	5	II SEM ONLY

2. Programme Core Courses: **Total Credits to be earned: 56**

S.No	Course Code	Name of the Course	Number of Hours / Week			Credit	Semester/ Pre-Requisite
			L	T	P		
STUDIO							
1.	22GA140	Public Architecture	-	-	12	12	I SEM
2.	22GA240	Energy Efficient Building Design	-	-	12	12	II SEM / [Pass in 22GA140 Public Architecture (I SEM)]
3.	22GA310	Dissertation	-	-	8	8	III SEM
4.	22GA320	Integrated Architectural Design	-	-	10	10	III SEM / [Pass in 22GA240

Board of Studies Meeting approved on 05.12.2022

Approved in 64th Academic Council Meeting held on 11.01.2023

							Energy Efficient Building Design (II SEM)]
5.	22GA410	Thesis	-	-	16	16	IV SEM [Pass in 22GA320 Integrated Architectural Design (III SEM)]

3. Elective Foundation Courses: **Total Credits to be earned: 04**

S. No	Course Code	Name of the Course	Number of Hours / Week			Credit	Semester/ Pre-Requisite
			L	T	P		
THEORY							
1.	22GAFA0	Urban Heritage and Architectural Conservation	2	-	-	2	II SEM AND ABOVE
2.	22GAFC0	Landscape Construction	2	-	-	2	II SEM AND ABOVE
3.	22GAFD0	Architecture and critical Theory	2	-	-	2	II SEM AND ABOVE
4.	22GAFE0	Architecture Pedagogy	2	-	-	2	III SEM AND ABOVE
THEORY CUM STUDIO							
2.	22GAFB0	Zero Energy Mass Customization and Housing	2	-	-	2	II SEM AND ABOVE

4. Program Elective Courses: **Total Credits to be earned: 02**

S. No	Course Code	Name of the Course	Number of Hours / Week			Credit	Semester/ Pre-Requisite
			L	T	P		
THEORY							
1.	22GAPA0	Intellectual Property Rights	2	-	-	2	II SEM AND ABOVE
2.	22GAPB0	Design Research and Field Studies	2	-	-	2	II SEM AND ABOVE
3.	22GAPC0	Disaster Mitigation and Management	2	-	-	2	II SEM AND ABOVE
4.	22GAPD0	Urban Ecology	2	-	-	2	II SEM AND ABOVE

THIAGARAJAR COLLEGE OF ENGINEERING, MADURAI- 625 015

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SCHEME OF EXAMINATIONS
(For the candidates admitted from 2022-2023 onwards)

Annexure – II

Degree: M. Arch **Programme: General**

Architecture

FIRST SEMESTER

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks					Min. Marks for Pass			
				Continuous Assessment* (A)		Terminal Exam (B)		Max. Marks (A + B)	Continuous Assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
				Written test + Assignments	Assignments + Viva voce	Written test	Viva voce			Written test	Viva voce	
THEORY ^												
1	22GA110	Urban Design Theories	3	40	-	60^	-	100	-	45	-	50
THEORY CUM STUDIO (Skill based)												
2	22GA120	Computational Processes Lab	-	-	50	-	50**	100	-	-	45	50
3	22GA130	Performance Evaluation of Built Environment	-	-	50	-	50**	100	-	-	45	50
STUDIO[#]												
4	22GA140	Public Architecture	-	60	-	-	40[#]	100	-	-	-	50

*** Continuous** Assessment Evaluation pattern will differ from subject to subject

^ For Theory courses Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for the award of terminal examination marks.

** **For** Theory cum Studio Courses (Skill based) Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 50 marks for the award of terminal examination marks.

For Studio Courses Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.

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SCHEME OF EXAMINATIONS
(For the candidates admitted from 2022-2023 onwards)

Annexure – II

Degree: M. Arch **Programme: General**

Architecture

SECOND SEMESTER

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks					Min. Marks for Pass			
				Continuous Assessment* (A)		Terminal Exam (B)		Max. Marks (A + B)	Continuous Assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
				Written test + Assignments	Assignments + Viva voce	Written test	Viva voce			Written test	Viva voce	
THEORY ^												
1	22GA211	Integrated Building Systems	3	40	-	60^	-	100	-	45	-	50
2	22GA220	Climate Change Adaptation and Resilience	3	40	-	60^	-	100	-	45	-	50
THEORY CUM STUDIO (Skill based)												
3	22GA230	Geographical Information Systems for Built Environment	-	-	50	-	50**	100	-	-	45	50
STUDIO[#]												
S.NO	Sub. Code	Name of the Subject		Continuous Assessment* (A)		Terminal Exam (B)		Max. Marks (A + B)	Continuous Assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
						Written test	Viva voce			Written test	Viva voce	
4	22GA240	Energy Efficient Building Design	-	60		-	40[#]	100	-	-	-	50

*** Continuous** Assessment Evaluation pattern will differ from subject to subject

^ For Theory courses Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for the award of terminal examination marks.

**** For** Theory cum Studio Courses (Skill based) Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 50 marks for the award of terminal examination marks.

[#] For Studio Courses Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.

THIRD SEMESTER

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks				Min. Marks for Pass			
				Continuous Assessment* (A)	Terminal Exam (B)		Max. Marks (A + B)	Continuous Assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
					Written test	Viva voce			Written test	Viva voce	
STUDIO[#]											
1	22GA310	Dissertation	-	60	-	40[#]	100	-	-	-	50
2	22GA320	Integrated Architectural Design	-	60	-	40[#]	100	-	-	-	50

[#] **For** Studio Courses Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.

FOURTH SEMESTER

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks				Min. Marks for Pass			
				Continuous Assessment* (A)	Terminal Exam (B)		Max. Marks (A + B)	Continuous Assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
					Written test	Viva voce			Written test	Viva voce	
STUDIO[#]											
1	22GA410	Thesis	-	60	-	40[#]	100	-	-	-	50

[#] **For** Studio Courses Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.

ELECTIVE FOUNDATION COURSES

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks				Min. Marks for Pass			
				Continuous assessment* (A)	Terminal Exam (B)		Max. Marks (A + B)	Continuous assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
					Written test	Viva voce			Written test	Viva voce	
THEORY ^											
1.	22GAFA0	Urban Heritage and Architectural Conservation	3	40	60^	-	100	-	45	-	50
2.	22GAFC0	Landscape Construction	3	40	60^	-	100	-	45	-	50
3.	22GAFD0	Architecture and critical Theory	3	40	60^	-	100	-	45	-	50
4.	22GAFE0	Architecture Pedagogy	3	40	60^	-	100	-	45	-	50

*** Continuous** Assessment Evaluation pattern will differ from subject to subject

^ For Theory courses Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for the award of terminal examination marks.

ELECTIVE FOUNDATION COURSES

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks						Min. Marks for Pass			
				Continuous assessment* (A)			Terminal Exam (B)		Max. Marks (A + B)	Continuous assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
				Written test & Assignments	Written test & Assignments + Viva voce	Assignments + Viva voce	Written test	Viva voce			Written test	Viva voce	
THEORY CUM STUDIO (Skill based) **													
1.	22GAFB0	Zero Energy Mass Customization and Housing	**-**	**-**	**-**	**50**	**-**	**50****	**100**	**-**	**-**	**45**	**50**

*** Continuous** Assessment Evaluation pattern will differ from subject to subject

**** For** Theory cum Studio Courses (Skill based) Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 50 marks for the award of terminal examination marks.

PROGRAM ELECTIVE COURSES

S.NO	Sub. Code	Name of the Subject	Duration of Terminal Exam. [in Hours]	Max. Marks				Min. Marks for Pass			
				Continuous assessment* (A)	Terminal Exam (B)		Max. Marks (A + B)	Continuous assessment (A)	Terminal Exam (B) (100 Marks)		Total (A + B)
					Written test	Viva voce			Written test	Viva voce	
THEORY ^											
1.	22GAPA0	Intellectual Property Rights	3	40	60^	-	100	-	45	-	50
2.	22GAPB0	Design Research and Field Studies	3	40	60^	-	100	-	45	-	50
3.	22GAPC0	Disaster Mitigation and Management	3	40	60^	-	100	-	45	-	50
4.	22GAPD0	Urban Ecology	3	40	60^	-	100	-	45	-	50

*** Continuous** Assessment Evaluation pattern will differ from subject to subject

^ For Theory courses Terminal Examination will be conducted for maximum marks of 100 and subsequently be reduced to 60 marks for the award of terminal examination mark

22GA110	URBAN DESIGN THEORIES	Category	L	T	P	Credit
		CFC	2	0	0	2

Preamble

The course introduces students to the theories of urban design that are composed with the goal of making urban environments equitable, beautiful, functional and sustainable. This course emphasizes the importance of critically analyzing urban design texts and develops an opinion about urban developments that are sustainable& responsive to the subject's need, growth and change in time.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course, students will be able to

COs	Course Outcome Statement	Weightage in %
CO1	Acquire knowledge of the urban design domain, its scale, scope and objectives	10% (Understand)
CO2	Detailed knowledge of theories and concepts about the subjects and objects of Urban design	10% (Understand)
CO3	Critically examine the methodologies employed in the formulation of Urban design theories	20% (Apply)
CO4	Compare urban design theories to bring out their practicality in addressing the futuristic needs.	20% (Apply)
CO5	Develop individual's opinion of sustainable urban development	20% (Apply)
CO6	Discover research skills and tools to enhance knowledge in the field of urban design in innovative ways	20% (Apply)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-			-
Understand	20	20	40	40	20
Apply	80	40	60	60	80

Syllabus

INTRODUCTION TO URBAN DESIGN: Scope and Objectives of Urban Design – Tangible and intangible factors of urban design – Definition of Theory and its importance to practice, Basic Human Needs – Jon Lang - Categorization of urban design theories - Senses, Socialistic and Technological – Place theory, Linkage Theory and Figure Ground, Descriptive and Normative theories. - Urban Scale: Micro, Meso and Macro scale – Privacy, Territoriality and Proxemics – Intimate, Urbane and Monumental -Place making. THEORIES ABOUT THE SUBJECTS WITHIN URBAN DESIGN : Knowledge of the subjects of Urban Design - Theories of composition of mass and space– how to represent physical forms - Collage City by Colin Rowe; Theories about visual aspects of public spaces - Townscape by Gordon Cullen;Theories of the image of the city - The Image of the City by Kevin A Lynch; Theories of safety - Safe Cities by Gerda R Wekerle; Theories to evoke social interaction - The Social Life Of Small Urban Spaces by William H Whyte; Theories to enhance identity, studying history and the meaning of cities - Urban open space by Helen Woolley ; Celebrating Public Spaces of India by Anshuman Gupta and Archana Gupta; A Place in the Shade/ The New landscape by Charles Correa. THEORIES ABOUT THE OBJECT OF URBAN DESIGN :Understanding of the objects of Urban Design –Comprehensive view of what urban design object is about (descriptive emphasis):Christopher Alexander's Patterns Language – Improvement of the object of urban design (prescriptive emphasis): Walkable Cities by Jeff Speck THEORIES ABOUT THE KNOWLEDGE :Review of the Knowledge of Urban Design : Design with Nature by Ian L McHarg; Types of Urban design - Overall design; All - of- a piece Urban design; Urban Infrastructure design, Urban Guidelines - Urban Design by Jon Lang; SUSTAINABLE INTEGRATED URBAN DESIGN: Methodology and Framework for a sustainable urban planning and design; Sustainable

Urbanism ; Circles of Sustainability-New tools for sustainable integrated urban Design; Sustainable Urban Design – The Indian Scenario.

Learning Resources

1. A typology of Urban Design theories and its application to the shared body of knowledge.HoomanForoughmandAraabi, URBAN DESIGN International volume
2. Colin, Rowe (1978). Collage City. The MIT Press
3. Werkele, Gerda R (1995). Safe Cities. Van Nostrand Reinhold, Cullen, Gordon (1961). Townscape. John Wiley & Sons
4. Lynch, Kevin A (1960). The Image of the City. The MIT Press
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8. Charles Correa (2010). A Place in the Shade. Penguin Books
9. Lynch, Kevin A (1981). A theory of Good City Form. The MIT Press
10. Speck, Jeff(2012), Walkable City: How Downtown Can Save America, One Step at a time. Farrar, Straus and Giroux
11. Alexander, Christopher (1977). A Pattern Language. Oxford University Press.
12. Lang, Jon (2005). *Urban design* : a typology of procedures and products. Publisher: Oxford ; Burlington, MA
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Reference reading

1. Sitte, Camillo(1989). City Planning According to Artistic Principles, London: Pheidon Press
2. Cullen, Gordon (1961). Townscape. John Wiley & Sons
3. Jacobs, Jane (1961). The Death and Life of Great American Cities. Random House, New York
4. Gehl, Jan (2011). Life Between Buildings. Island Press
5. Krier, Rob (1993). Urban Space. Academy Editions.
6. Tibbalds, Francis (2012). Making People - Friendly Towns. Taylor & Francis.
7. LefebvreHenri (1968). Right to the City. Library of Congress Cataloging
8. Calthorpe's, Peter (2002). Urban Network concept.

