

Master of Architecture (Conservation)

The Syllabus

Introduction

India is a country with rich natural and cultural heritage. The variation in heritage is due to geographical locations, time periods, builders, architectural styles, different sizes and scales of cultural heritage, existing traditional knowledge systems, continuity in traditional practices, different categories of built heritage ranging from prehistoric, historic and archaeological sites and different typologies from a building to large cultural regions. Today there are around 3600 centrally protected monuments, around 5000 state protected monuments, large number of living monuments protected by various religious bodies and large number of built heritage under the ownership of either private organizations or private owners. Hence the need of Conservation Architect is felt by all. Today not more than 200 qualified conservation architects are practicing in India, making it a profession in demand. The requirement for a qualified conservation professional is more demanding as with technological advancements the society is drastically changing and it is important to understand the meaning of heritage in the present society. The heritage is also vulnerable due to threats like rapid urban growth, industrial and intensive agricultural activities, growing land prices, encroachments etc.

The present status of education in conservation in India is that four to five universities teach conservation in various formats. No institute is presently imparting conservation education in Central India. The past experience for post graduate admissions at SPA Bhopal has shown many queries and interest of students for the programme in conservation. This inspires our institute to start the Post Graduate Programme in Conservation.

Conservation practice requires a professional with skills towards interpretation of heritage values; maintenance and management of heritage; process and knowledge of construction and building; and knows how to use technological advancements and expertise. Hence the programme in conservation is devised to train the students towards theory and philosophies in conservation, process and techniques necessary for maintenance and management of heritage, appropriate use of standards in practice. This training shall facilitate informed decision making and application of acquired skills and techniques.

Conservation Programme Objectives

The programme shall fulfill the charter of SPA Bhopal towards imparting quality education inclusive of environmental, social and cultural sustenance. It shall build a comprehensive database of India through research and documentation. The Conservation Programme aims at developing appropriate management and technical skills for conservation practice. Thus the trained professionals shall provide leadership in conservation profession.



Applicants to the Programme

Eligibility

Bachelor's Degree in Architecture and Planning (with minimum experience of one year) with not less than 55% marks in aggregate.

Admission Requirements

Students are required to present a portfolio which shall demonstrate their aptitude and experience towards conservation and three letters of recommendation.

The Programme

The programme is divided into five modules namely:

Module	Contents
Theoretical Framework	Theory and Philosophy Focuses on building the theoretical background necessary for all conservation activities including knowledge systems approach, communicative skills, interpretations and understanding of core disciplines of interactions.
Technical Framework	Scientific (Traditional and Modern) Focuses on the various kinds of techniques required to handle various types, scopes, and scales of conservation including various kinds of knowledge required related to materials, structural systems, physical properties and traditional techniques towards making of an artifact or construction of a building.
Management Framework	Scales and Components Focuses on various levels required for management, for various scales of conservation projects likely to be handled by conservation professional. It deals with various approaches required for management including holistic and integrated approach, participatory approach etc.
Operational Framework	Laws and Jurisdiction, Profession Focuses on the administrative, political and legal frameworks under which the conservation works are undertaken. The restrictions and opportunities of jurisdictions towards implementation of various conservation activities are explored.
Application	First Hand Experience on various scales of live project



Structure of the programme

Module	Semester I	Semester II	Semester III	Semester IV
Theoretical Framework	Research Approaches and Social Sciences	Inter-cultural Competence	Research Methodologies	Heritage Impact Assessment
	Traditional Knowledge System	Authenticity and Integrity	Regeneration	
	Natural and Designed Landscape	Cultural Landscape	Sacred Landscape	
Technical Framework	Theory of Materials	Structural Systems	Strengthening and Retrofitting	
	Architectural History	Appreciation and Criticism	Interventions	
Management Framework	Documentation and Communication Techniques	Information and Data Management	<p>Common Pool Elective Conservation :</p> <ol style="list-style-type: none"> 1. Museum Design 2. Disaster Management of Cultural Resources <p>Landscape:</p> <ol style="list-style-type: none"> 1. Landscape and City design 2. The future cities 3. Movement Corridors <p>Urban Design:</p> <ol style="list-style-type: none"> 1. Urban design politics 2. Architectural criticism 3. City and the arts <p>Environment Planning:</p> <ol style="list-style-type: none"> 1. Water Resource Management 2. Energy Auditing and Accounting <p>Urban Regional Planning:</p> <ol style="list-style-type: none"> 1. Urban redevelopment 2. Planning for tourism 3. Quantitative methods and systems analysis 	<p>Elective</p> <p>Option A: Visitor Management</p> <p>Option B: Carrying Capacity</p> <p>Option C: World Heritage Sites</p>
Operational Framework	History of Conservation	Conservation Practice in India and abroad	Professional Training	
Application	Building Level	Area Level	Regional Level	Thesis

The Programme is a two year programme organized in four semesters with practical training in summer vacations for not less than eight weeks.



Assessment

The objective of the evaluation system is to critically assess the thorough understanding of the discipline developed by the student and find appropriate means of assessing the knowledge and skills developed by each individual student. The assessment of all studio subjects shall be through continuous evaluation with due credit given to class participation. Intermediate reviews would be conducted at various stages of work with deliverables in the form of drawings and reports. The assessment of all theory subjects shall be through written exams and assignments. Assessment of understanding of current issues related to course shall be through assignments to be submitted as reports and discussed in class presentations. Case studies would also be given as assignments to understand the methodology and process adopted to carry out projects. In addition to assignments, participation of students in class discussion would be recorded and evaluated time to time. End Semester Evaluation is based on theory examinations, viva-voce examinations or a combination of both depending on the requirement of the subject.

