Walchand College of Engineering, Sangli

(Government Aided Autonomous Institute)

Course Contents (Syllabus) for

Second Year M. Tech.
Civil
(Environmental Engineering)
Sem – III to IV

AY 2020-21

Title of the Course: **Dissertation Phase I (3EV690) & Phase II (3EV691 & 3EV692)**	L	T	P	Cr
	-	-	20	10

Pre-Requisite Courses: Core courses in Environmental Engineering

References:

1. National and International journals in Environmental Engineering
   a. Journal of Indian water works association,
   b. Journal of environmental science and engineering (NEERI),
   c. Journal of environmental engineering (ASCE),
   d. Water research,
   e. Water science and technology,
   f. Journal of Water supply: Research and technology-AQUA,
   g. Journal of environmental management,
   h. Journal of waste management,
   i. Water science and technology –Water supply,
   j. Journal of Water Reuse and Desalination,
   k. Journal of American water works association.
   l. Building and Energy (Elsevier)

Course Objectives :

1. Provide in-depth knowledge to tackle real world problems of societal concerns.
2. Impart flexibility to the student to have increased control over his/ her learning.
3. Enhance student's learning through increased interaction with peers and colleagues.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	**Bloom's Cognitive**	
		Level	**Descriptor**
CO1	**Defend** the objectives of the dissertation by **grasping** and **analyzing** through an extensive literature review in the area of study.	II IV V	Understanding Analyzing Evaluating
CO2	**Formulate** the methodology and **Execute** the study through conduct of analytical/Experimental work to achieve the objectives.	III VI	Applying Creating

CO-PO Mapping:

PO	**1**	**2**	**3**	**4**	**5**	**6**
CO1	1		2			
CO2	2			3	2	3

Assessments:

Teacher Assessment:

In Semester Evaluation (ISE) and End Semester Evaluation (ESE)

Assessment	**Marks**
ISE 1	100
ISE 2	100
ESE	100

ISE 1 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.

ISE 2 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.

ISE 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.

Course Contents:

The third semester is completely devoted to dissertation work which is defined based on the interest of the students to specialize in a particular area.

Students are expected to carry out independent research work on the chosen topic.

In this semester it is expected that the student has carried out substantial research work including exhaustive literature survey, formulation of the research problem, development/fabrication of experimental set-up (if any/required) and testing, and analysis of initial results thus obtained.

Title of the Course: Professional Elective 4 Project Management (3EV611)	L	T	P	Cr
	3	-	-	3

Pre-Requisite Courses: Nil

Textbooks:

1. Jack Gido, James P Clements, *Project Management*, Cengage Learning India Pvt. Ltd., 2nd Reprint 2011, ©2007

References:

1. John Adair, Strategic Leadership, Kogan Page Ltd., 1st ed. 2010.
2. Project Management, Achieving Competitive Advantage, Jeffrey K. Pinto, Dorling Kindersley India Pvt. Ltd. Ed. 2009.
3. B.C. Punmia and Khandelwal, *Project Planning and Control with PERT and CPM*, Lakshmi Publications Pvt. Ltd., 4th Edition, 2008
4. K. Nagarajan, *Project Management*, New Age Int., 2nd ed. 2004.

Course Objectives :

1. To develop a holistic, integrated approach to manage projects, exploring both technical and managerial challenges in environmental / structural engineering projects.
2. To inculcate leadership, and ethical qualities in dealing with real life project environment and develop positive attitude towards individual response-bility in project execution.
3. To induce qualities for supporting industry's life-long learning programs, working in interdisciplinary and cross functional teams with effective communication skills and managerial challenges.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		Level	Descriptor
CO1	**Perceive** critically the project characteristics, project management principles and **apply** them in the context to real world problems.	III	Applying
CO2	**Formulate and solve** projects in context of scheduling and controlling with time and cost as constraints using the imparted knowledge of network scheduling techniques and applications using software.	III	Applying
CO3	**Demonstrate** leadership skills and communicate effectively in convincing various stakeholders to accomplish project objectives ethically.	III	Applying

CO-PO Mapping:

PO	1	2	3	4	5	6
CO1					3	
CO2		2				
CO3		3			2	

Assessments:

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	Marks
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 60-70% weightage for course content