Course Designers

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22GA120	COMPUTATIONAL PROCESSES LAB	Category	L	T	P	Credit
		CFC	2	0	3	5

Preamble

Computational Processes in Architectural Design introduces the students to contemporary methodologies of computational design concepts combining mathematical geometry logics with visual scripting. The module aligns with the notion of rule-based computer-generated geometries for sequence transformations and exploits the power of algorithms to generate parametric models. The module also deals with simulation in design which is not merely a predictive analytical tool but can also be used to model complex relationships and observe their interactions as means of experimenting with ideas and generating forms through visual scripting.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

CO Number	Course Outcome Statement	Weightage*** in %
CO1	Relate conceptual knowledge and skills; for visual programming and computational design thinking.	10% (Understand)
CO2	Demonstrate parametric modeling skills on spatial, curve and surface geometries.	20% (Apply)
CO3	Compute algorithms; for contemporary computational concepts and optimization objectives.	15% (Apply)
CO4	Demonstrate proficiency in material elasticity and dynamic simulations.	15% (Apply)
CO5	Demonstrate skill in multifaceted mesh geometry simulations.	15% (Apply)
CO6	Demonstrate ability in exploration of form finding processes through experiments involving materials and physics.	25% (Apply)

*** Weightage depends on Bloom's Level and number of contact hours.

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment			Terminal Examination
	1	2	1	2	3	
Remember	-	-	-	-	-	-
Understand	-	-	10	10	10	10
Apply	-	-	90	90	90	90

Syllabus

INTRODUCTION TO COMPUTATIONAL DESIGN THINKING - Introduction to Digital Architecture – Origins - Philosophical change - Proto-Parametrics - Cybernetic revolution - Early Digital Exploration and Advancement in digital technologies -Computer Aided Design - Navigation - Viewports - Mouse Controls - Menu - Toolbars - Panels - Rhino Objects, Creating Geometry - Selecting Geometry - Modeling Aids - Snaps and Gumballs - Visual Programming - Interface - Components - Wire Conduits - Navigation - Component Palettes - Parameters and Data Primitives - Associative Modeling - Integer Ranges - Range Transformations - Symbolic Expressions - Procedural Geometry - Epicyclic Curves - Shape Replications - Cross Linking and Visual Attributes. **PARAMETRIC GEOMETRICS -** Spatial Geometry - Points and Vectors - Point Semantics - Vector Semantics - Relationships between Points and Vectors - Basic Vector Arithmetic - Scaling - Vector Inversion - Point Average - Points on Line - Points on Plane - Point Distance - Vector Length - Normalization - Spatial Operations - Dot Product - Trigonometry - Projection - Closest Point to Line - Directionality and Containment - Cross Product - Orthogonality - Parallelism - Orthonormalization - Closest Point to Plane and Mapping - Curve Geometry - Points on Curves - Curve Domains - Curve Divisions - Distance Division - Index Visualization - Range Indexing - Target along Curves - Normal along Curves and Frames along Curves - Surface Geometry - Point Evaluation - Tangent Plane - Surface Normal - Surface Frames - Surface Curvatures - Surface Divisions and Surface Closest Point - Parametric Modeling - Spline Geometry - rotating about Spline - Rotating Frame Points - Centerline Geometry - Diagonal

Bracing - Dress-up Geometry - Shaping - Measuring Design Performance and Design Space Exploration. **COMPUTATIONAL PROCESSES -** Computational algorithm - Shape Grammar - Sierpinski Triangle - Fractals - Koch Snowflake and Cellular Automata - Optimization algorithm– Genetic Algorithm - Generative Design and Topology Optimization. **SIMULATED DESIGN -** Space and Time - Persistent Data Storage - Retrieval - Updating Clock - Incrementing Clock - Resetting Logic - Clock Packaging - Geometry Binding and Animation Sequence - Modeling Entities - Serialization - Packing and Unpacking Logics - Simulation Controller - Physics Logic - Force Analysis - State Integration - Penalty Constraints and Visualization - Multibody Dynamics - Forces as Relationships - 2-Body Setup - N-Body Simulation and Bounding the Universe - Material Elasticity - Single Spring - Undamped Spring - Damped Spring - Cables - Chains - Spring Force Revisited and Complete Graphs. **FORM FINDING** - Mesh Geometry - Single Triangle - Single Quad - Mixing Faces - Fused Cube - Index Patterns - Index Ordering - Procedural Meshes - Conic Surfaces - Loft Surfaces - Meshing Surfaces - Curvature Mapping - Color Coding - Mesh Normal - Mesh Lighting - Mesh Displacement - Vertex Welding - Mesh Morphing - Mesh Subdivision - Tetrahedron Mesh - Mesh Disassembly - Mesh Assembly - Mid-Point Subdivision - Recursive Application and Molecule Transform -Part 1 - Relations Design - Edge Topology - Compression Vaults - Model Setup - Force Analysis - Visualization - Minimal Surfaces - Mesh Preparation and Visual Anchor Definition - Part 2 - Soap Films - Topology Extended - Vertex Normal - Pressure Force - Alternative Anchoring and Mesh Relaxation.

Learning Resources

1. Computational Design; Neil Leach and Philip F. Yuan; Tongji University Press (21 February 2018).
2. Computational Design Thinking: Computation Design Thinking (AD Reader); Wiley; 1st edition (30 September 2011).
3. Digital Fabrication; Neil Leach and Philip F. Yuan; Tongji University Press (20 February 2018).
4. Computational Design: Technology, Cognition and Environments; Rongrong Yu, Ning Gu, Michael J. Ostwald; CRC Press.
5. AAD Algorithms-Aided Design; Arturo Tedeschi; Le Penseur; 14th edition (1 October 2014).
6. Post-parametric Automation in Design and Construction; Alfredo Andia, Thomas Spiegelhalter; Artech House; Illustrated edition (November 16, 2014).
7. Material Computation: Higher Integration in Morphogenetic Design: 216; Academy Press; 1st edition (2 March 2012).
8. Parametric architecture with Grasshopper; Arturo Tedeschi.

Course Designers

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22GA130	PERFORMANCE EVALUATION OF BUILT ENVIRONMENT	Category	L	T	P	Credit
		CFC	2	-	3	5

Preamble

The course introduces the students about the fundamentals of energy and resource optimization measures in building design and construction projects using different energy simulation tools. It aims to teach practical skills to deploy resource efficiency and optimization in building design offering unique content with real life case studies and examples. This course helps to identify opportunities for reducing energy consumption by improving the building fabric and building services. It provides exposure to environmental performances and analysis based on climatic data models and data structure.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

CO Number	Course Outcome Statement	Weightage*** in %
CO1	Develop critical thinking skills, quantitative skills, and design approaches	**Understand** 10
CO2	Comprehend various climatic factors and their influence in building design	**Understand** 10
CO3	Gain knowledge on various tools and techniques based on climatic data models and data structure.	**Understand** 10
CO4	Quantify the impact of design strategies on energy, water and material consumption using the building simulation software	**Apply** 30
CO5	Analyze appropriate design elements, strategies, form for achieving thermal comfort in Buildings	**Analyze** 20
CO6	Examine improvement measures and their relative cost-benefit implications	**Analyze** 20

*** Weightage depends on Bloom's Level, number of contact hours,

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment			Terminal Examination
	1	2	1	2	3	
Remember	-	-	-			-
Understand	-	-	30	30	30	30
Apply	-	-	30	30	30	30
Analyze	-	-	40	40	40	40

Syllabus

ENVIRONMENTAL FACTORS - Environmental impacts of buildings - Resource optimization measures – Energy, Water and Materials use in buildings - concepts of resource efficiency - opportunities in different building sectors. **SIMULATION AND PERFORMANCE ANALYSIS TOOL** - Introduction to Simulation Software, an environmental prediction software package in architecture - to study the simple and intuitive 3D modeling interface and to explore the range of analysis functions. **FORM, SKIN AND CLIMATE** -Fundamentals of climate - climate control strategies based on climate types - bioclimatic classification - Net Zero Carbon Building - concept of carbon offsets - Fundamentals of building physics - heat transfer and heat storage capacity - Passive design strategies - passive heating /cooling concepts to manage heat transfer - impact of orientation, zoning, insulation, and vernacular considerations - design strategies for thermal comfort - Solar shadow modeling tools, heat flow analysis, sizing of passive solar features, Thermal comfort indices - Conduct a basic sensitivity analysis using building simulation software. **HVAC AND CONTROLS** - Systems for ventilation, cooling, heating and hot water - energy use in buildings - temperature control and climate appropriateness -Energy efficient best practices - benefits of natural air ventilation and ceiling fans - various active cooling and ventilation system types and their efficiency characteristics - Energy efficient best practices - various heating and hot water system types and their efficiency characteristics – energy - efficient design elements in various building types. Case studies; modeling of ventilation, Conduct a basic sensitivity analysis using building simulation software. **LIGHTING AND RENEWABLE ENERGY SOURCES -** Daylighting - good daylighting and associated heat gain and loss - Efficiency lighting system and controls - concept of controls such as timers, occupancy sensors, daylight sensors and photoelectric controls - Renewable energy sources - Renewable technologies such as photovoltaic panels - different solar photovoltaic types and their efficiency - Case studies; light simulation tools, Conduct a basic sensitivity analysis using building simulation software. **WATER AND MATERIALS -** Water efficiency - breakdown of water end-uses - fixture efficiency, water recycling, and rainwater

harvesting - Carbon intensity of construction materials - relationship between material elements and embodied energy - quantity, optimization of technology substitute materials with low embodied energy - building's carbon footprint – life cycle energy analysis - Case studies; Conduct a basic sensitivity analysis using building simulation software. **APPLICATIONS IN DESIGN -** Generate and analyze climate data for any geographic location, predict microclimatic conditions on urban sites, Details of building energy survey – building information, building physical data, building envelope construction details, perform shading, day lighting, airflow, heating and cooling simulation studies, predict indoor temperatures and other environmental conditions, control systems and operating schedules, calculate energy requirements and assess environmental impact and life costs of buildings. **POST OCCUPANCY EVALUATION -** Assessing existing buildings on their energy use, environmental impact and occupant satisfaction. Building performance bench marks, rating and comparison of buildings. Techniques, methods and procedures of Post Occupancy Evaluation.

References

1. Garg H P., Prakesh J., Solar Energy: Fundamentals & Applications, Tata McGraw Hill, 2000.
2. Duffie, J.A. and Beckman, W.A., Solar Engineering of Thermal Processes, John Wiley, 1991.
3. Alan L Fahrenbruch and Richard H Bube, Fundamentals of Solar Cells: PV Solar Energy Conversion, Academic Press, 1983
4. Autodesk Ecotect Analysis 2010 Bible.

Course Designers:

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22GA140	PUBLIC ARCHITECTURE	Category	L	T	P	Credit
		PCC	-	-	12	12

Preamble

This studio focuses on the integration of sustainable technologies into the design of a public space. The student will explore this integration at various scales, and will focus on materiality, people's behaviour, innovative sustainable approaches, etc. The students are assigned to develop complex urban design and architectural projects, by critically reflecting and integrating relevant design criteria such as heritage, mobility, public space, landscape, urban structure, morphology, density, scale, building typology, materiality, program, and phased development.

Prerequisite

NIL

Course Outcomes

On the successful completion of the course students will be able to

CO Number	Course Outcome Statement	Weightage*** in %
CO1	Acquire knowledge on the syntax for public spaces that are self-sustaining.	10% Understand
CO2	Predict the context related to public architecture and to explore solutions based on real world problems.	10% Analyze
CO3	Interpret the concepts of spatial efficiency and experience of public spaces.	10% Evaluate
CO4	Empathize with the study of public spaces and its application in the context of sustainable public space design.	20% Analyze
CO5	Synthesize the acquired knowledge into a design process and details through environmental policies and public space making.	40% Create
CO6	Communicate the design ideas and prepare design documentation of a self-sustained public space.	10% Apply

List of Experiments/Activities with CO Mapping

Phases	Deliverables	Marks	Course Outcomes
Continuous Assessment			
Review 1	Deliverables as per the studio requirement	100*	CO1, CO2, CO6
Review 2		100*	CO1, CO2, CO3, CO4 & CO6
Review 3		100*	CO2, CO3, CO4, CO5 & CO6
Review 4		100*	CO2, CO3, CO4, CO5 & CO6
*During the course of the semester, four reviews will be conducted. Each review will be evaluated for 100 marks and subsequently be reduced to 60 marks for the award of Continuous Assessment marks based on Rubrics.			
Terminal Examination			
Viva-Voce	Sheets & models	100*	CO1, CO2, CO3, CO4, CO5, & CO6
*Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.			

