Walchand College of Engineering

Vishrambag, SANGLI-416415

(Government Aided Autonomous Institute)

Syllabus

(S. Y. M. Tech.) Civil (Environmental Engineering)

With Effect From

Academic Year

2024-25

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2024-25

Course Information

Programme	M. Tech. Civil (Environmental Engineering)
Class, Semester	Second Year M. Tech., Semester III
Course Code	7EV691
Course Name	Dissertation Phase I
Desired Requisites:	Core courses in Environmental Engineering

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	24 Hrs./Week	**Credits: 12**			

Course Objectives

1	Provide in-depth knowledge to tackle real world problems of societal concerns.
2	To impart knowledge for establishing objectives by carrying out extensive literature review on selected dissertation topics.
3	To analyze/experiment selected research topic further and review, classify and consolidate observations/results based on the detailed analytical/ experimental work.

Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
	At the end of the course, the students will be able to,	Descriptor	Level
CO1	***Complete*** detailed literature survey to understand research developments and set up research hypotheses.	Applying	III
CO2	***Formulate*** the objectives of the dissertation based on the scope of work in the area of study.	Creating	VI
CO3	***Formulate*** the methodology to achieve the objectives of work.	Creating	VI
CO4	***Execute*** the study through conduct of analytical/Experimental work to achieve the objectives.	Applying	III

Module Contents

The dissertation work will start in semester III, and should involve scientific research, design, collection, and analysis of data, determining solutions and must bring out the individual's contribution. Dissertation Phase 1 will have presentation and report submission. The presentation will include identification of the research problem based on the extensive literature review on the topic referring to latest literature available, defining objectives of the work, and the methodology to be adopted.

LA-I is based on the efforts by the student for synopsis preparation. It shall be evaluated using the parameters extent of literature review, scope defined, objectives, fundamental concepts, quality of presentation, and interaction during presentation, effort/work done, quality of report and interaction with guide.

LA-II is based on the progress made during the semester for the objectives defined in the synopsis and the report submitted by the students. It shall be evaluated through progress seminar(s) at the end of the semester. The parameters for evaluation include extent of work done, results and discussion/publication efforts, quality of presentation, quality of report, interaction during presentation and interaction with guide.

ESE will have end semester presentation. End semester presentation will include the validation work and completion of nearly half the work defined for the dissertation. The literature review should continue to

study the latest research material available in the chosen field. The external examiner should assess the work done by the individual student based on the detailed report on identification of topic for the work, the methodology adopted and presentation followed by viva-voce. The parameters for evaluation include results and discussion/publication efforts, quality of presentation, quality of report and interaction during presentation.

References

1	National and International journals in Environmental Engineering
2	Journal of Indian water works association,
3	Journal of environmental science and engineering (NEERI)
4	Journal of environmental engineering (ASCE),
5	Water research,
6	Water science and technology,
7	Journal of Water supply: Research and technology-AQUA,
8	Journal of environmental management
9	Journal of waste management,
10	Water science and technology –Water supply,
11	Journal of Water Reuse and Desalination,
12	Journal of American water works association.
13	Building and Energy (Elsevier)
14	Technical Reports of Professional societies.
15	International and national codes of Practices and Handbooks.
16	Internet sources and Distance Learning.
17	Published Ph.D. and M. Tech Thesis of Reputed Institutes.

CO-PO Mapping

	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1	3					
CO2			3			1
CO3	3					2
CO4				3		

Assessment

- The assessment is based on LAI, LAII and ESE.
- LAI shall be conducted by Departmental Post-Graduate Committee (DPGC).
- LA II shall be conducted by Departmental Post-Graduate Committee (DPGC)
- ESE shall be conducted at the end of semester by a duly constituted examination panel composed of Chairman, internal examiner (guide) and external examiner.
- For passing, Min. 40% marks in (LA I+LA II +ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing).