(normally last three modules) covered after MSE.	
Course Contents:	
Module 1: Project Management Concepts	**6 Hrs.**
Factors Governing Modern Business, Effective Project Management, definition of project, Attributes of Project, Strategic Planning, Project Life Cycle, considerations for RFP, Project Process, Project Balancing, Project Environment, Programme and Portfolio.	
Module 2: Project Planning and Schedule	**8 Hrs.**
WBS, Responsibility matrix, Devp. of non-network and network schedules, Activity duration estimates, Schedule calculations, Probability considerations, PMS.	
Module 3: Schedule control	**6 Hrs.**
Project control process Updating schedule, Approaches to schedule control, Resource considerations.	
Module 4: Cost Planning and Performance	**8 Hrs.**
Project cost estimates, Budget, Actual cost, Cost Forecasting, Managing cash flows.	
Module 5: Project Manager and Project Team	**6 Hrs.**
Responsibilities and skills, Delegation, Managing Change, Devp. and effectiveness of project team, Ethics, Conflicts on Projects, Time Management.	
Module 6: Project communication and Documentation	**6 Hrs.**
Personal communication, Effective listening, Meeting, Presentations and Report preparation, Types of Project organizations- their merits and demerits, SWOT analysis.	
Module wise Outcomes: At end of each module students will be able to 1. **Explain** basic properties of projects; differentiate between project management practices and traditional business functions, project life cycle and concepts of project success. 2. **Grasp** the key scheduling terminologies, apply logic for developing network schedules, perform duration calculations and identify critical paths and floats. 3. **Interpret** the various steps involved in project control process, apply the changes in updating networks leading to new schedules in consideration to various resources. 4. **Outline** baseline budget, analyzing cost performance index, Cost forecasting. 5. **Practice** the responsibilities of project manager and develop skills and techniques to ethically manage and control projects with effective delegation. 6. **Explain** the characteristics of organizational structures, develop the art of enhancing personal communication, handle effective project presentations and prepare project reports.	

Title of the Course: Professional Elective 4 **Operation and Maintenance of Environmental Facilities** **(3EV612)**	L	T	P	Cr
	3	-	-	3

Pre-Requisite Courses: Courses on Water and Wastewater Treatment, Air pollution, Solid Waste Management

Textbooks:

1. Quasim S. R., Motley E. M. and Zhu G., "Water works engineering", PHI learning private limited, 2000.
2. Wark K. And Warner C.F., "Air Pollution", H.R. Publication, 1st Edition, 1978.

References:

1. "Manual on water supply and Treatment", CPHEEO, Ministry of Urban Development, Govt. of India, New Delhi, 1999.
2. "Manual on Sewerage and Sewage Treatment", CPHEEO, Ministry of Urban Development, Govt. of India, New Delhi, 1993.

Course Objectives :

1. Provide in-depth knowledge of operation and maintenance of infrastructural facilities in environmental engineering.
2. To enhance the technical competency and apply the acquired knowledge for research and development, industry, and consultancy activities.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	**Bloom's Cognitive**	
		Level	**Descriptor**
CO1	**Explain** concepts of operation and maintenance for environmental facilities.	II	Understanding
CO2	**Apply** the imparted knowledge to effectively operate the system.	III	Applying
CO3	**Solve** operation and maintenance problem associated with real life environmental facility.	V	Evaluating

CO-PO Mapping:

PO	**1**	**2**	**3**	**4**	**5**	**6**
CO1			2			
CO2				3		
CO3				2		3

Assessments:

Teacher Assessment:

Two components of In Semester Evaluation (ISE), One Mid Semester Examination (MSE) and one End Semester Examination (ESE) having 20%, 30% and 50% weights respectively.

Assessment	**Marks**
ISE 1	10
MSE	30
ISE 2	10
ESE	50

ISE 1 and ISE 2 are based on assignment/declared test/quiz/seminar etc.

MSE: Assessment is based on 50% of course content (Normally first three modules)

ESE: Assessment is based on 100% course content with 60-70% weightage for course content (normally last three modules) covered after MSE.

Course Contents:

Module 1: Introduction	**5 Hrs.**
Need of Operation and Maintenance (O & M), Basic principles, corrective and preventive maintenance, Detailed plans, drawings, operation manuals, computer usage in O and M.	
Module 2: Water Supply System	**8 Hrs.**