Syllabus

Public spaces are an integral part of the culture of cities, often shaping a city's image and identity. Public spaces are proposed to develop projects of open and symbolic places in which the community can recognize itself. The intention of the studio will be to explore urban morphology, form and visual approaches to public space, through impacting factors such as climate, economy, politics, regional aspirations, health, safety, welfare, gender equality, inclusivity, etc. Each of the focus areas mentioned above could be a focus of the design studio.

Examples :

1. Youth Spaces; Children and Playgrounds; Healthy Public Spaces
2. Plazas and Civic Spaces – regional Aspirations and Power
3. Women and Public Spaces – Gender equality and Inclusivity
4. Changing Neighborhoods and Changing Expectations
5. "Third Spaces", Markets - Inclusivity
6. Privatization and Threats to Public Space - welfare, and inclusivity
7. Smart infrastructure – technology and the city

Learning Resources

1. Ian Bentley ed. Responsive environments: a manual for designers. Oxford: The Architectural Press, 1988

2. Gosling and Maitland, Urban Design, New York: St. Martin's Press, 1989
3. Correa, Charles. Housing and Urbanization, London: Thames & Hudson, 1999
4. Gehl, Jan. Life between Buildings: Using Public space. Washington, DC.: Island Press, 2011
5. Whyte, William. The Social Life of Small Urban Spaces. Project for Public Spaces, 2001
6. Lynch, Kevin. The Image of the City. Cambridge: MIT PRESS, 1960. 13
7. Anthony M. Oram and Zachary P. Neal,(eds.) Common Ground: Readings and Reflections on Public Space. Routledge, Taylor and Francis, New York, 2010.
8. Broadbent, Geoffrey. Emerging Concepts in Urban Space Design. Abingdon: Taylor & Francis, 2003.
9. Norberg- Schulz, Christian. Towards a Phenomenology of Architecture. New York: Rizzoli, 1980
10. Watson, Donald et.al. Time Saver Standards for Urban Design. New York: McGraw-Hill Education, 2003
11. A.Goldsmith, Stephen. What We See: Advancing the Observations of Jane Jacobs. New York: New York University Press, 2010
12. Haas, T., and Mehaffy, M. (2018). The future of public space. Urban Design International
13. Kohn, M. (2004). Brave New Neighborhoods: The privatization of public space. New York: Routledge.
14. Project for Public Spaces (no date). Placemaking: What if we built our cities around places? New York: Project for Public Spaces.
15. Roberts, J. (2012). "How to build a better block." TEDx Talk University of Austin:https://www.youtube.com/watch?v=8HTkBTnZ9D4

Course Designers:

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22GA211	INTEGRATED BUILDING SYSTEMS	Category	L	T	P	Credit
		CFC	2	0	0	2

Preamble

To achieve the desired functional purpose of any building efficiently, it is important to integrate all the required building services with the building systems. This course aims to emphasize the importance of building services integrated to the building structural components. The students will have a brief introduction to the latest technologies for integrated building systems and services.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course, students will be able to

COs	Course Outcome Statement	Weightage in %
CO1	Recognize the need, benefits and trends of integrated building systems.	Understand (10%)
CO2	Describe the different modes of integration (physical - visual - performance) of building systems and the design implications	Understand (20%)
CO3	Discuss the various elements within the three modes of integration of building systems	Understand (20%)
CO4	Demonstrate the integration process through case examples in Office buildings	Apply (20%)
CO5	Demonstrate the integration process through case examples in Hi-Tech buildings	Apply (20%)
CO6	Outline Building Automation Systems (BAS), its components and interface.	Understand (10%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Understand	60	60	60	60	60
Apply	40	40	40	40	40
Analyze	-	-	-	-	-
Evaluate	-	-	-	-	-

Syllabus

IDEA OF INTEGRATION: Integrated buildings: design, technology and integration - Integration among various building systems – Trends linking integrated systems and design – Benefits of integrated building systems. INTEGRATED BUILDING SYSTEMS AND ARCHITECTURE: – Modes of Integration: Physical (shared space) - Visual (shared image) - Performance (shared function) - Integration of elements: Site, Structural, Envelope, Mechanical, Interior. INTEGRATION IN OFFICE BUILDINGS: General overview and the need for integrating building systems - Case Example: Willis Faber Dumas Insurance Company Headquarters - Brief, Climate, Issues identified - Mode of Integration: Site, Structure, Envelope, Mechanical and Interior - Technical

Integration through Visual, Physical and Performance - Additional Case Examples: John Deere Headquarters, Briarcliff House; Lockheed Building. EXCERCISE: Research on building integration in office or other building typologies relevant to the concurrent design studio. INTEGRATION IN HI-TECH BUILDINGS: General overview and the need for integrating building systems - Case Example: Lloyd's of London Insurance Building - Brief, Climate, Issues identified - Mode of Integration: Site, Structure, Envelope, Mechanical and Interior - Technical Integration through Visual, Physical and Performance - Additional Case Examples: Centre Georges Pompidou, Sainsbury Centre for Visual Arts; Lloyd's of London; Hong Kong and Shanghai Bank. EXCERCISE: Research on building integration in Hi-Tech buildings relevant to the concurrent design studio. BUILDING AUTOMATION AND MANAGEMENT: Interfaces and components of Building Automation Systems - application in Intelligent Buildings especially for HVAC, Electrical, Fire, Vertical Transportation, safety and security systems and energy management and design. EXCERCISE: Research on various intelligent building systems and its application in current building practices.

(Note for reference: Architectural works of David Guise, Carl Bovil, and Richard Rush. Architect / engineers whose individual design work and architectural collaborations qualify as purely integrative: Luigi Nervi, Felix Candela, Frei Otto, and Peter Rice)

Learning Resources

1. Leonard R. Bachman, 'Integrated Buildings: The systems basis of architecture', John Willey and Sons, 2003. online access through archive.org: https://archive.org/details/Integrated_Buildings_The_Systems_Basis_of_Architecture/mode/1up?view=theater
2. Klaus Daniels, Elizabeth Schwaiger, 'Advanced building systems : a technical guide for architects and engineers', Birkhäuser, Basel, 2003
3. Richard D. Rush, 'The Building Systems Integration Handbook', Butterworth-Heinemann Ltd, 1991
4. HenrikMissen, "Industrialized Building and Modular Design", C & CA K, 1972.
5. Directory of Indian Building Materials Products Building materials and Technology Promotion Council and Centre for Symbiosis of Technology, Environment Management, Bangalore, 2000-2001.
6. Building control Systems by Vaughn Bradshaw, John Wiley & Sons; 2nd Edition (26 October 1993)

Course Contents and Lecture Schedule

Module No.	Topic	No. of Hours	Course Outcome
1.	**IDEA OF INTEGRATION**	**2**	
1.1	Integrated buildings: design, technology and integration - Integration among various building systems	1	CO1
1.2	Trends linking integrated systems and design – Benefits of integrated building systems	1	CO1
2	**INTEGRATED BUILDING SYSTEMS AND ARCHITECTURE**	**4**	
2.1	Modes of Integration: Physical (shared space) - Visual (shared image) - Performance (shared function)	2	CO2
2.2	Integration of elements: Site, Structural, Envelope, Mechanical, Interior.	2	CO3
3	**INTEGRATION IN OFFICE BUILDINGS**	**10**	
3.1	General overview and the need for integrating building systems	2	CO4
3.2	Case Example: Willis Faber Dumas Insurance Company Headquarters - Brief, Climate, Issues identified	4	CO4
3.3	Mode of Integration: Site, Structure, Envelope, Mechanical and Interior - Technical Integration through Visual, Physical and	4	CO4

	Performance. **EXCERCISE:** Research on building integration in office or other building typologies relevant to the concurrent design studio.		
4	**INTEGRATION IN HI-TECH BUILDINGS**	**10**	
4.1	General overview and the need for integrating building systems	2	CO5
4.2	Case Example: Lloyd's of London Insurance Building - Brief, Climate, Issues identified	4	CO5
4.3	Mode of Integration: Site, Structure, Envelope, Mechanical and Interior - Technical Integration through Visual, Physical and Performance Additional Case Examples: Centre Georges Pompidou, Sainsbury Centre for Visual Arts; Lloyd's of London; Hong Kong and Shanghai Bank. **EXCERCISE:** Research on building integration in Hi-Tech buildings relevant to the concurrent design studio.	4	CO5
5	**BUILDING AUTOMATION AND MANAGEMENT**	**4**	
5.1	Interfaces and components of Building Automation Systems	2	CO6
5.2	Application in Intelligent Buildings especially for HVAC, Electrical, Fire, Vertical Transportation, safety and security systems and energy management and design. **EXCERCISE:** Research on various intelligent building systems and its application in current building practices.	2	CO6
	TOTAL NUMBER OF HOURS	**30**	

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22GA220	CLIMATE CHANGE ADAPTATION AND RESILIENCE	Category	L	T	P	Credit
		CFC	2	0	0	2

Preamble

The course deals with the fundamentals of climate change. This course also provides a broad spectrum in the international climate change legal and policy framework and explains key issues. It describes the role of adaptation and provides a rationale for climate change mitigation and propose actions in key sectors. It outlines the basic strategies of planning process for a resilient city.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

CO Number	Course Outcome Statement	Weightage*** in %
CO1	Describe the basic concepts of climate change.	Understand (10%)
CO2	Identify projected trends and impacts in climate change	Understand (10%)
CO3	Summarize the role and provision of the organizations working on mitigation of climate change effects.	Understand (20%)
CO4	Explain the main elements of a recognized climate change planning methodology for building a resilient city.	Understand (20%)
CO5	Apply the acquired knowledge to derive the parameters for assessing vulnerability of a study area with respect to climate change impact.	Apply (20%)
CO6	Illustrate the adaptation and mitigation strategies in creating resilient build form associated with climate change.	Apply (20%)

*** Weightage depends on Bloom's Level, number of contact hours,

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	100	60	60	60	60
Apply	-	40	40	40	40

Syllabus

Introduction to Climate Change Science: Overview of key concepts such as climate, weather and the greenhouse gas effect, carbon stocks and flow - the human contribution to climate change - changes in the climate since the industrial revolution - projected future trends and impacts of climate change on surface temperature, precipitation, ocean pH, sea-level rises, Arctic sea-ice extent and impact on buildings, Effects on Humans - sources of scientific climate information, relevant programmes and institutions at global and local scale. **International Legal and Policy Framework for Climate Change:** Outline of the international legal and policy framework - key issues under negotiation - history of international climate change negotiations and the United Nations Framework Convention on Climate Change (UNFCCC) - key provisions of the UNFCCC - organizational structure, and different Party groups under the Convention - the Kyoto Protocol and its associated bodies, Paris Agreement, Key outcome from COP26 - overview of Negotiation Streams - key issues relevant for a future climate change regime. **Climate Change Risk and Vulnerability Assessments:** Challenges of urbanization and urban management - Urban disaster risk - Urban vulnerability - Increasing urban disaster risk and vulnerability - Outline key elements of a vulnerability assessments - Vulnerability indicators - Approaches and scope of vulnerability assessment. **Climate Change Adaptation and Mitigation:** Introduction to Climate Change Adaptation - adaptation measures that can be implemented for various vulnerable sectors - introduction to linkages between climate change adaptation and development - international adaptation initiatives and programmes with case studies. Introduction to Climate change Mitigation and Low carbon development - Strategic Frameworks and Policy Approaches for Mitigation and Low Carbon Development - International Initiatives to Support Climate Change Mitigation with case studies. **Climate-Resilience: Towards Sustainable Development:** Introduction to Climate-Resilience, Circles of Sustainability – its subcomponents and interdependencies. Links between Sustainable Development and Climate-resilience. Contributions to Resilience through Climate Change Responses - Integrating Climate Change Adaptation and Mitigation for Sustainable

Risk Management - Implications for Current Sustainable Development Strategies. Exercise 1a: Derive the parameters for assessing vulnerability of a study area with respect to climate change impact. **Exercise 1b:** Based on the vulnerability parameters identified on the context – Develop a diagram based on the circles of sustainability.