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

AY 2025-26 onwards

Course Information	
Programme	M. Tech. Civil (Environmental Engineering)
Class, Semester	Second Year M. Tech., Semester III
Course Code	7EV647
Course Name	Mini Project- I
Desired Requisites	Water supply and treatment, Air and Noise Pollution, Solid waste management

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**Lab ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	4 hrs/week				
Interaction	-	**Credits: 2**			

Course Objectives

1	To expose the students to real-life engineering problems encountered in industry/society and inculcate problem-solving skill in students.
2	To encourage students to develop sustainable solutions for real-life problems through experimental/analytical studies.
3	To provide an opportunity for self and life-long learning.
4	To enhance students' technical and professional skills required for industry and career advancement.

Course Outcomes (CO)

CO	Description After the completion of the course, the students will be able to	Blooms Taxonomy Descriptor	 Level
CO1	**Identify and formulate** real-life problem/s related to water supply & treatment/pollution mitigation **and define** the scope.	Analyze	IV
CO2	**Collect and Analyze** the data required for the identified problem.	Analyze	IV
CO3	**Propose** an appropriate plan to mitigate the problem pertinent to air/noise/solid waste pollution	Analyze	IV
CO4	**Evaluate** the performance of water supply/treatment facility through experimental/&analytical studies/tools.	Evaluate	V
CO5	**Design** a water treatment facility/supply system considering sustainable, technical, and economical aspects.	Create	VI

List of Experiments /Activities

Course Contents

Students should select one of the following real-life environmental or civil engineering problems:

1. **Water Treatment Design:** Design a water treatment plant (WTP) for isolated, small-scale, industrial, or packaged establishments.
2. **Facility Assessment:** Evaluate the performance of existing water supply/treatment/processing facilities and propose upgrades or modifications.
3. **Water Distribution System Analysis:** Analyze and design a real-life water distribution system.
4. **Pollution Mitigation:** Conduct a comprehensive study of air, noise, or solid waste pollution, and propose a mitigation plan.

List of Activities

1: Problem Identification & Scoping

- **Define the Problem:** Select a real-life or societal issue. Ensure it is distinct from the major project.
- **Scope:** Methodology/Approach the problem (e.g., experimental work, analytical study, or using software/simulation tools).

2: Data Collection

- **Site Visits:** Conduct field visits to the selected location to understand ground realities.
- **Surveys & Questionnaires:** Gather qualitative and quantitative data through stakeholder interaction and surveys.

3: Tool & Software Selection

- Identify and learn relevant software to aid in analysis.

4: Experimental/&Analytical Work

- Perform necessary field tests, laboratory experiments, or analytical calculations based on the data collected.

5: Solution Development

- Propose alternative solutions or remedial measures.
- Ensure solutions are feasible, cost-effective, and technically sound (compliant with relevant environmental and engineering standards).

6: Documentation

- Compile a summary of findings, draw logical conclusions, and provide actionable recommendations for implementation.

References	
1	Bentley Software
2	Autodesk Software
3	https://www.geoslope.support/kb/article/10-geostudio-reference-manuals/
4	Pertinent BIS codes/Laboratory manuals
Useful Links	
1	https://www.bentley.com/education
2	https://www.seequent.com/products-solutions/geostudio/
3	https://www.autodesk.com/in/education/home

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11		1	2
CO1		**3**				**3**			**2**		**2**			
CO2			**2**	**3**	**3**				**1**					
CO3	**1**		**3**	**3**		**3**	**1**				**2**		**2**	
CO4	**1**	**2**		**3**	**3**	**3**	**1**		**2**		**2**		**2**	
CO5	**1**		**3**	**3**	**3**	**3**	**1**		**2**	**1**	**2**		**3**	
The strength of mapping: 1:Low, 2:Medium, 3:High														

Assessment				
There are three components of Mini Project- I, LA1, LA2, and ESE IMP: ESE is a separate head of passing. ESE is treated as End Semester Exam and is based on all experiments/lab activities.				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Problem identification, Data Collection, Initiation of Experimental/Analytical study	Course teacher & internal panel	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Progress of Experimental/Analytical study, Solution/Remedial measures, Conclusion	Course teacher & internal panel	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
ESE	Overall study, Report, and Presentation/Oral	Course teacher & internal panel	During Week 13 to Week 18 Marks Submission at the end of Week 18	40