Intakes, pumps, transmission pipes, water treatment process control, Quantity and quality monitoring.	
Module 3: Water Distribution and Sewerage System	**7 Hrs.**
Water distribution system: Loss of carrying capacity of pipes, pipe breaks and leakages, leak detection, record keeping, O and M of Appurtenances, Use of network models in O and M, Corrosion control. Sewerage system: Maintenance, Inspection methods, Manual and television, Cleaning and rehabilitation, Safety in sewer inspection.	
Module 4: Wastewater Treatment Plant	**8 Hrs.**
Wastewater treatment plant: O and M of wastewater treatment plant, Monitoring and operational problems, Corrective measures. Performance: Plant performance, Need for upgradation, Process reliability, Odour management.	
Module 5: Air Pollution Control Facilities	**7 Hrs.**
Air pollution control facilities: Regular inspection of devices, SPM control equipment, Gravity settlers, Cyclone separators, Bag filters, Scrubbers, Electrostatic precipitator, Gaseous control devices, incinerators and their trouble shooting.	
Module 6: Planning and Management	**5 Hrs.**
Organizational structure, work planning, preparation and scheduling, Cost estimates.	
Module wise Outcomes: At end of each module students will be able to 1. **Explain** principles of operation and maintenance. 2. **Apply** operational and maintenance principles for solving problems of water supply system. 3. **Apply** operational and maintenance principles for solving problems of water distribution and sewerage system. 4. **Solve** the operational problems of sewage treatment plant. 5. **Apply** operational and maintenance principles for solving problems of air pollution control facilities. 6. **Explain** and **devise** organizational structure of operation and maintenance cell and schedule the activities.	

Title of the Course: Dissertation Phase III (3EV693) & Phase IV (3EV694 & 3EV695)	L	T	P	Cr
	-	-	32	16

Pre-Requisite Courses: Core courses in Environmental Engineering

References:

1. National and International journals in Environmental Engineering
   a. Journal of Indian water works association,
   b. Journal of environmental science and engineering (NEERI),
   c. Journal of environmental engineering (ASCE),
   d. Water research,
   e. Water science and technology,
   f. Journal of Water supply: Research and technology-AQUA,
   g. Journal of environmental management,
   h. Journal of waste management,
   i. Water science and technology –Water supply,
   j. Journal of Water Reuse and Desalination,
   k. Journal of American water works association.
   l. Building and Energy (Elsevier)

Course Objectives :

1. Provide in-depth knowledge to tackle real world problems of societal concerns.
2. Impart flexibility to the student to have increased control over his/ her learning.
3. Enhance student's learning through increased interaction with peers and colleagues.

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	Bloom's Cognitive	
		Level	Descriptor
CO1	**Execute** the study through conduct of analytical/Experimental work to achieve the objectives.	III	Applying
CO2	**Analyze, interpret and critique** the findings of the study.	III IV V	Applying Analyzing Evaluating
CO3	**Defend** the outcomes of the dissertation through self-learning and **justify** the project work as per appropriate standards of documentation and presentation.	V	Evaluating

CO-PO Mapping:

PO	1	2	3	4	5	6
CO1	2			3	2	3
CO2				3	2	
CO3		3	3		2	

Assessments:

Teacher Assessment:

In Semester Evaluation (ISE) and End Semester Evaluation (ESE)

Assessment	Marks
ISE 1	100
ISE 2	100
ESE	100

ISE 1 is based on the work done by the student during fourth semester. It shall be evaluated using

the parameters extent of work done after phase II, quality of presentation, interaction during presentation, and interaction with guide.

ISE 2 is based on the work done during the semester 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.

ISE 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.

Course Contents:

In fourth semester, the students continue their dissertation work.

It is expected that the student has completed most of the experimental/computation works and analyzed the results so obtained as proposed in the synopsis.

The work should be completed in all respects in this semester.

The students are required to submit the dissertation work in the form of report as per the institute rule.

Title of the Course:	L	T	P	Cr
Summer Internship (3EV696)	-	-	-	1

Pre-Requisite Courses: Courses taught in Semesters I and II

Course Objectives :

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

Course Learning Outcomes:

CO	After the completion of the course the student should be able to	**Bloom's Cognitive**	
		Level	**Descriptor**
CO1	**Perceive** knowledge of group dynamics and contribute to multidisciplinary work.	II	Understanding
CO2	**Demonstrate** knowledge to solve societal problems and **apply** it for efficient management of projects independently and in teams.	III	Applying
CO3	**Communicate** with industry/society regarding environmental engineering activities effectively and **comprehend** and write effective reports.	II	Understanding
CO4	**Demonstrate** ethical behavior with professional code of conduct and contribute to sustainable development of society.	III	Applying

CO-PO Mapping:

PO	**1**	**2**	**3**	**4**	**5**	**6**
CO1					2	
CO2				2		
CO3		2				
CO4					2	

Assessments:

Teacher Assessment:

In Semester Evaluation (ISE)

Assessment	**Marks**
ISE	100

ISE is based on extent of objectives defined; work done at the organization, outcome of training, and quality of report. DPGC shall carry out the evaluation.

Course Contents:

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