Evaluation Pattern

- The performance of the student shall be evaluated through continuous assessment and it shall be based on minor examinations, class tests, intermediate reviews, assignments/ tutorials, quizzes/ viva voce, studio works, field works, home works, jury etc. and attendance. The end semester examination shall be conducted by means of written papers, practicals, jury and/or viva voce, design reports or a combination of these methods, as specified in the scheme of examination.
- For each subject the distribution of marks for assessment at different stages will be:

Stage 1 (5 weeks from the commencement of classes)	Stage 2 (10 weeks from the commencement of classes)	Attendance	Internal assessment	End semester exam
15%	15%	5%	25%	40%

Note:

- 1) In the subjects having written exam & viva- voce in the end semester exam percentage will be considered as 20% for written exam & 20% for viva-voce exam.
- 2) The stages of marking adopted above will not be applicable for the subjects of professional training, and only one time evaluation at the end of the training period will be done. 50% of subject marks will be awarded by the employer in accordance to the institute format and 50% by the institute.

- All subjects carry number of credits as indicated in the scheme.
- To earn the credits a student has to obtain a minimum of 45% marks in that respective subject.
- It is compulsory for a candidate to appear in the end term examination.



Scheme of Examination M.Arch. (Conservation) Semester I

Subject Code	Subject Name	WCH	ESE format	Credits
MACO 0101	Research Approaches and Social Sciences	4	WR V V	4
MACO 0102	Traditional Knowledge System	2	- V V	2
MACO 0103	Natural and Designed Landscape	2	WR -	2
MACO 0104	Theory of Materials	2	WR -	2
MACO 0105	Architectural History	2	- V V	2
MACO 0106	Documentation and Communication Techniques	4	- V V	4
MACO 0107	History of Conservation	2	WR -	2
MACO 0108	Conservation Studio I (Building Level)	12	- V V	12
TOTAL		30		30

M.Arch. (Conservation) Semester II

Subject Code	Subject Name	WCH	ESE format	Credits
MACO 0201	Inter-cultural Competence	2	WR -	2
MACO 0202	Authenticity and Integrity	2	WR V V	2
MACO 0203	Cultural Landscape	4	- V V	4
MACO 0204	Structural Systems	4	WR -	4
MACO 0205	Appreciation and Criticism	2	- V V	2
MACO 0206	Information and Data Management	2	- V V	2
MACO 0207	Conservation Practice in India and abroad	2	WR -	2
MACO 0208	Conservation Studio II (Area Level)	12	- V V	12
TOTAL		30		30



WCH - Weekly Contact Hours, ESE - End Semester Examination, WR - Written Examination, V V - Viva Voce

Scheme of Examination

M.Arch.(Conservation) Semester III

Subject Code	Subject	WCH	ESE format	Credits
MACO 0301	Research Methodologies & Thesis Programming	3	- V V	3
MACO 0302	Common pool Elective Option A: Museum Design Option B: Disaster Management of Cultural Resources	2	WR -	2
MACO 0303	Sacred Landscape	2	- V V	2
MACO 0304	Strengthening and Retrofitting	2	WR -	2
MACO 0305	Interventions	2	WR -	2
MACO 0306	Regeneration	3	WR V V	3
MACO 0307	Professional Training*	4	- V V	4
MACO 0308	Conservation Studio III (Regional Level)	12	- V V	12
	TOTAL	30		30

M-Arch (Conservation) Semester IV

Subject Code	Semester 4	WCH	ESE format	Credits
MACO 0401	Heritage Impact Assessment	4	- V V	4
MACO 0402	Elective Option A: Visitor Management Option B: Carrying capacity Option C: World Heritage Sites	4	WR V V	4
MACO 0403	Thesis	22	- V V	22
	TOTAL	30		30

WCH - Weekly Contact Hours, ESE - End Semester Examination, WR - Written Examination, V V - Viva Voce

*The professional training shall have a system of contact hours with the expert imparting training to the student



COURSE DETAILS-

M.Arch. (Conservation) Semester I

MACO 0101: Research Approaches and Social Sciences

Objective

The objective is to understand the scientific approach of cultural studies and cultural theories related to perception and interpretation of heritage.

Contents

- Introduction to various core disciplines including Social Sciences (Anthropology, Sociology, History, Art- History, etc.), Archaeology, Museology and Planning.
- Synergies between the core disciplines towards understanding heritage.
- Different Approaches and Methodologies to study Culture.
- Importance of core disciplines in holistic understanding of conservation.
- Impacts of core disciplines on Conservation.
- Understanding various perception and interpretation of heritage.
- Evolving holistic and integrated habits of thought.

Deliverables

- Students will explore various scientific approaches of cultural studies and cultural theories.
- The assignments shall deal with the core subject individually and later through case studies shall lead to holistic understanding of conservation.
- Assignment will be in the form of a report, site visit report, class reviews and tutorials covering topics mentioned above with suitable illustrations and supportive material

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No.
Archaeology in India: Individuals, Ideas and Institutions, 2009	Sengupta, Gautam, ed. and Gangopadhyay, Kaushik, ed.	934 ARC
Researches in Archaeology and Conservation, 1999	Mishra, P.K., ed.	930.1028 RES
The Past is a Foreign Country, Cambridge CUP	Lowenthal David	ISBN: 9780521294805
History of 20th-century Art, Flammarion, 2001	Blistene, Bernard	ISBN: 9782080105646
Heritage Studies: Methods and Approaches	Marie Louise Stig Sorensen, John Carman	ISBN: 9780415431859

MACO 0102: Traditional Knowledge System

Objective

The objective is to edify the difference between the formal education and the cultural knowledge system and to use this traditional and architectural knowledge system for conservation.

Contents

- Difference between formal education and traditional knowledge.



- Traditional Knowledge: Prevailing knowledge within the society transferred through generations including those like prediction of rainfall, language, preserving and storage of food materials etc.
- Architectural Knowledge and its connection to Indigenous Architecture.
- Traditional Architecture and its associative crafts.
- Historic City, a product of people, place and time.
- Historicity and development.
- Architectural Knowledge System as a tool for Conservation.

Deliverables

- Students shall apply the knowledge of traditional and architectural knowledge system for conservation.
- The assignments shall include the study of a historic city and explore the architectural knowledge system as a tool for conservation.
- Assignment will be in the form of reports, drawings and presentations. The students shall make progressive presentations for reviews at various stages.