Walchand College of Engineering, Sangli

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AY 2025-26 onwards

Course Information

Programme	M. Tech. Civil (Environmental Engineering)
Class, Semester	Second Year M. Tech., Semester III
Course Code	7EV648
Course Name	Mini Project- II
Desired Requisites	Water supply and treatment, Air and Noise Pollution, Solid waste management

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**Lab ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	4 hrs/week				
Interaction	-	**Credits: 2**			

Course Objectives

1	To expose the students to real-life engineering problems encountered in industry/society and inculcate problem-solving skill in students.
2	To encourage students to develop sustainable solutions for real-life problems through experimental/analytical studies.
3	To provide an opportunity for self and life-long learning.
4	To enhance students' technical and professional skills required for industry and career advancement.

Course Outcomes (CO)

CO	Description After the completion of the course, the students will be able to	Blooms Taxonomy Descriptor	 Level
CO1	**Identify and formulate** real-life problem/s related to water supply & treatment/Pollution mitigation **and define** the scope.	Analyze	IV
CO2	**Collect and Analyze** the data required for the identified problem.	Analyze	IV
CO3	**Propose** an appropriate plan to mitigate the problem pertinent to air/noise/solid waste pollution	Analyze	IV
CO4	**Evaluate** the performance of water supply/treatment facility through experimental/&analytical studies/tools.	Evaluate	V
CO5	**Design** a water treatment facility/supply system considering sustainable, technical, and economical aspects.	Create	VI

List of Experiments /Activities

Contents of Mini-project – II

The students are expected to work on any one of the following assignments/real-life problems

1. **Wastewater Treatment Design:** Create a custom treatment system for isolated sites, small-scale facilities, packaged units, or industrial applications.
2. **System Evaluation & Upgrades:** Assess the current performance/processing of an existing sewage treatment facility and propose modifications to boost efficiency.
3. **Sewerage Network Analysis:** Develop or evaluate a functional sanitary sewer or storm drainage system.
4. **Sustainability Assessment:** Evaluate the long-term viability and sustainability of water, wastewater, or other environmental facilities.
5. **Pollution Study & Mitigation:** Analyze a specific surface water or groundwater pollution issue and design practical mitigation strategies.

List of Activities

1: Problem Identification & Scoping

- **Define the Problem:** Choose a specific real-world or societal issue that is completely separate from your major project.
- **Set the Scope:** Decide how you will tackle the problem (e.g., through experiments, analytical studies, or software simulations).

2: Data Collection

- **Site Visits:** Conduct field trips to your chosen location to understand real-world conditions.
- **Surveys:** Gather qualitative and quantitative data through stakeholder interactions and questionnaires.

3: Tool & Software Selection

- Identify and master the specific software or analytical tools needed for your project.

4: Experimental & Design Work

- Perform the necessary field tests, lab experiments, or analytical calculations based on your collected data.

5: Solution Development

- Propose practical, cost-effective, and technically sound remedial measures that comply with environmental and engineering standards.

6: Documentation

- Compile your findings into a comprehensive report featuring logical conclusions and actionable recommendations for implementation.

References	
1	Bentley Software
2	Autodesk Software
3	https://www.geoslope.support/kb/article/10-geostudio-reference-manuals/
4	Pertinent BIS codes/Laboratory manuals
Useful Links	
1	https://www.bentley.com/education
2	https://www.seequent.com/products-solutions/geostudio/
3	https://www.autodesk.com/in/education/home

CO-PO Mapping														
	Programme Outcomes (PO)												PSO	
	1	2	3	4	5	6	7	8	9	10	11		1	2
CO1		**3**				**3**			**2**		**2**			
CO2			**2**	**3**	**3**				**1**					
CO3	**1**		**3**	**3**		**3**	**1**				**2**		**2**	
CO4	**1**	**2**		**3**	**3**	**3**	**1**		**2**		**2**		**2**	
CO5	**1**		**3**	**3**	**3**	**3**	**1**		**2**	**1**	**2**		**3**	
The strength of mapping: 1:Low, 2:Medium, 3:High														