Learning Resources

1. Devesh Sharma, K C Sharma, Climate Change and Environment: Concepts and Strategies to Mitigate Impacts, 2016
2. Karen O'Brien, Elin Selboe, The Adaptive Challenge of Climate Change, 2018
3. Wayne Ganpat, Wendy-Ann Isaac, Environmental Sustainability and Climate Change Adaptation Strategies (Advances in Environmental Engineering and Green Technologies), 2019
4. Anton Cartwright, Susan Parnell, Gregg Oelofse, Sarah Ward, Climate Change at the City Scale: Impacts, Mitigation and Adaptation in Cape Town, 2012
5. Mark Pelling, Adaptation to climate change: from resilience to transformation, 2010
6. Reid, Hannah, Climate change and human development, 2014
7. Introductory e-Course on Climate Change – UN CC

Online Learning Resources

1. https://www.ipcc.ch/site/assets/uploads/2018/02/WGIIAR5-Chap20_FINAL.pdf
2. https://unfccc.int/
3. https://www.ipcc.ch/

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22GA230	GEOGRAPHICAL INFORMATION SYSTEM FOR BUILT ENVIRONMENT	Category	L	T	P	Credit
		CFC	2	0	3	5

Preamble

GIS (Geographical Information System) is a multidisciplinary field that has been used for data integration, analysis and decision-making in many societal sectors. This course provides the concepts of Remote Sensing, types, Image processing techniques used to process satellite data, and an introduction to GIS. This course will give introductory knowledge about theory and methodology within management and analysis of geographic data using geographical information systems (GIS) tools. Through the use of open-source GIS software students will learn how to critically use mapping tools and geographic data for spatial analysis and representation.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO's	Course Outcome Statement	Weightage*** in %
CO1	Identify the ways in which GIS can be used to support spatial thinking, analysis, modeling and mapping.	Understand (10%)
CO2	Understand the image processing techniques to process the different types of data.	Understand (10%)
CO3	Explain the special characteristics of spatial information and the raster and vector data models that are typically used to represent real-world phenomena.	Understand (10%)
CO4	Select and process the appropriate satellite images of a built environment with respect to its context.	Apply (20%)
CO5	Explore various mapping techniques for a built environment through plugins and adding attribute data.	Apply (20%)
CO6	Conduct GIS mapping, analysis and visualization tasks in a built environment.	Analyze (30%)

*** Weightage depends on Bloom's Level, number of contact hours

Assessment Pattern: Cognitive Domain

Cognitive Levels	Assignment						Terminal Examination
	1	2	3	4	5	6	
Understand	80	20	80	-	-	-	30
Apply	20	80	20	40	40	40	40
Analyse	-	-	-	60	60	60	30

Syllabus

INTRODUCTION TO G.I.S - Introduction to Geographical Information System (GIS). Defining the objectives of GIS in problems related to the macro environment. Outline of commercial and open source GIS software. Introduction to basic components of GIS software - GIS Interface - Toolbars - Installation of additional plug-ins - Loading different types of Data into GIS - Shape files. Outline of Spatial and non-spatial data. Understanding of Projection and Coordinate systems. Preparation of map with the appropriate format for specific purposes. **SPATIAL AND ATTRIBUTE DATA INPUT** - Passive and Active Remote Sensing, Image Processing – Spectral Signature Curve, GPS, Aerial Photograph, Satellite Imagery, LIDAR and Drones. Identification of required spatial data layers. Coding schemes. National Urban Information System – Buvan. Digitization of spatial data. Editing. Geo-referencing of Satellite Imagery, Cadastral Map. Attribute data - Attribute Queries - Spatial Queries - Field Calculator - Role of attribute data in defining geographic features. Digital Elevation Model (DEM) analysis. Topology generation. Joining attribute data to its geographic features. **SPATIAL ANALYSIS USING GIS** - Generation of 3-D Model in GIS. Performing overlay functions. Manipulating attribute data. Preparation of Existing Land use Map and report generation. Land Suitability Analysis - Surveillance and Infrastructure Mapping - HOTSPOT IDENTIFICATION AND MAPPING - Mapping Service - Density Map - Analysis. Network Analysis. **MODELING THE MACRO ENVIRONMENT** - Need for modeling the macro environment for different scales and purposes. Modeling for suitability/ projects/ situations/ problems in the realm of urban design, landscape design, site planning and environmental planning.

Exercise: (Following Exercises to be carried out for a selected neighbourhood

1. Exploring the GIS tools with an available different database of the built environment.
2. Mapping the Basic elements in the Built environment using GIS tools.
3. Geo – referring the historic map /old map.
4. Analysing the old historic maps to explore the growth of the built environment of the historic town.
5. DEM analysis.

6. Prepare various maps related to the required context with proper legends and format of built environment with attribute data.

References

Books:

1. Arthur. H. Robinson et al., 'Elements of Cartography', John Wiley & Sons, New York, 1995. Judith. A. Tyner, 'Principles of Map Design', the Guilford Press, New York, 2010.
2. Ramesh Elmasri and Shamkant.B.Navate, 'Fundamentals of Database Systems, Pearson Education Limited, USA, 2010.
3. Anji Reddy.M., 'Textbook of Remote Sensing and Geographical Information Systems, B.S. Publications, Hyderabad, 2008.
4. Michael Law and Amy Collins, 'Getting to know ArcGIS Pro', ESRI Press, USA, 2016.
5. Paul. D. Zwick and Margaret.H. Carr, 'Smart Land-use Analysis: The LUCIS Model', ESRI Press, USA, 2007.
6. David Maquire, Michael Batty and Michael F.Goodchild, 'GIS, Spatial Analysis and Modeling, ESRI Press, 2005.
7. Cynthia A. Brewer, 'Designing Better Maps: A Guide for GIS Users' – 2nd Edition, ESRI Press, 2015

Website:

QGIS training Manual: https://docs.qgis.org/3.22/en/docs/training_manual/index.html

Maps Sources:

1. ESRI GIS for Archaeology: http://www.esri.com/industries/archaeology/
2. Electronic Cultural Atlas Initiative: http://www.ecai.org/
3. Open Source GIS: http://opensourcegisblog.blogspot.com/
4. GIS and Agent-Based Modeling: http://www.gisagents.org/
5. GIS and Science: http://gisandscience.com/
6. The Landscape Research Centre: http://www.landscaperesearchcentre.org/
7. GIS/US National Park service: http://www.nps.gov/gis/
8. Survey of INDIA – Open series Map: https://www.surveyofindia.gov.in/

Course Designers:

1. Prof.Dr. I Chandramathy -cmarch@tce.edu
2. Prof.R.Subalakshmi - rsiarch@tce.edu

22GA240	ENERGY EFFICIENT BUILDING DESIGN	Category	L	T	P	Credit
		PC	-	-	12	12

Preamble

This studio aims to develop knowledge, skills and competence in the field of energy efficient buildings that are responsive to local climate context. The students are assigned to develop architectural projects by implementing passive and active environmental design strategies applying energy efficient principles to make the buildings self-sufficient and energy efficient.

Prerequisite

Completed the course **22GA140 - Public Architecture (I SEM)**

Course Outcomes

On the successful completion of the course students will be able to

CO Number	Course Outcome Statement	Weightage in %
CO1	Interpret the underlying concepts of energy efficient architecture to experiment and utilize them in building design.	Understand (10%)
CO2	Explore design strategies to arrive at energy efficient and environmentally friendly solutions.	Apply (10%)
CO3	Apply energy efficient building codes and green certification systems towards high performance building design	Apply (10%)
CO4	Investigate strategies using simulation tools for design decisions and energy efficiency	Analyze (20%)
CO5	Evaluate various parameters of energy efficient building design development.	Evaluate (10%)
CO6	Create innovative design solutions by analyzing energy efficient principles, environmental context and use of innovative materials and techniques	Create (40%)

List of Experiments/Activities with CO Mapping

Phases	Deliverables	Marks	Course Outcomes
Continuous Assessment			
Review 1	Deliverables as per the studio requirement	100*	CO1, CO2, CO3, CO4, &CO5
Review 2		100*	CO1, CO2, CO3, CO4, &CO5
Review 3		100*	CO2, CO3, CO4, CO5, & CO6
Review 4		100*	CO2, CO3, CO4, CO5, & CO6
*During the course of the semester, four reviews will be conducted. Each review will be evaluated for 100 marks and subsequently be reduced to 60 marks for the award of Continuous Assessment marks based on Rubrics.			
Terminal Examination			
Viva-Voce	Sheets & models	100*	CO1, CO2, CO3, CO4, CO5, & CO6
*Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.			

Syllabus

Energy efficient green buildings are the need of the hour to reduce negative environmental impacts caused due to global warming and climate change issues. The intention of the studio is to implement the learnings from first semester subjects such as computational processes and performance evaluation of built environment towards the design of energy efficient building. The process will include analysis, evaluation and optimization of strategies using digital tools. The studio will explore and integrate relevant energy efficient design decisions on site selection, building form and envelope, building plan and space organization, technology integration, micro climate enhancement, sustainable and green materials, landscaping and renewable energy sources.

Examples of Approaches: Building level environmental concerns including energy conservation; Use of passive and active techniques combined with energy systems for achieving thermal comfort. Use of natural daylight and ventilation for thermal comfort and daylighting advantage; Radiation, heat load and U-value calculations as performance evaluation using digital tools; and design with services and structural systems integration. The focus of the studio can be all the above approaches of simulation and optimization applied to a single building block in the design project.

1. Residential buildings such as group developments, apartments, etc
2. Educational buildings such as schools, colleges, training centers, etc
3. Business buildings such as offices, banks, etc
4. Institutional buildings such as hospitals, rehabilitation centers, etc
5. Commercial buildings such as hotels, shopping malls, etc

Limitations: The planning can be for a project of larger scale to apply energy efficient strategies, but the simulation can be limited to a single block in the design project of size not exceeding 5000 sq.m.

Learning Resources

1. Wines James & Jodido Philip, “Green Architecture – The Art of Architecture in the age of Ecology”, Tachen Publishers, New York, 2000.
2. Mackenzie Dorothy, “Green design: design for the Environment”, Laurence King, London, 1997.
3. Farmer John & Richardson Kenneth, “Green Shift: Changing attitudes in architecture to the Natural World”, Architectural Press, Boston, 1999.
4. The European Commission, “A Green Vitruvius: Principles and Practices of Sustainable Architectural Design”, James & James, London, 1999.
5. Scott Andrew, “Dimensions of Sustainability: Architecture, Form, Technology, Environment & Culture”, F&FN Spon, London, 1998.
6. O’Callaghan, Paul, W – “Buildings for Energy Conservation”, Pergamon Press, London, 1980
7. Givoni Baruch, “Passive and Low Energy Cooling of Buildings”, Van Nostrand Reinhold, New York, 1994.
8. Sodha, M., Bansal, N. K., Bansal, P. K., KuMEB, A., and Malik, M. A. S., “Solar Passive Buildings”, Pergamon Press, Oxford, 1986.
9. Bansal Narendra, K., Hauser Gerd and Minke Gernot, “Passive Buildings Design: A Hand book of Natural Climatic Control”, Elsevier Science, Amsterdam, 1994.
10. Goulding, John, R., Lewis, Owen, J., and Steemers, Theo, C., “Energy in Architecture”, Bastford Ltd., London, 1986.
11. Langston, Craig A. and Ding, Grace Sustainable practices in the built environment 2001.
12. Martin J Gainsborough, Radford and Helen Bennets, T J Williamson, “Understanding Sustainable architecture”, Spon Press, London, 2003.
13. Baker Nick and Steamers Koen, “Energy and Environment in Architecture”, E & FN Spon, London, 1999.
14. Givoni, B., “Man, Climate and Architecture”, Elsevier, Amsterdam, 1986.
15. Watson Donald, “Climate Design: Energy Efficient Building principles and practices”, McGraw Hill Book Company, New York, 1983.

Course Designers:

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3. Prof.C. Piraiarasi cparch@tce.edu

22GA310	DISSERTATION	Category	L	T	P	Credit
		PC	0	0	8	8

Preamble

Dissertation offers an opportunity to understand architecture, history and design primarily through research. It is also intended to enlighten students on the fundamentals of research in Architecture and its significance in Architectural Practice. Further the course provides an opportunity for the student to identify focus area of research and carry out investigations on the selected area of study covering various aspects related to architecture and to demonstrate the research qualitatively / quantitatively in a specific area.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	Course Outcome Statement	Weightage*** in %
CO1	Comprehend the components, types, and methods adopted in architectural research	Understand (5%)
CO2	Discover the various specializations in Architecture and related fields.	Understand (5%)
CO3	Apply and demonstrate documentation and technical writing skills.	Apply (25%)
CO4	Apply and Exhibit proficiency in creative, logical and lateral thinking processes through verbal and visual communication skills.	Apply (20%)
CO5	Analyze and synthesize a defined context or societal issues using a scientific approach, and then develop solutions to the identified problems.	Analyze (25%)
CO6	Exemplify the ability to critically analyze, evaluate and interpret data.	Analyze (20%)

List of Experiments/Activities with CO Mapping

Phases	Deliverables	Marks	Course Outcomes
Continuous Assessment			
Review 1	Deliverables as per the studio requirement	100*	CO1 & CO2
Review 2		100*	CO1, CO2, CO3 & CO6
Review 3		100*	CO1, CO2, CO3, CO5, & CO6
Review 4		100*	CO1, CO2, CO3, CO4, CO5, & CO6
*During the course of the semester, four reviews will be conducted. Each review will be evaluated for 100 marks and subsequently be reduced to 60 marks for the award of Continuous Assessment marks based on Rubrics.			
Terminal Examination			
Viva-Voce	Report and Full Paper	100*	CO1, CO2, CO3, CO4, CO5, & CO6
*Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.			