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No.
The Transformation of Nature in Art (Indira Gandhi National Centre for the Arts)	Coomaraswamy, Ananda K., Vatsyayan, Kapila.	ISBN: 9788120716438
Order of things: An Archaeology of the Human Sciences, 1994	Foucault, Michel	ISBN: 9780415267373
Craft techniques for Traditional Buildings, Batsford, 1991	Wright, A	ISBN: 0713464194
Traditional Building: A global survey of structural forms and cultural functions	Noble, Allen G.	ISBN: 9781890206628
Vernacular Architecture and Regional Design: Cultural Process and Environmental Response, 2009	Heath, Kingston Wm	720.103 HEA-V

MACO 0103: Natural and Designed Landscape

Objective

The objective is to understand the difference between Natural and Designed Landscape. It shall elaborate on the need and means to tackle the various issues related to conserving the historic landscapes, as an important aspect of cultural heritage.

Contents

- Understanding Geography and natural habitats.
- Understanding of ecology, biodiversity and climate change.
- Changing attitude of mankind towards nature and its response in landscape designs.
- Role of site planning, flora and fauna, water systems etc. in landscape designs.
- Historic Landscape and Landscape Design.
- Indian definitions to open spaces and designed landscapes.
- Natural and designed landscapes as an important cultural resource, conservation and management of historic landscapes.



Deliverables

- Students shall develop skills to identify, maintain and manage natural and designed landscapes.
- The assignments shall include case studies and application of principles for conservation.
- Assignment will be in the form of reports, reviews and tutorials with suitable illustrations.

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./ Publisher
Arguments for protected areas: Multiple benefits for conservation and use, 2010	Stolton, Sue, ed. And Dudley, Nigel, ed.	333.9516 ARG
Community-based biodiversity conservation in the Himalayas, 2011	Gokhale, Yogesh, ed. And Negi, Ajeet K.	333.9516 COM
Earth-scan reader in poverty and biodiversity conservation , 2010	Rose, Dilys, ed. And Elliott, Joanna, ed.	333.9516 EAR
Landscape-scale conservation planning, 2010	Trombulak, Stephen C., ed. And Baldwin, Robert F., ed.	333.72 LAN
Managing and designing landscapes for conservation: moving from perspectives to principles, 2007	Lindenmayer, D.B., ed. And Hobbs, R.J., ed.	712 MANK8
Historic Gardens: making an Inventory for the Indian context, 2006.	Priyaleen Singh	New Delhi: INTACH.

MACO 0104: Theory of Materials

Objective

The objective is to understand the traditional materials their behavior and changes due to various atmospheric elements.

Contents

- Introduction to building materials: location, formation, physical and chemical properties and sourcing of building materials.
- Characterization of materials and compatibility of its usage.
- Relationship between various historic building materials and historic buildings.
- Maintenance requirements of building materials.
- Diagnosis and assessment of defects in building materials by atmospheric elements.
- Remedial measures.
- Strengthening of building materials.
- New building materials.

Deliverables

- Students will acquire knowledge of traditional materials and their behaviour and workability.
- The assignments shall include on site observation and application to develop measures of conservation.
- Assignment will be in the form of site visit report, class reviews and tutorials covering topics mentioned above with suitable illustrations and supportive material



Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
Architectural Tiles : Conservation and Restoration from the Medieval Period to Twentieth Century, 2005	Durbin, Lesley	738.60288 DUR-A
Conservation of Building Stones, 2001	Kumar, V.A.	720.288 KUM-C
Low-tech, Light-tech and High-tech : Building in the Information Age, 2000	Daniels, Klaus	721.04672 DAN-L
Lime and Lime mortars, Donhead Shaftesbury, 1998	Cowper, A. D.	ISBN: 9781873394298
Material and Skills for Historic building Conservation, Blackwell Publishing, 2008.	Forsyth, Michael	ISBN: 9781405111706
What are Lime Mortars	Gurmeet S. Rai, P. Desarkar	INTACH publication
Why Use Lime	Sangeeta Bais	INTACH publication

MACO 0105: Architectural History

Objective

The objective is to explain the historic evolution of architecture/architectural idioms based on examples of buildings from different time periods and various contexts. The students will be exposed to the theory of parallel history, technological advancement of that era and establishment of the process of evolution of architectural idioms or no idioms.

Contents

- Architecture a product of people, place and time leading to the theory of parallel history and technological advancements.
- Introduction to evolution of architectural idioms.
- Relationship between architectural idioms, time period and countries.
- Hybrid architecture and building of no idiom.
- Analysis of architectural idioms.
- Identifying additions and alterations to buildings.
- Solutions for additions, alterations and new construction to historic buildings.

Deliverables

- Students shall be acquainted with the theory and principles of architectural idioms.
- The assignments would include study and interpretation of architectural idioms and dealing with addition and alterations to buildings.
- Assignment will be in the form of reports, drawings and presentations. The students shall make progressive presentations for reviews at various stages.

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
New light on Hampi: Recent Research at Vijayanagara, 2006	Fritz, John M., ed. And Michell, George, ed.	726.121 NEW
Archaeology and Monumental Remains of Delhi, 2002	Stephen, C.	725.94095456 STE-A



Fire and Memory : Architecture and Energy, 2000	Fernandez-Galiano, Luis	720.472 FER-F
Sarkhej – Roza complex – CEPT University	Desai, Miki	720.288095475 SAR
Chambal Valley: a Heritage Treasure, 2010	Willis, Michael	930.10954 WIL-C

MACO 0106 Documentation and Communication Techniques

Objective

The objective is to develop the necessary technical skills and competence required for the preparation of inventories of cultural resource for survey, analysis and recording. The module emphasizes the need for a methodical and systematic process for inventory as an essential basis for management and conservation plans. The section on Communication Techniques shall equip the students to competently communicate their thoughts and ideas in written, oral or visual form.

Contents

- Understanding and need for documenting any
- Introduction to various methods of documentation.
- Standards of documentation.
- Difference between data and documentation.
- Appropriate documentation techniques of various scales and components of cultural resources.
- Application of documentation techniques.
- Communicating documentation including technical skills and competence.
- Photogrammetry and Cloud computing.

Deliverables

- Students shall acquire necessary skills towards documents and communication techniques.
- The assignments would include preparation of inventories, drawings and collection of data.
- Assignment will be in the form of reports, drawings and presentations. The students shall make progressive presentations for reviews at various stages.