Assessment				
There are three components of Mini Project- II, LA1, LA2, and ESE IMP: ESE is a separate head of passing. ESE is treated as End Semester Exam and is based on all experiments/lab activities.				
Assessment	**Based on**	**Conducted by**	**Typical Schedule**	**Marks**
LA1	Problem identification, Data Collection, Initiation of Experimental/Analytical study	Course teacher & internal panel	During Week 1 to Week 6 Marks Submission at the end of Week 6	30
LA2	Progress of Experimental/Analytical study, Solution/Remedial measures, Conclusion	Course teacher & internal panel	During Week 7 to Week 12 Marks Submission at the end of Week 12	30
ESE	Overall study, Report, and Presentation/Oral	Course teacher & internal panel	During Week 13 to Week 18 Marks Submission at the end of Week 18	40

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AY 2024-25

Course Information

Programme	M. Tech. Civil (Environmental Engineering)
Class, Semester	Second Year M. Tech., Semester IV
Course Code	7EV692
Course Name	Dissertation Phase-II
Desired Requisites:	Dissertation Phase-I

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	30	30	40	100
Practical	34 Hrs./Week	**Credits: 17**			

Course Objectives

1	To analyze/experiment selected research topic further and review results based on the detailed analytical/ experimental work.
2	Classify and consolidate observations/results based on the detailed analytical/ experimental work.
3	Impart flexibility to the student to have increased control over his/ her learning.

Course Outcomes (CO)

CO	Description	Blooms Taxonomy	
	At the end of the course, the students will be able to,	Descriptor	Descriptor
CO1	***Execute*** the study through conduct of analytical/Experimental work to achieve the remaining objectives.	Applying	III
CO2	***Analyse*** the findings of the study.	Analysing	IV
CO3	***Interpre*t** and ***critique*** findings of the study.	Evaluating	IV
CO4	***Defend*** the outcomes of the dissertation through self-learning	Evaluating	IV

Module Contents

In this semester it is expected that the student has carried out substantial research work through testing and analysis of results obtained through experimental/analytical study.

LA I is based on the progress made during the semester-IV for the objectives defined in the synopsis and the report submitted by the students. It shall be evaluated through progress seminar(s). The parameters for evaluation include extent of work done, results and discussion/publication efforts, quality of presentation, quality of report, interaction during presentation and interaction with guide. It shall be evaluated using the parameters extent of work done after dissertation phase I ESE, quality of presentation, interaction during presentation and interaction with guide.

LA II is based on the work done during the semester and the report submitted by the students. It shall be evaluated through progress seminar(s). The parameters for evaluation include extent of work done, results and discussion/publication efforts, quality of presentation, quality of report, interaction during presentation and interaction with guide.

The research paper based on the completed work through five phases should be drafted and submitted to respective guide or communicated to reputed journal or conference.

ESE will have end semester presentation. End semester presentation will include the validation work and completion of all lf the work defined for the dissertation. The external examiner should assess the work done by the individual student based on the detailed report on identification of topic for the work, the methodology adopted, results and discussions, findings and conclusions of the study and presentation followed by viva-voce. The parameters for evaluation include results and discussion/publication efforts, quality of presentation, quality of report and interaction during presentation.

References

1	Technical Reports of Professional societies.
2	International and national codes of Practices and Handbooks.
3	Internet sources and Distance Learning.
4	Published Ph.D. and M. Tech Thesis of Reputed Institutes.

CO-PO Mapping

	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1				3		
CO2				3	2	
CO3		3	3		2	
CO4					3	

Assessment

- The assessment is based on LAI, LAII and ESE.
- LAI shall be conducted by Departmental Post-Graduate Committee (DPGC).
- LA II shall be conducted by Departmental Post-Graduate Committee (DPGC)
- ESE shall be conducted at the end of semester by a duly constituted examination panel composed of Chairman, internal examiner (guide) and external examiner.
- For passing, Min. 40% marks in (LAI+LAII +ESE) are needed, and Min. 40% marks in ESE are needed. (ESE shall be a separate head of passing).

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

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AY 2024-25

Course Information

Programme	M. Tech. Civil (Environmental Engineering)
Class, Semester	Second Year M. Tech., Semester IV
Course Code	7EV645
Course Name	Internship
Desired Requisites:	Courses taught in semester I and II

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	-	-	100	100
Practical	4 Hrs./Week	**Credits: 2**			

Course Objectives

1	To expose the students to real life engineering problems encountered in industry/society.
2	To provide an opportunity to work in collaborative and multidisciplinary environment.