Syllabus

Research methods - Introduction to concepts and types of research, methods of data collection, measurement and scaling techniques. The students are expected to study/document / analyze in detail a chosen area of their research interest. The topics may range from analyzing the recent trends in architectural researches, building performances, urban design, urban renewal, urban ecology, disaster management, landscape design, climate change adaptation, and digital tools in architectural design, design process, architectural theory and many more. The student is expected to demonstrate their research in a specific area and quantitatively/qualitatively evaluate their proposal/ design / solution. Emphasis must be on critical understanding, logical reasoning and technical writing. A dissertation could also be a Thesis preparation course and gives the student scope for independent study and opportunity to explore specific area of interest which will form the basis of his/ her design thesis project in the next semester.

Studio Methodology

The topic will have to be approved at the end of the previous semester and reviewed periodically by a jury. By the end of the semester, students are expected to submit a written report of approximately 8000 words and produce a research paper on their chosen area of interest, wherein standard referencing conventions and technical writing norms must be adhered to. The content of the dissertation report includes and not limited with Identification of Dissertation Topic and Area, Hypothesis Formulation, Objectives and Methodology, Importance, Purpose and Scope of the Dissertation in architecture in terms of design, technology, environment, economic and behavioral areas, Literature and Field Studies.

Books

1. Iain Borden and KaaterinaRuedi; The Dissertation: An Architecture Student's Handbook; Architectural Press; 2000.
2. Turabian's A Manual for Writers of Research Papers, Theses, and Dissertations [7th edition]
3. John W Creswell; Research design: Qualitative, Quantitative and Mixed Methods Approaches;
4. Linda Grant and David Wang, Architectural Research Methods, John Wiley Sons 2001.
5. Ranjith Kumar; Research Methodology- A step by step guide for beginners; Sage Publications; 2005. Sage Publications; 2002.
6. Wayne C Booth; Joseph M Williams; Gregory G. Colomb; The Craft of Research, 2nd Edition; Chicago guides to writing, editing and publishing.
7. How Designers Think. The Design Process Demystified, Bryan Lawson,
8. Naturalistic Inquiry by Yvonna S. Lincoln, Egon G. Guba, SAGE, 1985
9. The Landscape of Qualitative Research: Theories and Issues, Norman K. Denzin, Yvonna S. Lincoln, SAGE Publications, 13-Feb-2003 - Social Science - 684 pages

Course Designers:

1. Prof.Dr. I.Chandramathy cmarch@tce.edu
2. Prof. S. Ragul srlarch@tce.edu

22GA320	INTEGRATED ARCHITECTURAL DESIGN	Category	L	T	P	Credit
		PC	-	-	10	10

Preamble

The module is designed to advance the student's 'Integrated Design Thinking' approach, through novel use of either technology or addressing any social, economic and cultural issue or conservation or public sector through rigorous investigation and application of appropriate structural, environmental, material, regulations and building service strategies into the building design through **Building Information Modeling**. The students will be expected to develop a critical understanding of the problem and back-up their claim by a theoretical underpinning before developing it into a design solution.

Prerequisite

Completed the course **22GA240 - Energy Efficient Building Design (II SEM)**

Course Outcomes

On the successful completion of the course students will be able to

CO Number	Course Outcome Statement	Weightage*** in %
CO1	Demonstrate thorough synthesis, methodological process and narrative with critical evaluation. (Process)	Understand (10%)
CO2	Demonstrate proficiency of using building information modeling tools to develop a working functional model. (BIM)	Apply (10%)
CO3	Comprehensive technical strategy demonstrating design-led response to urban or conservation or social or technological integration through extensive research and innovative application. (Integration)	Apply (25%)
CO4	Demonstrate evidence of in depth understanding and integration of environmental, structural material, regulations and services, across all the areas of design. (Technical)	Apply (25%)
CO5	Implement publishable/professional standard work appropriate to the selected project, applying relevant techniques and appropriate media. (Communication)	Apply (10%)
CO6	Develop innovative and creative idea with reference to advanced theoretical research. (Design)	Create (20%)

*** Weightage depends on Bloom's Level and number of contact hours.

List of Experiments/Activities with CO Mapping

Phases	Deliverables	Marks	Course Outcomes
Continuous Assessment			
Review 1	Deliverables as per the studio requirement	100*	CO1 & CO2
Review 2		100*	CO1, CO2, CO3 & CO6
Review 3		100*	CO1, CO2, CO3, CO5, & CO6
Review 4		100*	CO1, CO2, CO3, CO4, CO5, & CO6
*During the course of the semester, four reviews will be conducted. Each review will be evaluated for 100 marks and subsequently be reduced to 60 marks for the award of Continuous Assessment marks based on Rubrics.			
Terminal Examination			
Viva-Voce	Sheets & models	100*	CO1, CO2, CO3, CO4, CO5, & CO6
*Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.			

Syllabus

Integrated design is a comprehensive holistic approach to design which brings together specialisms usually considered separately. It attempts to take into consideration all the factors and modulations necessary to a decision-making process. With its roots in sustainability, and with the universal acceptance of data driven design, it is widely acknowledged that integrative design completed in a comprehensive way is the process that will lead to a more sustainable and responsible built environment. Organized in order of the design process itself—pre-design, schematic design, and design development.

Example: The problem should consider the responsibility of the individual and the collective in designing a dynamic and adaptive community that responds to **economic, social and cultural problems including pandemic, sea-level rise, housing crisis, climate and environmental, food scarcity and urban sprawl.** The problem needs to be properly analyzed and documented through 1000 words report along with the reason of why it needs to be taken as a High-rise or a Large-complex design solution. It's important throughout the process that there exists a relationship between the problem, the solution, the community and the city.

The design objective of the Technical Investigation is to demonstrate a thorough critical research, analysis, application and an understanding of building performance. The Investigation should respond to regulatory principles and appropriate

structural strategy. It must also include a detailed design including a 1:1 sectional drawing. Most importantly the ability to combine all this thinking and strategies to enable a holistic design process.
TASK 1 - Response to Brief - Develop a report of the problem and outline a brief synopsis of the proposed design solution along with diagrams, sketches, precedents and quotes.
TASK 2 - Response to Site and Context - Environmental and social analysis of the site including limitations and proximity networks. Output - Illustrated drawings and site sections.
TASK 3 – Scheme - Produce a complex design proposal responding to your individual problem.
Output - Illustrated drawings.
TASK 4 - Atmosphere and Space Envelope | Exhibition - Develop a physical model of a key space in the design to study about its atmospheric quality, materials and lighting.
Output - Mandatory physical model and 1:1 scaled detailed drawing.
TASK BIM5 - Environmental Response - Lighting and ventilation strategies, building performances, sustainability checklist, energy and carbon efficiency strategy. Output - Illustrated drawings, building/room sections and optional analysis through simulation software.
TASK BIM6 – Structure - Material choice, structural strategy and diagramming.
Output - Illustrated drawings, isometric and optional analysis through simulation software.
TASK BIM7 – Services and Regulations - Outline the building services planning, building regulations, fire and accessibility strategy. Output - Illustrated drawings.
TASK 8 – Visualization -Create a 2-to-5-minute video explaining about the project and design approach. Output - Rendered Walk-through/Interactive game-play/Virtual Reality.

Reference

1. CABE (2004) Creating Successful Masterplans. CABE.
2. Banham, R. (1960) Theory and Design in the First Machine Age. London: The Architectural Press.
3. Miles, M. (1997) Art, space and the city: public art and urban futures. Oxford: Routledge.
4. Harvey, D. (1973) Social justice and the city. Baltimore: John Hopkins University Press.
5. Huizinga, J. (2000) Homo Ludens: A Study of the Play-Element in Culture. Boston: Beacon Press.
6. Ford, E (1990 & 1996) The Details of Modern Architecture (2 vols) MIT Press, Cambridge MA
7. Linton, H., 2000. Portfolio Design. New York: W.W. Norton
8. Computational Design; Neil Leach and Philip F. Yuan; Tongji University Press (21 February 2018).
9. Computational Design Thinking: Computation Design Thinking (AD Reader); Wiley; 1st edition (30 September 2011).
10. Digital Fabrication; Neil Leach and Philip F. Yuan; Tongji University Press (20 February 2018).
11. Computational Design: Technology, Cognition and Environments; Rongrong Yu, Ning Gu, Michael J. Ostwald; CRC Press.
12. AAD Algorithms-Aided Design; Arturo Tedeschi; Le Penseur; 14th edition (1 October 2014).
13. Post-parametric Automation in Design and Construction; Alfredo Andia, Thomas Spiegelhalter; Artech House; Illustrated edition (November 16, 2014).
14. Material Computation: Higher Integration in Morphogenetic Design: 216; Academy Press; 1st edition (2 March 2012).
15. Parametric architecture with Grasshopper; Arturo Tedeschi.
16. BIM Design: Realizing the Creative Potential of Building Information Modeling; Richard Garber; Wiley; 1st edition (11 July 2014)
17. Beyond BIM: Architecture Information Modeling; Danelle Briscoe; Routledge; 1st edition (14 October 2015)
18. BIM and Construction Management: Proven Tools, Methods, and Workflows; Brad Hardin; Wiley; 2nd edition (May 11, 2015)
19. BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors; Rafael Sacks; Wiley; 3rd edition (2 October 2018).

Course Designers

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22GA410	THESIS	Category	L	T	P	Credit
		PC	0	0	16	16

Preamble

The course provides an opportunity to utilize knowledge and skills they have acquired through integrated architectural design process during previous semesters and to engage the interests and skills the student bring with them to the program in order to allow them to become an authority in their chosen area of study. The course imparts the purpose and need for a multidisciplinary approach towards the design solution.

Prerequisite

Completed the course **22GA320 - Integrated Architectural Design (III SEM)**

Course Outcomes

On the successful completion of the course students will be able to

Cos	Course Outcome Statement	Weightage*** in %
CO1	Interpret the knowledge, skills and techniques acquired in the various courses of the previous semesters through integrated architectural design processes.	Understand (10%)
CO2	Formulate the problem as a response to the man, context, culture, concern to environment, developments in building industry, changing trends of contemporary architectural practices, etc., through literature and case studies.	Understand (10%)
CO3	Critically analyze specific and appropriate aspects relating to the discipline of architecture and reflect this in the realm of design.	Analyze (20%)
CO4	Choose appropriate design methodology for various contemporary and advanced issues.	Evaluate (10%)
CO5	Develop a design solution for an architectural programme involving multi-level planning with complex circulation, having large span structure, complex site planning.	Create (40%)
CO6	Demonstrate the compatibility of design solutions through simulations.	Apply (10%)

List of Experiments/Activities with CO Mapping

Phases	Deliverables	Marks	Course Outcomes
	Continuous Assessment		
Review 1	Deliverables as per the studio requirement	100*	CO1 & CO2
Review 2		100*	CO1, CO2, CO3 & CO6
Review 3		100*	CO1, CO2, CO3, CO5, & CO6
Review 4		100*	CO1, CO2, CO3, CO4, CO5, & CO6
	*During the course of the semester, four reviews will be conducted. Each review will be evaluated for 100 marks and subsequently be reduced to 60 marks for the award of Continuous Assessment marks based on Rubrics.		
	Terminal Examination		
Viva-Voce	Sheets & models	100*	CO1, CO2, CO3, CO4, CO5, & CO6
	*Terminal Examination in the form of Viva voce will be conducted during the end semester for a maximum of 100 marks and subsequently be reduced to 40 marks for the award of terminal examination marks.		

Syllabus

Thesis shall be a design project with a strong research component / shall extend as a research providing solution to the issue analysed in the dissertation done in the previous semester. The scale of the project could extend from a design of a built environment (individual site to settlement level) to framing of guidelines/strategies for the issues identified, analysed in the fields of Urban design, Climate change, Conservation, etc. The process would culminate in design interventions at scales appropriate to the topic. The project shall desirably have the potential to serve as a starting point for practice and/ or further research. Students will submit a detailed proposal on their topic of interest(s). The Proposal shall be approved by the thesis review committee. The thesis project will be reviewed periodically by the review committee. At the end of the semester, the final thesis will be submitted and presented through a viva voce examination before a jury.

Learning Resources

1. Urban and Regional Development Plan formulation and Implementation (URDPFI)– 2014, Vol I & Vol II.
2. Tamil Nadu Combined Development and Building Rules, 2019.
3. ECBC 2017 (Energy Conservation Building Code).
4. http://tcpo.gov.in/
5. De Chiara and Callender, Time-Saver Standards for Building Types, Mc Graw Hill Publishing Company, New York, 1973.
6. Nufert Ernst, Architects Data, Blackwell Science Ltd., Britain, 1980.

7. Linda Grant and David Wang, “Architectural Research Methods”, John Wiley Sons, 2002.
8. Donald Appleyard, “The Conservation of European Cities”, M.I.T. Press, Massachusetts, 1979.
9. Richard Kintermann and Robert, “Small Site Planning for Cluster Housing”, Van Nostrand Reinhold Company, London/New York 1977.
10. Miller T.G.Jr., “Environmental Sciences”, Wadworth Publishing Co., 1994
11. Geoffrey and Susan Jellico, “The Landscape of Man”, Thames and Hudson, 1987.
12. Arvind Krishnan & Others, “Climate Responsive Architecture”, A Design Handbook for Energy Efficient Buildings, TATA McGraw Hill Publishing Company Limited, New Delhi, 2007.
13. National Building Code 2016.
14. Council of Architecture Manual of Architectural Practice 2022.