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
Measurement and Recording of Historic Buildings – Donhead, 1993	Swallow, Peter	ISBN: 9781873394083
Surveying Historic Buildings, Donhead, 1996	Watt, D & Swallow P	ISBN: 9781873394670
Guide to recording Historic Buildings, Butterworth, 1990.	ICOMOS	ISBN: 075061210X
Architectural Heritage: Inventory and Documentation, Methods in Europe, Council of Europe, 1992	Proceedings, French Ministry for education and culture	ISBN: 9287123411
Manual on Systems of Inventorying Immovable Cultural Property, UNESCO, 1984	Meredith H. Sykes	ISBN: 9789231020803



MACO 0107: History of Conservation

Objective

The objective is to introduce personalities, ideologies and various philosophies that helped to formulate the principles of conservation discipline as it exists today in India and abroad. The students shall be introduced to the various charters and development of UNESCO as the global agency and its role in the field of conservation.

Contents

- Difference between archeology and conservation.
- History of conservation movement and emergence of conservation.
- Definitions and terminologies in conservation.
- Principles and approaches of conservation.
- UNESCO, World Heritage Centre and World Heritage Sites.
- Emerging concepts in heritage.
- Application of principles, approaches and concepts of conservation in practice.

Deliverables

- Students shall be acquainted with the philosophies and principles of conservation.
- The assignments shall include studies of various charters and roles of various organisations in conservation.
- Assignment will be in the form report, class reviews and tutorials covering topics mentioned above with suitable illustrations and supportive material

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
Protecting the cultural heritage : National Legislation and International Conventions, 1999	Biswas, S. S.	344.094 BIS-P
Care and administration of heritage monuments in India 1784 - 1904 -2012	Pant, Dharendra Kumar	725.940954 PAN-C
Conservation: principles, dilemmas and uncomfortable truths, 2009	Bracker, A., Ed. and Richmond, A., ed.	363.69 CON
Revealing India's Past (COSMO PUBLICATION)	Cumming Sir John	ISBN81-307-0087-5
The Conservation Movement: a History of Architectural Preservation(ROUTLEDGE 2013)	Glendinning, Miles	978-0-415-54322-4
Approaches to the Archaeological Heritage: A Comparative Study of World	Cleere Henry	ISBN:9780521243056



MACO 0108: Conservation Studio I

Objective

The objective is to experience and find solutions to the problems and issues confronting historic buildings/site.

Contents

- Understanding historic buildings/site.
- Demarcation of historic sites and its relationship to surroundings.
- Understanding the building and composition of building materials.
- Identification of function, use and condition of the buildings/site.
- Statement of Significance of historic buildings/site.
- Maintenance, Management and Conservation of the buildings/site includes planning interventions.
- Memory

Deliverables

- Students shall study and find solutions to problems and issues confronting historic building/site.
- The studio shall be progressive work in group. Deliverables shall include drawings and report. Progressive presentations shall be made for reviews at various stages.



M.Arch. (Conservation) Semester II

MACO 0201 Inter-cultural Competences

Objective

The objective of the module is to sensitize students to the significance of cultural influences, to become aware of cultural differences and similarities, and to encourage others to interact and communicate efficiently with people of diverse cultural backgrounds.

Contents

- Inter-cultural and cross-cultural communication.
- Importance of verbal and non-verbal communication.
- Coding and Decoding of verbal and non-verbal communication in its cultural context.
- Developing skills for inter-cultural communication.
- Understanding relationship between culture and globalization.
- Understanding process of globalization to international politics including politics of/for heritage.
- Understanding the relationship between local culture and global citizenship.

Deliverables

- Students shall be equipped to interact and communicate with people of diverse cultural background.
- The assignments shall include application of skills in primary survey.
- Assignment will be in the form of reports, reviews and tutorials with suitable illustrations.

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
Art of Central Asia and the Indian subcontinent in Cross-Cultural Perspective, 2009	Pande, Anupa, ed.	709.58 ART
Beginning theory: An Introduction to literary and cultural theory, 2011	Barry, Peter	801.95 BAR-B
Crossing cultural frontiers : Biblical themes in Mughal painting, 2011	Verma, S. P.	759.04 VER-C
Encyclopedia of Vernacular Architecture of the World	Paul Oliver (Editor)	ISBN-10: 0521564220
Lateral and Parallel Thinking	Bono, Edward de	http://www.edwdebono.com/debono/lateral.htm

MACO 0202: Authenticity and Integrity

Objective

The objective is to introduce debates and understanding concepts of authenticity and integrity. The subject will elaborate authenticity in terms of functions forms, designs, materials and location and Integrity as the wholeness of the heritage.



Contents

- Defining authenticity and integrity
- The context of Nara document and its importance on defining heritage.
- Role of traditional knowledge system in defining authenticity and integrity.
- Authenticity and integrity in Indian context.
- Traditional concepts of reconstruction like – *Jeernodhar* in light of authenticity and integrity.
- Authenticity and integrity as a bench mark of heritage.
- Application of authenticity and integrity in conservation.

Deliverables

- Students shall learn the theory and practice of concepts of authenticity and integrity.
- The assignments shall include application of authenticity and integrity in conservation.
- Assignment will be in the form of a report, class reviews and tutorials covering topics mentioned above with suitable illustrations and supportive material

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
Management Guidelines for World Cultural Heritage Sites. 2 nd ed. Rome: 1998	Feilden, B.M. & Jokilehto, J.	ICCROM
Campaign Authenticity: a series of workshops held in SPA Delhi, 2002, Coordinator: Prof Nalini Thakur, HOD, Dept of Architectural Conservation, SPA Delhi	Kawathekar, V., Chandra, S. & Kodasi, S.	Unpublished Report SPA Delhi
The Nara Document on Authenticity (Nara Conference on Authenticity in relation to the World Heritage Convention held at Nara, Japan from 1-6 November 1994	UNESCO, WHC	www.whc.unesco.org

MACO 0203 Cultural Landscapes

Objective

The objective is to build understanding for protection and management of cultural landscape.