Course Outcomes (CO) with Bloom's Taxonomy Level

At the end of the course, the students will be able to,

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	***Perceive*** knowledge of group dynamics and contribute to multidisciplinary work.	Understand	II
CO2	***Demonstrate*** knowledge to solve societal problems and ***apply*** it for efficient management of projects independently and in teams.	Apply	III
CO3	***Communicate*** with industry/society regarding engineering activities effectively and ***comprehend*** and write effective reports.	Understand	II
CO4	***Demonstrate*** ethical behaviour with professional code of conduct and contribute to sustainable development of society.	Apply	III

Contents

The objective of this training is to expose the students to industry environment and practices. Students are sent to leading Engineering organizations/Research laboratories/Design and Consultancy organizations to undergo a rigorous training for a minimum period of **one month** during summer term/vacation.

CO-PO Mapping

	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1					2	
CO2				2		
CO3		2				
CO4					2	

Assessment

- The assessment is based on ESE. The panel of minimum two members from the department shall assess the student for the internship.
- The students are expected to present the work done in an internship tenure.
- The students shall also submit a detailed report based on activities done in an internship and learnings through the same.
- The students shall also submit the duly signed internship certificate from the organization/s where internship was done, clearly indicating the period of internship in the certificate.

Prepared by	DAC/BoS Secretary	Head/BoS Chairman

Walchand College of Engineering, Sangli

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AY 2024-25

Course Information

Programme	M. Tech. Civil (Environmental Engineering)
Class, Semester	Second Year M. Tech., Semester IV
Course Code	7EV646
Course Name	Techno-Socio Activity
Desired Requisites:	-

Teaching Scheme		**Examination Scheme (Marks)**			
Lecture	-	**LA1**	**LA2**	**ESE**	**Total**
Tutorial	-	-	-	100	100
Practical	2 Hrs./Week				
Interaction	-	**Credits: 1**			

Course Objectives

1	Develop skills like teamwork, and communication through technical contribution on socio-economic issues
2	Enhance understanding of the socio-economic impact of engineering projects and technology on society.
3	Apply engineering knowledge and problem-solving skills to address real-world challenges

Course Outcomes (CO)

At the end of the course, the students will be able to,

CO	Description	Blooms Taxonomy	
		Descriptor	Level
CO1	***Explain*** professional culture/ethics and build proficiency in professional communication, working in teams, decision making and leadership.	Understand Apply	II III
CO2	***Apply*** the technical knowledge through participation in techno-socio assignments.	Apply	III
CO3	***Demonstrate*** ethical quality and social responsibilities through the technical knowledge gained.	Evaluate	V

List of Activities

List of Activities:

1. Involvement in techno-socio activity
   a) Presentation on involvement in techno-socio activity individually/through student clubs during F.Y. & S.Y. M. Tech.
   b) Submission of summary report on these activities.
2. Techno-socio activity (Team Activity)
   a) Organization of a technical activity/event for the benefit of society in a batch.
   b) Submission of report on the organized activity.
3. Submission of certificates/documents required for student port-folio (Participation in Curricular and Extra-Curricular Activities within and outside the campus).

References

1	National Institute for Engineering Ethics (NIEE)
2	Professional ethics, National Society of Professional Engineers (NSPE).
Useful Links	
1	https://www.asce.org/pdf/ethics_manual.pdf
2	https://www.aicte-india.org/atal

CO-PO Mapping						
	Programme Outcomes (PO)					
	1	2	3	4	5	6
CO1		3			3	
CO2			2		3	
CO3			2		3	

Assessment
The assessment is based on ESE. The panel of minimum two members from the department shall assess the student for the techno-socio activity. The students are expected to present the work done in an four semesters. The students shall also submit a detailed report based on activities done and learnings through the same. The students shall also submit the duly signed certificate from the organization/s, local bodies where activities were carried out.

Prepared by	DAC/BoS Secretary	Head/BoS Chairman