Course Designers:

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ELECTIVE FOUNDATION COURSES

22GAFA0	URBAN HERITAGE AND ARCHITECTURAL CONSERVATION	Category	L	T	P	Credit
		EFC	2	0	0	2

Preamble

To expose students to the interdisciplinary nature of conservation, so as to ensure students develop skills required to function as responsible professionals. "Urban Heritage and Conservation" will equip students to develop models of sustainable integrated conservation addressing the complexities of historic buildings, and heritage cities of India.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	Course Outcome Statement	Weightage*** in %
CO1	Describe the basics of Heritage and its conservation, Types, and Terminologies.	Understand (10%)
CO2	Describe Architectural, Urban heritage through case studies.	Understand (10%)
CO3	Analyze the Heritage city based on different parameters	Analyze (30%)
CO4	Identify, decipher and interpret issues relating to Heritage in the Urban context	Apply (15%)
CO5	Integrate the successful existing National and International urban conservation techniques legal measures, policies and principles.	Apply (15%)
CO6	Practice and implement the conservation strategies after analysing its context.	Apply (20%)

*** Weightage depends on Bloom's Level, number of contact hours,

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	-
Remember	-	-	-	-	-
Understand	20	20	20	-	20
Apply	20	20	20	20	20
Analyse	60	60	60	80	60

Syllabus

INTRODUCTION TO URBAN HERITAGE – Heritage – Types of Heritage – Conservation - Degrees of intervention – Adaptive Reuse, Rehabilitation, Preservation, Restoration, Up Gradation, Retrofitting, Revitalization, Regeneration, Renewal, and Redevelopment - Role of conservation agencies - Role of Conservation Architect in Urban conservation. **DOCUMENTATIONS IN URBAN HERITAGE -** Discourse on traditional and contemporary urbanism - Morphology of historic settlements - Mapping - Tangible - Intangible - Documenting - Measured drawing, Arial / 360 Photography, Photogrammetry, 3D Laser scanning, LIDAR - Analysing the urban heritage – Issues in Historic cities. Understanding the Historic cities of Tamilnadu - MADURAI, SRIRANGAM. **GOVERNING BODIES & LEGAL MEASURES IN URBAN CONSERVATION** – UNESCO – World Heritage City Nomination - Government of India heritage programs - HRIDAY, PRASAD, and Smart City Mission. Act and Policies - AMASRA Amendment 2010 and implications for urban conservation – TDR. **URBAN CONSERVATION STRATEGIES -** Approaches - Historic urban landscapes - Integrated urban conservation - Heritage Tourism. Case studies: Revitalization strategy of Historic core of Ahmedabad, Adaptive reuse and Restoration of Chettinadu mansions, Façade restoration – Pondicherry. International case studies Australian and European examples Etc.

Learning Resources

- W. Install, Donald & Associates; Chester – A Study In Conservation; Published By London Her Majesty's Stationery Office, Edition 1968.
- K. Parajuli, Yogeshwar; Bhaktapur Development Project – Experience In Preservation And Restoration In A Medieval Town; Edition 1974-85
- Cohen, Nahoum; Urban Planning Conservation And Preservation, Published By Mcgraw Hill,Edition 2001.
- Menon, A.G.K. & Thapar, B.K.; Historic Towns And Heritage Zones; Published By Intach, Edition 2002.
- J. Larkham, Peter; Conservation And The City; Published By Rout Ledge. London And New York, 1st Edition, 1996.
- Icomos, Isbn: 075061210x, Guide To Recording Historic Buildings, Butterworth, 1990.
- Lindsay Macdonald (Ed.), Isbn 13:978-0-75-066183-6, Digital Heritage: Applying Digital Imaging To Cultural Heritage.

- Urban Conservation in International Charters: From the Athens Charter to the Historic Urban Landscape Recommendation.
- Washington Charter - 1987 - Charter for the Conservation of Historic Towns and Urban Areas.
- Urban Heritage in Indian Cities by Intach.
- Improving Heritage Management in India by Niti Aayog.
- Transferable Development Right by Niti Aayog.

Course Designers:

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22GAFB0	ZERO ENERGY MASS CUSTOMIZATION AND HOUSING	Category	L	T	P	Credit
		EFC	1	1	0	2

Preamble

This course encompasses a series of technical lectures and tutorials on zero energy mass custom home (ZEMCH) design thinking, function analysis, weighted evaluation and design code development techniques, as well as hands-on training of energy and environmental design simulation techniques relevant to the delivery of quality affordable housing in developed and developing countries.

Prerequisite

Nil

Course Outcomes

On successful completion of the course students will be able to

CO's	Course Outcome Statement	Weightage*** in %
CO1	Identify and interpret social, economic and environmental sustainability issues in housing and undertake function analysis towards housing design code development and inclusive housing design	Understand (10%)
CO2	Demonstrate a mass custom design approach to sustainable housing development and apply cost reduction strategies for housing design	Apply (20%)
CO3	Identify design elements that affect domestic energy use and Devise passive design techniques for reduction of housing energy demand	Create (20%)
CO4	Identify renewable energy technologies applicable to affordable housing development	Understand (10%)
CO5	Estimate operational housing energy consumption using renewable energy technologies	Evaluate (20%)
CO6	Recommend design solutions to be applied for the delivery of zero energy mass custom homes and conduct building performance simulation	Apply (20%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Assignment				Terminal Examination
	1	2	3	4	
Understand	100	-	-	-	20
Apply	-	30	30	30	40
Analyse	-	-	-	-	-
Evaluate	-	30	30	30	20
Create	-	40	40	40	20

Syllabus

INTRODUCTION TO SUSTAINABLE HOUSING DEVELOPMENT - Introduction to ZEMCH - challenges in sustainable development – connection between energy use, greenhouse gas emissions and climate change – key role of construction industry in mitigating global warming - environmental, economic, social, political and philosophical aspects of sustainable development. Reflections of Housing on Social, Cultural and Economic Development - environmental and economic impact (affordability) of sustainable housing development - Environmentally sustainable Design Parameters. **MASS HOUSING TO MASS CUSTOMIZATION -** Mass housing paradigms, trends, challenges and future potentials - Prefabrication background and current conditions - prefabrication fundamentals, advantages and challenges - building methods, design, procurement, manufacturing and installation processes- increasing socio-economic diversity affordable housing demand - notion of sustainable development and concept of mass customisation - pragmatic application to housing design and production. **INCLUSIVE HOUSING DESIGN -** Changing and complex user needs - sensory and cognitive impairments - barrier-free design - principles, role and importance of Inclusive Design in the context of an ageing society - Case studies from India and abroad. **ENERGY DEMAND: ACTIVE AND PASSIVE DESIGN STRATEGIES -** Overview of the energy use in housing – Energy demand and carbon emissions - Energy benchmarks - integration of renewables and smart technologies - operation and maintenance- Overview of passive design and Active design strategies for reducing energy consumption (enhancing user comfort while reducing or eliminating fossil fuel usage) - Case Studies. **BUILDING PERFORMANCE AND SIMULATION -** Lighting concept - Lighting simulation - Water usage in housing - water simulation - Simulation of zero energy housing design (HOT 2000) - Renewable energy technologies-PV (RETSCREEN). **ZERO ENERGY HOMES - CASE STUDIES -** Introduction to ZEH - use of renewable and recycled materials - alternative energy system and clean sources – overview of building automation systems - Introduction to ZEH

standard - influencing parameters and criteria to build or refurbish to a ZEH standard - design, construction and operation of new Zero Carbon Homes - Case studies from India and abroad. **Activity:** Introduction to Function analysis system technique (FAST).*Brainstorming on Function analysis system technique.*

Exercises:

1. Function analysis system technique (FAST) - (Group discussion and presentation)
2. *Weighted evaluation and design code development (Group discussion and presentation)*
3. *Weighted evaluation and design code development – Value Engineering. (Group discussion and presentation)*
4. Building performance simulation for a given building model for an Indian context

Learning Resources

1. Masa Noguchi, ZEMCH: Toward the Delivery of Zero Energy Mass Custom Homes, Springer International Publishing Switzerland 2016, ISBN 978-3-319-31965-0
2. Masa Noguchi, ZEMCH Strategic Framework for Low Carbon Solutions in Sustainable Housing Delivery
3. Masa Noguchi, Mass customisation, Springer Tracts in Civil Engineering 2016
4. Masa Noguchi, ZEMCH Research Initiatives: Mass Customisation and Sustainability, ISBN 978-3-03842-111-5

Reference:

1. Chau, Hing-Wah, Yokota, AK and Noguchi, M (2018) *ZEMCH Sustainable Design Workshop: An Interactive Model for Sustainability Education.* In: ZEMCH 2018 International Conference, 29 Jan 2018 - 1 Feb 2018, The University of Melbourne, Victoria, Australia.

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22GAFC0	LANDSCAPE CONSTRUCTION	Category	L	T	P	Credit
		EFC	2	0	0	2

Preamble

This course intended to expose the students with the understanding of the materials, methods techniques and specification pertaining to landscape construction involving hardscape softscape and aqua-scope elements. This course focuses about various landscape services and its integration into landscape design.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO's	Course Outcome Statement	Weightage*** in %
CO1	Describe about landforms and apply their knowledge and skill in shaping the landform	Understand (10%)
CO2	Describe about landscape construction and apply their knowledge and skill in design and detailing of hard landscape construction.	Understand (10%)
CO3	Analyze the context and identify the choice of material, methods and techniques of construction with appropriate specifications.	Analyze (30%)
CO4	Analyze the context and integrate landscape services which are economical and efficient.	Analyze (10%)
CO5	Integrate the knowledge about landscape construction and apply their knowledge and skill in design and detailing of soft landscape construction.	Apply (20%)
CO6	Practice the landscape construction and apply their knowledge and skill in design and detailing of landscape construction for aquascapes.	Apply (20%)

*** Weightage depends on Bloom's Level, number of contact hours,

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	-
Understand	20	20	20	-	20
Apply	40	40	40	50	40
Analyze	40	40	40	50	40

Syllabus

INTRODUCTION- Land and Landforms - Landform – Contours – Slope Analysis – Grading –Suitability Mapping – Various methods and tools in analysis of landforms, Land as elements – construction of earthen mounds, earthen berms, swales, etc **HARDSCAPE AND CONSTRUCTION** - Design and Details of Hardscape Elements like road, paving, edges promenades Decks, plaza, terraces, pavilions, – parking area – choice of materials – method & technique of construction - Specifications and Details of Construction. **SOFTSCAPE AND CONSTRUCTION** - Plant material database – Structural and Visual Characteristics of plants – choice of plant material based on design and context – Specifications and Details of Construction. **AQUASCAPE, LANDSCAPE LIGHTING AND LANDSCAPE IRRIGATION** - Design and Details of Aquascape – elements like Fountains Cascades, Pools, Ponds etc… choice of materials – method & technique of construction – Specifications and Details of Construction. **URBAN LANDSCAPE COMPONENTS AND CONSTRUCTION** - Design and integration of landscape services like, landscape lighting, irrigation, rain water harvesting, storm water drainage, sewage collection & disposal, security, electric supply, communication network.

Learning Resources

1. Dines, C.W.H.N.T (2001) Time Saver standards for Landscape Architecture, McGraw Hill. 2. Hopper (n.d) Landscape graphic standards students, Ed. John Wiley and Sons Inc.
3. Reid, G.W (1987) Landscape graphics, Watson New York; Guptill Publication.
4. Sauter, D(2000) Landscape construction, Pelmer Thomson Learning.
5. Steven, S (2004) Site Engineering for Landscape Architects, John Wiley and Sons Inc .
6. Wood, M.L. (1993) Landscape Detailing Vol. I – IV Architectural Press.