Contents

- Definition of Cultural Landscapes including ecology of the place.
- Methodology of defining and recognizing Cultural Landscapes/ Regions.
- Techniques for assessing the cultural values of a Cultural Landscapes/ Region.
- Demarcating Cultural Landscapes through various parameters like political, physical, natural, linguistic boundaries etc.
- Methods of mapping the Cultural Landscapes.
- Analysis of Cultural Landscapes.
- Management and Conservation of Cultural Landscapes /Regions.



Deliverables

- Students shall acquire knowledge about cultural landscapes..
- The assignments would include application of concepts towards identification, demarcation and mapping of cultural landscapes.
- Assignment will be in the form of reports, drawings and presentations. The students shall make progressive presentations for reviews at various stages.

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
Conservation of Cultural Landscapes, 2006	Agnoletti, Mauro, ed.	304.2 CON
Archaeology of the Ganga Plain: Cultural-Historical Dimensions, 2010	Singh, Purushottam	930.10954 SIN-A
Built to meet Needs: Cultural Issues in Vernacular Architecture, 2006	Oliver, Paul	720.103 OLI-B
Heritagescapes and Cultural Landscapes, 2011	Singh, Rana P.B., ed.	304.2 HER

MACO 0204 Structural Systems

Objectives

The objective is to induce a better understanding of the structure and fabric of historic structures. The focus is on analysis of and interventions to the historic building structure.

Contents

- Introduction to construction techniques and structural components in a historic structure.
- Understanding various types of historic structural systems
- Structural analysis of historic structures.
- Understanding various techniques for structural analysis.
- Understanding the failure and distress in historic structures and development of new forms.
- Inspection and diagnosis of structures.
- Past remedial measures and its impact to the structures.

Deliverables

- Students shall acquire knowledge about historic structures.
- The assignments shall include observations of actual structure and interpret the structural systems.
- Assignment will be in the form of reports, reviews and tutorials with suitable illustrations.



Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
Structural Aspects of Building Conservation	Beckmann, Poul	ISBN 1417544341
Structures: Why things don't fall down	Gordon, J. E	ISBN:0306812835
Structures and Construction in Historic Building Conservation	Forsyth, Michael	ISBN: 9781405111713
Developments in Structural form, Allen Lane , 1975	Mainstone, Rowland	ISBN:9780713903331
Structural Appraisal of Historic Buildings	Robson, P	ISBN:9781873394687
The Stone Skeleton	Heyman, J.	ISBN: 9780521629638

MACO 0205 Appreciations and Criticism

Objective

The objective is to develop the ability towards appreciation and criticism as a tool to provide informed feedback on conservation project.

Contents

- Understanding linkage between philosophy, history, theory and practice in architecture and conservation.
- Relationship between idea and interpretation.
- Difference between review, appreciation and criticism.
- Relationship between criticism and practice.
- Techniques of appreciation and criticism.
- Appreciation and criticism as a tool to provide feedback.
- Writing appreciation and criticism.

Deliverables

- Students shall acquire knowledge and difference about appreciation and criticism.
- The assignments shall include short paper writing on appreciation and criticism of a heritage structure/ site.

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
Locating Cultural Change: Theory, Method, Process, 2011	Chanda, Ipshita ed.	306.0954 LOC
Urban culture: Critical concepts in literary and cultural studies, 2004	Jenks, Chris, ed.	307.76 URB
Rethinking Architectural Historiography, Routledge, 2006	Dana Arnold, Elvan Altan Ergut, Belgin	ISBN:041536082X
Critical Architecture, Routledge, 2007	Rendell Jane, Hill Jonathan, Fraser Murray	ISBN:0203945662
Architecture, Criticism, Ideology, Princeton Architectural Press, 1985	Ockman, Joan	ISBN: 9780910413046



MACO 0206 Information and Data Management

Objective

The objective is to expose the students to various modes and techniques in organizing data including GIS and Microsoft Access.

Contents

- Documentation as a data and resource.
- Various forms of data generated in conservation projects.
- Data compilation and storage.
- Various modes and techniques of organizing data.
- Linking data.
- Data analysis.
- Interpretation of data

Deliverables

- Students shall learn various methods and techniques of organising data.
- The students shall compile data develop system of storage, link, analyse and interpret data .
- Assignment will be in the form of reports, drawings and presentations. The students shall make progressive presentations for reviews at various stages.

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
Digital Heritage: Applying Digital Imaging to Cultural Heritage, 2006	MacDonald, Lindsay, ed.	025.84 DIG
Digital Applications for Cultural and Heritage Institutions (Ashgate)	James Hemsle, Vito Cappellini, Gerd Stanke	ISBN: 978-0-7546-3359-4
Analyzing Complex Survey Data	Eun Sul Lee and Ronald N. Forthofer	300.727 LEE-A
Geographic Information Analysis	David O'Sullivan and David J. Unwin	910.285 SUL-G
Making Maps: a Visual Guide to Map Design for GIS	John Krygier and Denis Wood	526 KRY-M

MACO 0207 Conservation Practice in India and abroad

Objective

The objective is to understand relationship between laws with their jurisdiction and its relationship to conservation practice.

Contents

- Protected and unprotected heritage in India.
- Laws and its jurisdiction
- Laws for protection of heritage in India including the provisions under the Constitution of India and 73rd and 74th amendments to the Constitution; AMASR act 1958, Antiquities and Art Treasures Act 1972, The Public Records Act of 1993, Hampi World Heritage Area Management Authority Act 2002, Majuli Cultural Landscape Region Act 2006; Town and Country planning Act, Maharashtra Region



Town and Country Planning Act 1966 Gazette a 'Draft list of heritage buildings and precincts for Greater Mumbai the Andhra Pradesh Urban Area Act 1975; Indian forest Act , Land Acquisition Act 1827, Public Premises Eviction Act 1971etc. Coastal Regulation Zone (CRZ) Regulation; Cantonment Act 2006 and Environment (Protection) Act, 1986 etc

- Legal protection under Ancient Monuments and Archaeological Sites and Remains Act of 1958 with all its amendments(July 1992 notification and The Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010) and the corresponding State Acts.
- Role of Archeological Survey of India, National Monument Authority, etc in protection of heritage in India.
- Legal systems of protection of heritage across the globe.
- Various plans for conservation including, management plan, conservation plan, etc and its statutory status.

