

<p>Kingdom of Saudi Arabia Ministry of Higher Education Qassim University College of Engineering</p>		<p>المملكة العربية السعودية وزارة التعليم العالي جامعة القصيم كلية الهندسة</p>
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CE 674 Unit Operation and Processes Laboratory

College: Engineering

Department: Civil

First: Course Definition

1- Course Code: CE 674

2- Units: 3

3- Semester:

4- Prerequisite:

5- Co-requisite:

6- Location (if not on main Campus):

Second: Course Objectives

- 1- To provide students hands-on experience with traditional techniques for water and wastewater analysis.
- 2- To provide students hands-on experience with modern techniques for water and wastewater analysis.
- 3- To advance proficiency in determining proper experimental controls.
- 4- To advance proficiency in critical analysis of experimental.
- 5- To determine the quality of water and wastewater.

1- Topics to be covered

Subject	No of Weeks	Units
Introduction (units, conversion, solutions preparation, safety).	1	3
Physical characteristics of water and wastewater (turbidity, solids, settleable solids, color)	1	3
Chemical characteristics of water and wastewater (pH, alkalinity, hardness, COD, metals)	1	3
Biological characteristics of water and wastewater (Coli, E-	1	3

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Sludge characteristics	1	3
Jar test	1	3
Types of settling	1	3
Filtration	1	3
Disinfection	1	3
Activated sludge	1	3
Anaerobic digestion	1	3
Adsorption, Ion exchange	1	3
Membrane filtration	1	3
Reverse osmosis	1	3

2- Course components (Total hrs in the Semester: 42)

Lecture	Excercise	Other
42	-	0

3- Intended Learning Outcomes of the Course (ILO's)

a. Knowledge

i) Description of the knowledge to be acquired:

- Physical characteristics of water and wastewater.
- Chemical characteristics of water and wastewater.
- Biological characteristics of water and wastewater.
- Sludge characteristics.
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ii) Teaching strategies to be used to develop that knowledge

- Class lectures.
- Term projects.
- Students' presentations.
- Group discussion.

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iii) Methods of assessment of knowledge acquired

- Exams.
- Quizzes.
- Homework assignments.
- Term projects.

b- Cognitive (Intellectual) Skills

i) Cognitive skills to be developed

- Characterization water and wastewater.
- Selection the operation parameters of water and wastewater treatment plants.
- Evaluation the performance of water and wastewater plant.
- Design and operation the required experiment for scientific research.

ii) Teaching strategies to be used to develop these cognitive skills

- Class lectures.
- Case studies analysis.
- Term projects.
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iii) Methods of assessment of students' cognitive skills

- Students' seminars and presentations.
- Term projects.
- Written reports.
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c. Interpersonal Skills and Responsibility

i) Description of the interpersonal skills and capacity to carry responsibility to be developed

- Decision making based on engineering analysis.
- Communication skills.
- Team work.
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ii) Teaching strategies to be used to develop these skills

- Class lectures.
- Term projects.
- Case studies analysis.

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iii) Methods of assessment of students' interpersonal skills and capacity to carry responsibility

- Term project.
- Written reports.
- Students' seminars and presentations.

d. Communication, Information Technology and Numerical Skills

i) Description of the skills to be developed in this domain

- Literature research.
- Problems modeling.
- Utilization of computer applications in analysis and design.

ii) Teaching strategies to be used to develop these skills

- Class lectures.
- Case studies analysis.
- Computer lab sessions.
- Term projects.

iii) Methods of assessment of students numerical and communication skills

- Term projects.
- Written reports.
- Students' seminars and presentations.
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e. Psychomotor (if applicable) & Other Non-cognitive Skills

i) Description of the psychomotor or other skills to be developed and the level of performance required

- NA

ii) Teaching strategies to be used to develop these skills-

- NA

iii) Methods of assessment of student's psychomotor skills

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4- Student Assessment Schedule

<i>Serial</i>	<i>Assessment tool (test, group project, examination etc.)</i>	<i>Week due</i>	<i>Weight</i>
1	Term Project – 1	3 rd	15 %
2	Mid Term Exam -1	7 th	15 %
3	Term Project – 2	10 th	15 %
4	Term Project – 3	13 th	15 %
5	Final Exam	16 th	40 %

5- Student Support

- Providing electronic library of textbooks and scientific periodicals.
- Providing the necessary computer applications for the course.

6- Learning Resources

i) Essential Books (References)

- Reynolds, T. "Unit Operations and Processes in Environmental Engineering", CL-Engineering, 1995, ISBN: 978-0534948849.
- American Public Health Association (APHA). "Standard Methods for the Examination of Water & Wastewater". Publisher: American Public Health Association. (October 2005). ISBN-13: 978-0875530475.

ii) Course Notes

- NA

iii) Recommended Books

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- Dunnivant F.M. "Environmental Laboratory Exercises for Instrumental Analysis and Environmental Chemistry". Publisher: Wiley-Interscience (August 23, 2004), ISBN-13: 978-0471488569.

iv) Electronic Books & Web Sites:

- Scientific journals and forums.
- Instructor's instruction.
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v) Periodicals

- ASCE scientific journals.
- EPA and IWA publications.

7- Course Evaluation and Improvement Processes

i) Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Students' questioners.
- Students' evaluation of course and instructor.

ii) Other Strategies for Evaluation of Teaching by the Instructor or by the Department

- Public faculty seminars.
- Assessment by external evaluators of students achievements.
- **Instructor (Course) Report**
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iii) Processes for Improvement of Teaching

- Assessment of students' work by external examiners.
- Analysis of students' evaluation of course and instructor.
- Seminars by industry professionals.
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iv) Processes for verifying standards of student achievement

- Check marking by an independent faculty member of a sample of student work.
- Periodic exchange and remarking of a sample of assignments/exams with a external evaluator.
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v) Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

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- Assessment and evaluation of the level of achieving the course outcomes through a continuous improvement process (part of a quality assurance system established by the university),
- Consequently, actions are to be taken to improve the course delivery when necessary.
- Review of the course objectives, outcomes and curriculum every 2 years.