Course Designers:

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2. Prof S Santhana Iyyappa Sundararaj pothi@tce.edu

22GAFD0	ARCHITECTURE AND CRITICAL THEORY	Category	L	T	P	Credit
		EFC	2	0	0	2

Preamble

The course offers an understanding about the causative factors of Architecture at both urban and building scales. It unfolds the complexity and hidden agenda of the societies and its reflection on architecture of that particular time period.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO's	Course Outcome Statement	Weightage*** in %
CO1	Express architecture as an integral product of society.	Understand (20%)
CO2	Associate principles and ideologies according to time, space and context.	Understand (20%)
CO3	Extend the historical, theoretical and contextual connections of architecture.	Understand (20%)
CO4	Develop the skill to identify, decipher and interpret issues relating to architecture based on Architectural criticism.	Analyze (10%)
CO5	Relate design vocabulary, visual languages between different architectural styles.	Apply (20%)
CO6	Connect the intricate nuances between theory and practice.	Analyze (10%)

*** Weightage depends on Bloom's Level, number of contact hours,

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	-
Understand	60	60	60	60	60
Apply	20	20	20	20	20
Analyze	20	20	20	20	20

Syllabus

INTRODUCTION – Introduction to Critical Theory – its role, purpose and its relation to Architectural design and practice - Context for the rise of critical theories like Marxism, capitalism - its influence on Architecture. **ARCHITECTURE AND SOCIETY -** Definition of power- Forms of power- ideas of power and society, Power in the built environment at various scales - Power-knowledge theory by Foucault - Panoptican - case example - Colonialism in India as a form of dominance - Ideas of segregation, control and surveillance in colonial towns - post colonial India(case study of Madras & New Delhi) - surveillance and control in the contemporary world- Idea of Ghettos, Introduction to the idea of gender and space - case example: islamic society. **SOCIAL THEORY AND ARCHITECTURE OF 20TH CENTURY -** Architecture as communication and representation of social theories - **Modernism**,(Works of Ludwig ,Walter Gropius and - urbanism of Le Corbusier, case study of Pruitt-Igoe - Minoru Yamasaki - FALL OF MODERNISM, Kenzo Tange's **metabolism**, **postmodernism** in architecture, **structuralism** as a movement (Theory of Claude Levi-Strauss, linguistic concepts of semiotics, concept of binary pairs, works of Aldo van Eyck). **POST STRUCTURALISM & DECONSTRUCTIVISM** (Theories of Jacques Derrida, concepts of topological theory, works of Frank O Gehry), **Critical Regionalism** (Theories of Alexander Tzonis, Liane Lefaivre and Kenneth Frampton works of International architects Tadao Ando or Alvaro Siza Indian architects Charles Correa or B.V Doshi) - Architecture of resistance, **Phenomenology** in architecture place making and New urbanism. **LATE CAPITALISM SOCIETY AND ARCHITECTURE -** Conditions of late capitalism- Society of spectacle-Architecture as spectacle and seduction. Influence of globalization and digital revolution on architectural processes- global/ regional debates- contemporary issues in architecture.

Learning Resources

1. Rethinking Architecture - A reader in cultural theory; edited by Neil Leach; Routledge - Taylor & Francis Group, London and New York; 2006.
2. Mark R.Cruvellier, Bjorn N.Sandaker and Luben Dimcheff; Model Perspectives - Structure, Architecture and Culture; Routledge - Taylor & Francis Group, London and New York; 2017.
3. SOM - Adrian Smith, FAIA of Skidmore, Owings & Merrill LLP; Archiworld Co, Ltd, Korea; 2002
4. Lynn, Greg. Folds, Bodies & Blobs: Collected Essays. La Lettre volee, 1998. ISBN
5. Venturi, Robert (1966).Complexity and Contradiction in Architecture, the Museum of Modern Art Press, New York. ISBN 0-87070-282-3
6. Lin, Zhongjie (2010). Kenzo Tange and the Metabolist Movement. Routledge.
7. Derrida, Jacques (1976). of Grammatology, (hardcover: ISBN 0-8018-1841-9, paperback: ISBN 0-8018-1879-6, corrected edition: ISBN 0-8018-5830-5) trans. Gayatri Chakravorty Spivak. Johns Hopkins University Press.

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22GAFE0	ARCHITECTURE PEDAGOGY	Category	L	T	P	Credit
		EFC	2	0	0	2

Preamble

Pedagogy is an art and science of teaching and learning. Architectural Pedagogy aims to give its graduates a comprehensive grasp of the ways in which architectural education has changed in response to shifting cultural and disciplinary contexts on a national and international level. Designing efficient teaching approaches, developing stimulating learning settings and assessing student learning outcomes are crucial skills for an architecture educator.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO's	Course Outcome Statement	Weightage*** in %
CO1	Investigate cutting-edge teaching tools to establish and educate in a more engaging and intuitive way.	Understand (10%)
CO2	Assess architectural designs, drawing upon a range of theoretical frameworks, design principles, and critical perspectives	Understand (20%)
CO3	Recognize gaps between practical and theoretical knowledge and incorporate them into teaching strategies for technical subjects like construction technology.	Understand (20%)
CO4	Integrate contemporary technologies into architecture education to provide more efficient teaching and learning procedures	Apply (20%)
CO5	Demonstrate skills of designing and overcoming impediments and obstacles which interfere in decision making process & make appropriate decisions	Apply (20%)
CO6	Develop the rubrics for the assessment of theory, theory cum studio, studio and allied courses	Apply (10%)

*** Weightage depends on Bloom's Level, number of contact hours,

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	-
Understand	50	50	50	50	50
Apply	50	50	50	50	50

Syllabus

INTRODUCTION TO INSTRUCTIONAL THEORIES, METHODS AND MEDIA: Need and importance of Instructional theories; **Planning of Teaching and Learning** - (Lesson Topic, Lesson Information, Intended learning outcomes, Teaching Aids, Resources, Arrangement of the Environment, Instructional Activities, Teacher Reflection); **Teaching Methods** – Lecture methods, Composition of a lecture, content development, Traditional techniques in imparting a good lecture; Discussion Method, Demonstration method, Case study Based Teaching, other innovative teaching methods (like flipped classroom, Jigsaw, fish bowl, etc), Achieving Course Outcomes, Feedback Analysis etc**, Learning Methods** - Learning by Doing, Incidental Learning, Learning by Reflection, Learning by Exploring, Collaborative Learning - think-pair-share, Learning by Arguing; – **Classroom management** - Classroom ethics & behaviour. **ARCHITECTURAL DESIGN PEDAGOGY: Design teaching models**: 12 design pedagogy models (synectics model, typology model, pattern-form model, space-composition model, conjecture-test model, analysis-synthesis model, behavioural model, socio-context model, constructivist model, sustainable design model, tectonic model and digital fabric model). **Design Approaches** (Integral approach; creating Sensitivity in design, Social and historical consciousness in design, Probing the cause-effect relationship in design, top-down approach and bottom-up approach), **Design Phases** (Preparing Design Brief – contents, types of design brief, with case examples of various scales; Case studies – preparing checklist, Pre-design, Schematic design, Design Development). Introducing design for the beginners; Basic Design and Architectural Design its connections. Methods of communicating ideas, Evolution of Studio representations (traditional, current, future), **Design studio management strategies** (Group discussions, Interdisciplinary teamwork (services, structures, site, urban design), Realistic design problem), Documenting and preparing Digital Information Resources. **Exercises:** Exercises on Design phases / Design teaching models / Design studio management strategies. **STUDENT ASSESSMENT AND EVALUATION: Planning of assessment methods** – need & importance, defining goals and objectives for Assessment, planning and stages of assessment programme, Role and purpose of assessment – Tools and techniques for assessment, **Aspects of Assessment** (Communication skills, Design thinking skills, Visual communication skills, Technical Documentation, Investigative skills, Fundamental design skills, Use of Precedents, Ordering system skills, etc), **Structuring Rubrics**: Formation of rubrics pertaining to the Process, Scale and stage of Design. **ARCHITECTURAL EDUCATION AND CONTEMPORARY PRACTICES:** case examples of architectural education and contemporary practices, various schools of architecture in the national and global scenario and their practices, Exercises: Exercises on case examples of architectural education and contemporary practices around the globe.

Learning Resources

Text Books:

1. Edward De Bono, Lateral Thinking.
2. Bryan Lawson – How Designer's Think, Architectural Press Ltd, London 1980.
3. Tom Health – Method in Architecture, John Wiley & Sons, New York, 1984.

References:

1. Buchanan, R. (1992). Wicked Problems in Design Thinking. In Design Issues, Vol. 8, No. 2 spring, 1992), pp. 5-21.
2. Cross, N. (2001). Designerly Ways of Knowing: Design Discipline versus Design Science. Design Studies, 17(No.3), Summer 2001, 49-55
3. Transformative Pedagogy in Architecture and Urbanism by Ashraf M. Salama
4. Art, Architecture, Pedagogy Experiments in Learning by Ken Ehrlich
5. S. K. Mangal(2009)"Essential of educational technology", PHI Learning Pvt. Ltd., 2009.
6. Bruce Joyce and Marsha Weils, "Models of Teaching", Pearson; 9 edition (April 14, 2014)
7. Klausmier and Ripple (1971) "Learning and Human Abilities" Harper &Row, New York.
8. Eames Charles & Ray, "An Eames Anthology", Yale University Press, Edited by Ostroff Denial.

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PROGRAM ELECTIVES

22GAPA0	INTELLECTUAL PROPERTY RIGHTS	Category	L	T	P	Credit
		PE	2	0	0	2

Preamble

This course is designed to introduce the importance of Intellectual Property rights and Copyrights and to get awareness of acquiring the patent and copyright for their innovative works. The course also aids the students to register their innovations and protect innovation in the form of intellectual property rights.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO Number	Course Outcome Statement	Weightage *** in %
CO1	Recognize the concept of intellectual Property rights, patents, copy right, trademarks and Value the importance of getting patents and copyrights for the innovations	Understand (15%)
CO2	Get aware on the procedure for applying and receiving the registration in national and international level.	Understand (15%)
CO3	Recognize the process of evolution of Architectural patents and copyrights as a solution with novelty.	Understand (15%)
CO4	Identify the parameters to be considered for the integration of novelty for identified issues in the field of design, construction and management through the case examples.	Understand (15%)
CO5	Summarize the aspects of novelty in their designs to get them patented and copyrighted.	Understand (20%)
CO6	Illustrate the procedure of application of design patent with their works.	Apply (20%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-			-
Understand	100	80	80	80	80
Apply		20	20	20	20

Syllabus

INTRODUCTION- Meaning of property, Origin, Nature, Meaning of Intellectual Property Rights, Provision of IPR under TRIPS and WTO. Kinds of Intellectual property rights—Copy Right, Patent, Trade Mark, Trade Secret and trade dress, Design, Layout Design, Geographical Indication, Plant Varieties and Traditional Knowledge. **PATENT -** Origin, Meaning of Patent, Types, Patentable and Non patentable Inventions, Registration Procedure, Rights and Duties of Patentee, Assignment and licence, Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties. **COPY RIGHT**—Origin, Definition &Types of Copy Right, Registration procedure, Assignment & licence, Terms of Copy Right, Infringement, Remedies, Copy rights with special reference to software. **TRADE MARKS-** Origin, Meaning & Nature of Trade Marks, Types, Registration of Trade Marks, Infringement & Remedies, Offences relating to Trade Marks, Passing Off, Penalties. **DESIGN PATENT & PRODUCT PATENT-** Meaning, Definition, Registration of Design -- Architectural design, Product/Furniture design - **ARCHITECTURAL PATENTS & COPYRIGHTS**- Architectural Patents and Copyrights in the field of Design solutions, Materials and Construction, Management, etc. -Architectural works Copyright protection Act 1980.

References

1. Intellectual property right, Deborah, E. Bouchoux, cengage learning.
2. Intellectual property right - Unleashing the knowledge economy, prabuddha ganguli, Tata Mc Graw Hill Publishing Company Ltd.
3. Intellectual Property Rights and the Law, Dr. G.B. Reddy, Gogia Law Agency.
4. Law relating to Intellectual Property, Dr. B.L.Wadehra, Universal Law Publishing Co.
5. IPR P. Narayanan
6. Law of Intellectual Property, Dr.S.R. Myneni, Asian Law House,
7. www.ipindia.nic.in

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22GAPB0	DESIGN RESEARCH AND FIELD STUDIES	Category	L	T	P	Credit
		PE	2	0	0	2

Preamble

Design research is foundational to understand complex human behaviour and develop that into actionable insights. With a sound research, one can create products, services, and systems that respond to human needs.
This course, aims at:

- Comprehending the importance of research in design by field survey/study, and analyze the results without bias.
- Developing skill to generate a concept for a practice-based research project, which will be empirically grounded in user data collected for the project.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course students will be able to

CO Number	Course Outcome Statement	Weightage *** in %
CO1	Describe various theories and methods in the planning of a practice-based research project.	Understand (10%)
CO2	Appreciate the multifaceted dimensions of design to carry out empirical studies for understanding users.	Understand (10%)
CO3	Perform advanced user studies in line with relevant ethical standards.	Apply (30%)
CO4	Resolve a social problem using appropriate theories and methods.	Apply (30%)
CO5	Identify and interpret issues relating to human behaviour/ human needs and incorporate the humane dimension into architecture.	Analyze (10%)
CO6	Infer the ethical and socio-cultural implications and acquire solutions through research.	Analyze (10%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Remember	-	-	-	-	-
Understand	20	20			20
Apply	60	60	80	80	60
Analyze	20	20	20	20	20
Evaluate	-	-	-	-	-

Syllabus

INTRODUCTION - Orientation to research process – Types of research - Data – types, collection methods - Data description - Descriptive statistics. **DATA COLLECTION AND ANALYSIS -** Data selection and processing - Data Modeling – Data Storage – Data Access - Data Analytics – Data Visualization – Data Standards and Data Quality - Legal, Policy and Ethics. **STATISTICAL MODELING -** Statistical hypothesis generation and testing – Re-sampling methods – Structural Equation Modeling – Factor analysis – Power analysis – Non-parametric testing – Spline based models. **QUALITATIVE RESEARCH -** Philosophy of qualitative research – Data observation – Characteristics and Strategies – Ethnography – Observation and Interpretation – Views on Observation – fieldwork organization – survey research – measurement of specific variables - note taking and interpretation – Historical Research – co-relational research -Visual Research - Case study. **QUANTITATIVE RESEARCH -** Quantitative research - Characteristics and Strategies - Experimental and quasi-experimental research - Simulation Research – logical argumentation – combined strategies– Case study. **RESEARCHING DESIGN -** Comparable and shared qualities of design and research – scope – Approaches to design – Ethics – Readability – Validity – Bias – Field study – Surveying/Questionnaire – Use of Equipments – Instruments – Manual reading – Generation of Standard reports – Data compilation – Data Projection – Reviews – Data

Modification and refinement – Case Study. **ANALYTICS -** Analytics– Analytics Process Model – Analytical Model Requirements - Types of Data - Analytics – Standardizing and categorizing - Data Segmentation – weights of evidence coding – variable selection - T-Test-ANNOVA – Chi square Analysis – correlation and Regression analysis – Multiple regression - F-Test –T-Distribution – Types of Analytics – Case Study - Big data analytics vs Business intelligence, characteristics – Big data tools application

Learning Resources

1. Groat, L. and Wang D., "Architectural Research Methods" second edition, John Wiley & Sons. 2013
2. Knight, A. and Ruddock,L., "Advanced Research Methods in Built Environment", John Wiley & Sons. 2008.
3. Kothari, C.R., "Research Methodology- Methods and Techniques", New Age International. 2004.
4. Henry Sanoff., “Visual Research Methods in Design”, Van Nostrand Reinhold, 1991.