Deliverables

- Students shall learn about law for protection of heritage in India.
- The assignments shall be based on legal documents and their reviews.
- Assignment will be in the form of reports, reviews and tutorials with suitable case studies.

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
The Law and the Conservation of Man-made Heritage in India,1989	E.F.N. Ribeiro	New Delhi: INTACH
Ancient monuments and Archaeological Sites and Remains Act, 1958: with Rules Amendments, Notifications and Orders, 2007	Tripathi, Alok	344.094 TRI-A
Time, Process and Structured Transformation in Archaeology, 2010	McGlade, James, ed. and Leeuw, Sander Van Der, ed.	930.1 TIM

MACO 0208 Conservation Studio II

Objective

The objective is to introduce the problems and issues confronting historic core and urban areas.

Contents

- Understanding historic core and its linkage to developing city.
- Demarcation of historic core and its relationship to surroundings.
- Understanding the historic core in terms of built and open spaces, skyline, interface and transitions.
- Identification of function, use and condition of the buildings/site/historic cores.
- Statement of Significance.
- Maintenance, Management and Conservation plan.
- Planning Interventions.

Deliverables

- Students shall study and find solutions to problem and issues confronting historic core/urban areas.
- The studio shall be progressive work in group. Deliverables shall include drawings and report. Progressive presentations shall be made for reviews at various stages.



M.Arch. (Conservation) Semester III

MACO 0301 Research Methodologies & Thesis Programming

Objective

The objective is to carry out independent theoretical research which may form the theoretical framework of the thesis.

Contents

- Skills towards technical writings.
- Research Design and Methodologies includes social research methods..
- Writing Hypothesis.
- Forms of data collection and data presentation.
- Writing Research Analysis and Conclusion.
- Writing Bibliography/References/Sources of information
- Thesis Programming including selection of thesis topic and preparation of synopsis.

Deliverables

- Students shall be equipped with theoretical research
- Assignments includes a research paper of 5000 words on theoretical framework required for thesis.

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
Architectural Research Methods, John Wiley and sons, 2002	Linda Groat, David Wang	ISBN:0471333654
Writing a Qualitative Research. 3 rd ed. , 2009.	H.F. Wolcott	New Delhi: Sage Publications.
A Manual For Writers For Research Paper, Thesis And Dissertation, Chicago, 2007	Turabian, Kate L.	ISBN: 0226823385

MACO 0302 Regeneration

Objective

The objective is to build the skills towards analyzing and developing cultural infrastructure through principles of traditional knowledge systems.

Contents

- Identification of Cultural Properties.
- Cultural vibrancy of the place: People, Quality of life, Intangible etc
- Regeneration and its needs.
- Regeneration process and its critical consideration like physical and cultural infrastructure.
- Heritage a tool for Urban Regeneration.
- Digress needs but Heritage Conservation an integral part of Urban Regeneration.
- Viability of Heritage Conservation as a tool for Urban Regeneration.



Deliverables

- Students shall be equipped with skill to develop cultural infrastructure.
- Assignments shall include identification of cultural properties and explore heritage conservation as a tool of Urban Regeneration.
- Assignment will be in the form of reports, reviews and tutorials with suitable case studies.

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
Partnership, Collaborative Planning and Urban Regeneration	McCarthy, John	ISBN:9780754613756
The Economics of Uniqueness: Investing in Historic City Cores and Cultural Heritage assets for sustainable Development	Guido Licciardi, Rana Amirtahmasebi	The world Bank, 2012
Conservation in the Age of Consensus, Routledge, 2009	John R. Pendlebury	ISBN: 0415249848
Chronocity: The Assessment of Built Heritage for Developable and Creative Change, Alinea, Editrice 2010	Dimitra Babalis	ISBN:8860555523
The New Economy of the Inner City: Restructuring, Regeneration and dislocation in the twenty first century Metropolis, 2008	Thomas A Hutton	ISBN:203933656

MACO 0303 Sacred Landscapes

Objective

The objective is to understand the concept of sacred landscapes, understanding and its connection to religion as a way of living.

Contents

- Concept of sacred landscape.
- Connection between religion and sacred landscape.
- Pilgrimage as an integral component of sacred landscape.
- Historic/religious cities as sacred landscape.
- Components of sacred landscapes including built, forest, water systems, etc.
- Analysis of sacred landscape.
- Protection, management and conservation of sacred landscape.

Deliverables

- Students shall acquire knowledge about uniqueness of sacred landscapes and its importance in Indian context.
- Assignments will include exploration to analyze the sacredness in a landscape and its uniqueness and its connection to historic core.
- Assignment will be in the form of reports, drawings and presentations. The students shall make progressive presentations for reviews at various stages.



Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
Thanjavur: a Cultural History, 2010	Chakravarthy, Pradeep	726.145 CHA-T
Vijayanagara Visions: Religious Experience and Cultural Creativity in a South Indian empire, 2007	Jackson, W.J.	954.87 JAC-V
Lingraja temple of Bhubaneshwar : Art and Cultural Legacy, 2008	Behera, K.S.	726.1450954133 BEH-L
Kalamukha temples of Karnataka : Art and Cultural Legacy, 2012	Filliozat, Vasundhara	726.145095483 FIL-K
Power of Urban Ethnic Places: Cultural Heritage and Community Life, 2011	Lin, Jan	307.7608900973 LIN-P
Sacred Landscapes in Asia: Shared Traditions, Multiple Histories, 2007	Ray, H. P. (ed)	New Delhi: IIC-Manohar

MACO 0304 Strengthening and Retrofitting

Objective:

The objective is to understand the behavior, repair and strengthening solutions of structural system of historic structures and also upgrading them to cater to the contemporary demands and needs.

The detailing of appropriate option of interventions will lead to making of an implementable document. Case studies of Completed project shall be evaluated towards quantification and quality.

Contents

- Introduction to repair and strengthening in historic structures.
- Understanding various methods of strengthening of historic structures.
- Understanding the failure and distress in historic structures.
- Understanding degradation and repair of materials.
- Assessment and diagnosis of structural system of the structures.
- Introduction to various advance techniques of strengthening and retrofitting.
- Remedial measures and solutions for strengthening and retrofitting of structures.
- Estimation including extracting information from documentation and preparation of estimates; writing specification for various items; rate analysis for special items and sequencing of items.

Deliverables

- Students will acquire skills to find appropriate remedial measures and solutions for strengthening and retrofitting of structure.
- Assignments will include on site observation and analysis and formulating proposal for remedial measures and solutions for strengthening and retrofitting of a structure.
- Assignment will be in the form of reports, reviews and tutorials with suitable illustrations.

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link



Lighting Retrofit and Relighting: a Guide to green lighting solutions, 2011	Benya, James R.	621.321 BEN-L
Repair of Ancient Buildings, Society for Protection of Ancient Buildings, 1981	Powys, A. R.	ISBN:189885601X
Structural Conservation of Monuments in South India, 1997	Murthy, K.L.	720.954 MUR-S
Sustainable Home Rrefurbishment : the Earthscan expert guide to retrofitting homes for efficiency, 2010	Thorpe, David	696 THO-S
Structural Aspects of Building Conservation, McGraw Hill, 1995	Beckmann, Poul	ISBN: 0750657332
Conservation Manual: A handbook for the use of Archaeological Officers and others entrusted with the care of ancient monuments, 1923	John Marshall	Calcutta: Superintendent Government Printing, Archaeological Survey of India
Analysis of Rates for Delhi - CPWD	CPWD	cpwd.gov.in/deputation/ar1-final.pdf

MACO 0305 Interventions

Objective

The objective is to explore various options of minimal intervention and choosing the appropriate option balancing the heritage needs and development needs. Case studies will be for extracting information from documentation and preparing detail project reports. Completed project shall be evaluated towards quantification and quality.

Contents

- Principles of minimal intervention.
- Scales and components of Intervention.
- Degree of Intervention.
- Exploring options of Intervention.
- Choosing the appropriate Intervention.
- Planning Intervention.
- Impact of the Intervention on the original.
- Evaluation including evaluating a completed project for its efficacy of interventions; evaluating a project for its adaptive reuse and understanding the impact of proposed interventions on conservation project.

Deliverables

- Students shall explore various options of intervention in the heritage context.
- Assignments to include case studies and site work for exploring option, selecting the right option and planning interventions.
- Assignment will be in the form of reports, reviews and tutorials with suitable illustrations.

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
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Heritage Conservation: Preservation and Restoration of Monuments – 1996	Batra, N.L.	720.288 BAT-H
Conservation of wooden objects – 2009	Bisht, A. S.	709.54 BIS-C
Conservation of building stones – 2001	Kumar, V.A.	720.288 KUM-C
Structural conservation of monuments in South India – 1997	Murthy, K.L.	720.954 MUR-S
Taj Mahal and its conservation – 2009	Dayalan, D.	720.954 DAY-T
Damp Buildings: Old and New. (ICCROM)	Massari, G.; Masari,	ISBN: 9290771119
A Guide to the Project Management Body of Knowledge: PMBOK(R) Guide	Project Management Institute	ISBN 9871935589679
Building Performance: Function, Preservation, and Rehabilitation	ASTM Special Technical Publication	ISBN-10: 0803104588

MACO 0306 Common Pool Elective

Objective

The objective is to enhance the knowledge of students by teaching them various subjects related to heritage aspects.

Option A: Museum Design

Objective

The objective is to train and develop skills for Museum Design.

Contents

- Introduction to Museums.
- Collections and Artifacts.
- Determinants for planning of museums.
- Standards and principles for designing of Museums.
- Vertical and horizontal circulation in Museums.
- Museum environments and designing New Museums.
- Adapting existing structures for Museums.

Deliverables

- Assignment will be in the form of a report, site visit report, class reviews and tutorials covering topics mentioned above with suitable illustrations and supportive material.

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
Museum: Design the Future, Booksurge Llc, 2009	George Jacob	ISBN: 1439235740
Reshaping Museum Space, Routledge, 2005	Suzanne Macleod	ISBN: 0203483227
Manual of Museum Planning: Sustainable Space, Facilities, and Operations	Barry Lord, Gail Dexter Lord, Lindsay Martin	ISBN: 0759121478
Museum Management	Kevin Moore	ISBN: 1134830653
Museums in motion: an introduction to the history and functions of museums	Edward Porter Alexander	ISBN: 075910509X

Option B: Disaster Management of Cultural Resources

Objective

The objective is to train and develop skills for Disaster Management of Cultural resources.



Contents

- Introduction to Disaster Management.
- National Disaster Management System of India.
- Analyze the vulnerability of cultural heritage for physical, socio economic and political risks.
- Risks to Cultural Resources during Disaster.
- Techniques and Strategies for mitigating risks to cultural heritage.
- Protecting Cultural Heritage in times of conflict and other emergencies.
- Planning for post-disaster recovery of cultural heritage.

Deliverables

- Assignment will be in the form of a report, site visit report, class reviews and tutorials covering topics mentioned above with suitable illustrations and supportive material.

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
Industrial Buildings: Conservation and Regeneration, Taylor and Francis, 2009	Stratton, Michael	ISBN: 1135807817
Architecture Reborn: Converting Old buildings for New Uses, Rizzoli, 1999	Powell, Kenneth	University of Michigan
Disaster management	Harsh K. Gupta	ISBN: 8173714568

MACO 307 Professional Training

Objective

The objective is to introduce all aspects of professional project works and importance of the conservation professional.

Contents

Training

- Training is an opportunity to test knowledge and implement studies in conservation for practice.
- The training is for hands on experience towards acquisition of skills.
- The training is expected to take place at a working site with pre approval of institute for a period of minimum eight weeks in summer vacation between semester II and semester III.
- The training can take place with a master's craftsman, an architect's or engineer's office with a practice in conservation, and/or any government organization/NGO/private organization/ owner with live conservation project.
- Training shall enhance ability to handle real life situation and dynamics of conservation.