Reference:

1. Bart Baesens, “Analytics in a Big Data World”, The Essential Guide to Data Science and its Applications, Wiley, First edition, 2014.
2. Kevin P. Murphy, “Machine Learning: A Probabilistic Perspective”, Massachusetts Institute of Technology, 2012.
3. Trevor Hastie and Robert Tibshirani and Friedman, “The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition”, Second edition, Springer, 2017.
4. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today’s Businesses", Wiley, 2013.

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22GAPC0	DISASTER MITIGATION AND MANAGEMENT	Category	L	T	P	Credit
		PE	2	0	0	2

Preamble

This course deals with the various disasters and to expose the students about the measures, its effect against built structures, and Hazard Assessment procedure in India. This course also deals with the methods of mitigating various hazards such that their impact on communities is reduced.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO's	Course Outcome Statement	Weightage *** in %
CO1	Comprehend the terminologies and the various types of disaster viz Natural disaster, Man-made disaster, Hydrological, Coastal and Marine Disasters, Atmospheric Disasters, Geological, Mass Movement and Land Disasters, Wind and Water Driven Disasters	Understand (10%)
CO2	Recognize the effects of natural calamities such as flood, tropical cyclones, earthquakes, landslides, heat waves, droughts and Tsunamietc on built structures- Case Examples	Understand (20%)
CO3	Get familiar with the concepts of risk reduction, Relationship between hazard-risk-vulnerability, Resilience, Factors contributing to Vulnerability.	Understand (10%)
CO4	Explore the design strategies and concepts of Disaster Mitigation in built structures- Guidelines for seismic design, restoration, Strengthening of existing buildings, Master planning -urban planning concepts- Case studies	Apply (30%)
CO5	Recognize the phases, stakeholders of disaster management, Guidelines and the policy framework for disaster management in India, Disaster preparedness- Monitoring and prediction -Role of technology.	Understand (10%)
CO6	Explore and infer on the idea of Capacity Building Rehabilitation measures and long-term reconstruction, Recovery-Livelihood options, Socio-economic rehabilitation- Case studies.	Apply (20%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Understand	50	50	50	50	50
Apply	50	50	50	50	50

Syllabus

INTRODUCTION TO NATURAL HAZARDS-.Terminologies- Disaster, Hazard, Vulnerability, Resilience, Relationship between disaster risk, vulnerability and hazard - Relationship between vulnerability and development. **Types of Disasters**-Natural Disaster, Man-made Disaster, Slow onset Disasters & Rapid onset Disasters, Hazard and Vulnerability profile of India - **Understanding the effects of natural calamities** such as flood, tropical cyclones, earthquakes, landslides, heat waves, droughts and Tsunami - Climate change, global sea rise, coastal erosion, environmental degradation, earth tremors & landslides - Urban disaster due to urbanization, desertification, pandemics, complex emergencies- Case studies on disaster in Sikkim Earthquake (2011), Burj-Latur Earthquake, The Indian Ocean Tsunami (2004), Uttarakhand Flash Floods (2013) Chennai Flash flood (2015),Cyclone Phailin 2013.etc.-**Effects on Built structures. DISASTER MITIGATIONBY PLANNING AND DESIGN STRATEGIES Pre-disaster Prevention**-Guidelines for building design and construction in seismic zones, restoration and strengthening of existing buildings –**Case studies** - Japan's approach to earthquake resilience, Preventive flood risk management, Master planning -urban planning concepts- Cities and Climate Change: Adaptation and Mitigation-Case studies on sponge city concepts etc. **DISASTER PREPAREDNESS AND MANAGEMENT: Disaster preparedness:** Disaster Risk Reduction Strategies, Risk Reduction Preparedness Plans, Action Plans and Procedures, Early Warning Systems, Components of Disaster Relief, Disaster preparedness, prevention and mitigation - short term and long-term prediction - Mapping of disaster-prone zones - monitoring and prediction of various hazards and its remedial options - Role of GIS and technology - Early warning system - Role of communication. D**isaster Management:** Introduction to Disaster Management - Phases of Disaster Management. Disaster Management in India-Agencies and stakeholders involved in Disaster Management- Central Government, State Government, District Administration, Armed Forces, Para-Military Forces, Fire Services, NGO's. Disaster Management Plan in India –National Disaster Management Act 2005, The National Policy on Disaster Management, 2009, National Plan on Disaster Management 2016. - National Disaster Management Authority (NDMA) - Do's and Don'ts during various disaster types. **DISASTER RECOVERY AND REHABILITATION:** Disaster Rehabilitation, Reconstruction and Recovery - **Rehabilitation and reconstruction policy**- Design Guidelines for reconstruction,

Temporary livelihood options and socio-economic rehabilitation, Capacity Building Rehabilitation measures and long-term reconstruction- **Case Studies** - Kerala Disaster 2018, Temporary Shelter Construction- India, Kenya Build back better recovery - Nepal, Progressive Housing - El Salvador, Tsunami reconstruction – Tamilnadu, Self-help housing -Turkey, The Production of refugee place -Tibetan Refugees, Community Participation in Disaster Risk Governance - Mumbai and Ghana, social dimension of risk, health and DRM-GADRI Discussions.

Learning Resources

1. Ray.N.Glough, Joseph Penzein, (1996), “Dynamics of Structures”, McGraw Hill International Ltd.
2. Jaikrishna & A.R.Chandrasekaran, (1996) “Elements of Earthquake Engineering”,SaritaPrakashan, Meerut.
3. Berg.GV (1982), “Seismic Design codes and procedures”, EERI, CA.
4. Booth, Edmund (1994), “Concrete Structures in earthquake regions; Design and Analysis”, Longman.
5. Dowrick. D.J (1987), “Earthquake resistant design for Engineers and Architects”,John Wiley & Sons, Second Edition.
6. G.K. Ghosh(1993) “Disaster Management” A.P.H. Publishing Corporation,New Delhi
7. R.B. Singh (1992)“Disaster Management”RawatPublications,New Delhi
8. Ayaz Ahmad(1990) Disaster Management: Through the New Millennium By Anmol Publications,New Delhi
9. Goel, S. L.(1991) “Encyclopaedia of Disaster Management” Deep & Deep Publications Pvt Ltd,New Delhi

IS Codes:

1. IS: 4326-1984, “Indian Std Code of practice for Earthquake Resistant Design and Construction of Buildings”.
2. IS: 1893 (Part I)-2002 “Code of practice for Earthquake Resistant Design of Structures

Course Designers:

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22GAPD0	URBAN ECOLOGY	Category	L	T	P	Credit
		PE	2	0	0	2

Preamble

Urban ecology offers a framework for understanding cities that are environmentally sustainable. This course explores the principles of urban ecology and their application to architecture and urban design. It focuses on the interactions among humans, societies and nature in urban environments; aspects of urban planning as it relates to ecology and the environment. Students learn to apply sustainable and resilient design principles, recognize the ecological impacts of proposed designs, and develop community-based research projects.

Prerequisite

Nil

Course Outcomes

On the successful completion of the course, students will be able to

CO's	Course Outcome Statement	Weightage *** in %
CO1	Understand the principles of urban ecology and their relevance to architecture and urban design	Understand (10%)
CO2	Recognize the impacts of urbanization, human influence on ecosystem and global issues through specific examples and case studies	Understand (20%)
CO3	Illustrate sustainable urban design approaches of cities that incorporate green infrastructure and resilient building design	Apply (20%)
CO4	Illustrate ecological planning principles for preservation and protection of ecologically sensitive areas through case studies	Apply (20%)
CO5	Recognize community-based research projects that incorporate urban ecology principles	Understand (10%)
CO6	Assess the impacts of changes and ecosystem service in case studies through modelling tools	Apply (20%)

Assessment Pattern: Cognitive Domain

Cognitive Levels	Continuous Assessment Tests		Assignment		Terminal Examination
	1	2	1	2	
Understand	40	40	40	40	40
Apply	60	60	60	60	60

Syllabus

Introduction to Urban Ecology: Definition of urban ecology, key concepts and principles, historical perspective, and current trends in urban ecology research. Urban ecosystems and their functions, including nutrient cycling, energy flow, urban biodiversity, patterns and potentials of urban biodiversity, factors affecting urban biodiversity and approaches for conserving urban biodiversity, and ecosystem services. Environmental systems as energy systems - Mechanisms of steady-state maintenance in open and closed systems. **Urbanization and Global issues:** Human influences on ecosystem, Urban growth and development, impacts of urbanization on natural and built environments, and urban-rural interactions, climate change, urban heat island, urban flood, oceans and fresh water pollution, trans boundary air pollution, etc. Exercises: *Study on global issues through specific examples and case studies. Study on localized solutions that incorporate urban ecology principles through specific examples and case studies.* **Introduction to Assessment Tools:** Environmental Impact Assessment (EIA), Ecological Footprint Analysis / Urban Footprint Analysis and Carbon sequestration analysis. Classification of ecological models, Applications of models, Elements of modelling, modelling procedure, modelling tools for assessing urban ecosystem services through case studies. Exercises: Case examples on studying the impact and influence of EIA. **Sustainable Urban Design and Green Infrastructure** Resilience in Ecology and Urban Design, Linking Theory and Practice for Sustainable Cities. Principles of sustainable urban design, Green infrastructure design, Role of green infrastructure, including green roofs and walls, urban forests, urban agriculture, urban parks and green spaces as carbon sinks; wetlands and urban lakes; and sustainable urban design approaches adapting to climate change, watershed management, flood risk etc. **Ecological Planning**: Preservation and protection of ecologically sensitive areas, Coastal zone, Best practices and Case studies. Restoration ecology, Abandoned sites, Brownfield, Reclamation, Remedial measures, Strategies, Solutions. Approaches to engaging communities in urban ecology research, including participatory research methods. International treatises, Land pollution, Overview of Government of India's policies (specific), Green actions of India, Environmental Policies, and Protocols, Global Environmental Initiatives-

Environmental Indicators - National Green Tribunal Act 2010, United Nations contribution to address these issues. Regenerative design, socio-ecological systems and co-evolution.

Learning Resources

1. Ian. L. McHarg, Design with Nature, American Museum of Natural History, National History Press, 1969.
2. Donald Watson, Michael J. Crosbie and John Hancock Callender, Time-Saver Standards for Architectural Design Data, Mcgraw – Hill International Editions, 1997.
3. Steven, S (2004) Site Engineering for Landscape Architects, John Wiley and Sons Inc .
4. Wood, M.L. (1993) Landscape Detailing Vol. I – IV Architectural Press.
5. Kangas, P.C. and Kangas, P., “Ecological Engineering: Principles and Practice”, Lewis Publishers, New York. 2003.
6. Etnier, C. and Guterstam, B., “Ecological Engineering for Wastewater Treatment”, Lewis Publishers, New York. 2007.
7. White, I.D., Mottershed, D.N. and Harrison, S.J., “Environmental Systems - An Introductory Text”, Chapman Hall, London. 2004.
8. Mitsch, J.W. and Jorgensen, S.E., “Ecological Engineering - An Introduction to Ecotechnology”, John Wiley & Sons, New York. 2009

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