Project Formulations and Appraisal

- Definition of Project and Project Management
- Introduction to Project Appraisal
- Project Planning and Project Scheduling



- Project Monitoring
- Types of Project Evaluation
- Bids and Tenders
- Contracts and Arbitration

Deliverables

- Students shall acquire skill to develop and appraise project.
- Assignment to include preparation of project.

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
CPWD Contract Document	CPWD	cpwd.gov.in/manualvolume2.pdf
Construction Contracts, Law and Management	Will Hughes, Ronan Champion, John Murdoch	ISBN: 9780415393690, Routledge
Projects	Prasanna Chandra	9780070077935, Mc Graw Hill
Contracts and their Management	Ramaswamy BS	ISBN 9788180381713

MACO 308 Conservation Studio III

Objective

The objective is to introduce the students to the identification of heritage, problems and issues confronting heritage at a regional scale.

Contents

- Understanding heritage at a regional scale like- cultural landscapes, etc.
- Identification of heritage with a knowledge system approach.
- Demarcation of the heritage area including revenue boundaries and ownership.
- Statement of Significance.
- Identification of function, use and interdependency within the region.
- Understanding the needs of heritage management and development towards sustainable future.
- Preparation of heritage management strategy.

Deliverables

- Students shall study and find solutions to problem and issues confronting heritage at regional scale.
- The studio shall be progressive work in group. Deliverables shall include drawings and report. Progressive presentations shall be made for reviews at various stages.



M.Arch. (Conservation) Semester IV

MACO 0401 Heritage Impact Assessment

Objective

The objective is to develop skills towards Heritage Impact assessment to assess the impact of development on heritage in various conditions.

Contents

- Understanding principles of impact assessment.
- Heritage impact assessment.
- Methodology for Impact assessment.
- Understanding impact of development on the heritage value.
- Base line conditions for impact assessment.
- Significance of impact with and without mitigation.
- Residual effects.

Deliverables

- Students shall acquire skills towards Heritage Impact Assessment.
- Assignment shall include a case study and preparation of Heritage Impact Assessment.
- Assignment will be in the form of reports, drawings and presentations. The students shall make progressive presentations for reviews at various stages.

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
Risk Preparedness: A Management Manual for World Cultural Heritage ICCROM, 2007	Stovel, H	ICCROM publication
ICOMOS guidelines for cultural world heritage properties, Jan 2011.	ICOMOS	ICOMOS publication
A Cultural heritage assessment of the impact on the outstanding universal value of the Greenwich maritime world heritage site, 2010	ICOMOS	ICOMOS publication
Management Guidelines for World Cultural Heritage Sites ICCROM, 2005	Feilden, B.M.; Jokilehto, Jukka	ICCROM publication

MACO 0402 Elective

Objective

The objective is to enhance the knowledge to develop specialization in handling complex management issues.

Option A: Visitor Management

Objective

The objective is to create awareness towards different types of visitors and their needs in finding management solution.



Contents

- Identification of different types of visitors.
- Formal and informal tourists.
- Pilgrimage and its linkage to cultural tourism.
- Organization and traditional facilities for visitors.
- Visitor needs and expectation.
- Infrastructural requirements.
- Critical consideration for visitor management.

Deliverables

- Students shall acquire knowledge about visitors and finding management solution.
- Assignment shall include working out infrastructural requirements for visitors.

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
Cultural Heritage and Tourism: An Introduction	Timothy, Dallen J.	ISBN: 1845411765
Heritage Visitor Attractions: An Operations Management Perspective, Thomson, 1999	Leask, Anna, Yeoman, Ian	ISBN: 0826460615

Option B: Carrying Capacity

Objective

The objective is to understand the process of calculating carrying capacity of Heritage site.

Contents

- Visitors Data.
- Future projection of visitors to the site.
- Impact of visitors on Heritage Site.
- Calculating of threshold of Heritage site towards visitors to the site.
- Identifying Indicators.
- Calculating carrying capacity.

Deliverables

- Students shall acquire skills to calculate carrying capacity.
- Assignment shall include exercise to calculate the carrying capacity for a heritage site.

Suggested Readings

Readings	Authors	SPAB Library code/ISBN No./Publisher/website link
Tourism Carrying Capacity Assessment	Ashgate. 2004 Mexa	ISBN: 075463569
Managing tourism at World Heritage Sites	UNESCO	UNESCO publication
Tourism and Archaeological Heritage Management at Petra, ICAHM, 2012	Douglas C.	ISBN: 1461414814



Option C: World Heritage Sites

Objective

The objective is to develop skills in management of World Heritage Sites.

Contents

- Operational Guidelines.
- Statement of Significance.
- Process of Nomination.
- Nomination Dossiers.
- Requirements of Management of World Heritage Sites.
- Facilitation requirements.
- Impact of nomination of World Heritage Site on socio economic condition of the surroundings.

Deliverables

- Students will acquire knowledge about nomination process of World Heritage Site.
- Assignment shall include preparation of tentative list document for a given site.

Suggested Readings

Readings
Convention concerning the protection of the World Cultural and Natural Heritage: adopted by the General Conference at its 17 th session, Paris. UNESCO 1972
Operational Guidelines for the implementation of World Heritage Convention, World Heritage Centre. UNESCO, 2003

MACO 0403 Thesis

Objective

The objective is to develop and acquire more specialized knowledge in the field of conservation through conservation projects or scientific research.

Contents

- Thesis is the main academic effort and culmination of all information and techniques learnt in the preceding semesters.
- Selection of thesis topic shall be from any aspect of Conservation whether theoretical, technical, management, operational or intervention.
- It is expected to undertake original work including data collection and primary surveys
- As part of the studio requirements, it is expected to go through a process of documentation, analyses and synthesis related to the specific topic and related area of work. It is required to work under the guidance of a supervisor allotted by the department and complete the requisite work in the course of the semester, ending in a viva-voce exam by a panel of examiners both external and internal.
- Progressive evaluation would be done by a panel of external and/or internal jurors during reviews held at intervals during the course of the semester.
- Submission and defense of the thesis through drawings, reports, study sheets, models and digital presentations and verbal communications in all the reviews and the final viva-voce.

