هيئة تقويم التعليم والتدريب
Education & Training Evaluation Commission

اعتماد NCAAA T4 2020

Course Specifications

Course Title:	**Atmospheric Chemistry**
Course Code:	**ENS 318**
Program:	**Environmental Sciences and Technology**
Department:	**Environmental Sciences Department**
College:	**Faculty of Meteorology, Environment and Arid Land Agriculture**
Institution:	**King Abdulaziz University**

Table of Contents

A. Course Identification

1. Credit hours:	**3**
2. Course type	
a.	**University** [ ] **College** [ ] **Department** [x] **Others** [ ]
b.	**Required** [ ] **Elective** [x]
3. Level/year at which this course is offered:	
4. Pre-requisites for this course (if any):	**ENS 311**
5. Co-requisites for this course (if any):	**None**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	2	100%
2	Blended	-	-
3	E-learning	-	-
4	Distance learning	-	-
5	Other	-	-

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	Lecture	30
2	Laboratory/Studio	-
3	Tutorial	-
4	Others (specify)	-
	Total	-

B. Course Objectives and Learning Outcomes

1. Course Description

This course provides a detailed overview of the chemical transformations that control the abundances of key trace species in the Earth's atmosphere. Emphasizes the effects of human activity on air quality and climate. Topics include photochemistry, kinetics, and thermodynamics important to the chemistry of the atmosphere; stratospheric ozone depletion; oxidation chemistry of the troposphere; photochemical smog; aerosol chemistry; and sources and sinks of greenhouse gases and other climate forcers.

2. Course Main Objective

On completion of this course, students should be able to:

- Identify the chemical components present in foods.
- perform analysis using the analytical instrumentation.

Compare between analytical methods with reference to quality control and authenticity.

3. Course Learning Outcomes

CLOs		Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Predict fate of molecules and radicals under typical atmospheric conditions	
1.2	Qualitatively explain and quantitatively compute trends in photolysis rate constants with altitude, season, and time of day for molecules whose photochemistry is known	
1.3	Qualitatively predict effects of chemical perturbations on catalytic cycles producing and destroying ozone	
1.4	Explain basic principles of greenhouse effect and compute global warming potentials	
2	**Skills :**	
2.1	Explain principles of chemical perturbations under typical atmospheric conditions.	
2.2	Judge problems associated with specified topics.	
3	**Values:**	
3.1	Demonstrate independent role and as part of a team.	
3.2	**Assess resources, time and cooperate with other members of the group.**	
3.3	**Show results of work to others.**	

C. Course Content

No	List of Topics	Contact Hours
1	Composition, Structure, and Transport in the Atmosphere	**2**
2	Photochemistry, Kinetics,	**2**
3	Stratospheric Ozone	**2**
4	Tropospheric Ozone	**8**
5	Aqueous Aerosols in the Troposphere	**8**
6	Global Climate Change	**8**
Total		**30**

D. Teaching and Assessment

1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Recognize competition between thermodynamics and kinetics	• In-class lecturing • Homework assignments. • Writing field report.	• In-class discussion. • Periodic, mid-term, and final exams.

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.2	Apply kinetics rules (lifetimes, pseudo-first order, steady state approximation, pressure dependent rate constants, Arrhenius/reaction coordinate diagrams)	‴ ‴ ‴ ‴ ‴ ‴ ‴	‴ ‴ ‴ ‴ ‴ ‴ ‴
1.3	Compare stability of organic radicals' chemical equilibria liquid-vapor equilibria conservation of energy.	‴ ‴ ‴ ‴ ‴ ‴ ‴	‴ ‴ ‴ ‴ ‴ ‴ ‴
1.4	Recognize adiabatic expansions and compressions Beer-Lambert law	‴ ‴ ‴ ‴ ‴ ‴ ‴	‴ ‴ ‴ ‴ ‴ ‴ ‴
2.0	**Skills**		
2.1	Explain principles of Graph numerical data and interpret graphical data.	• In-class lecturing • Homework assignments. • Writing field report.	• Periodic, mid-term, and final exams.
2.2	Extract numerical data from a statement of a problem, identify needed information, and identify the equations necessary to solve the problem	‴ ‴ ‴ ‴ ‴ ‴ ‴	‴ ‴ ‴ ‴ ‴ ‴ ‴
3.0	**Values**		
3.1	Share duty as part of a team.	• In-class lecturing • Homework assignments. • Writing field report.	• Periodic, mid-term, and final exams.
3.2	Adapt to resources, commit to time and cooperate with other members of the group.	‴ ‴ ‴ ‴ ‴ ‴ ‴	‴ ‴ ‴ ‴ ‴ ‴ ‴

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Periodic exams	monthly	15%
2	Midterm exam	8	20%
3	Lab. Exam	15	25%
4	Homeworks	monthly	10%
5	Final exam	16	30%

***Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :

6 hours/week

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	Wayne, R. P. Chemistry of Atmospheres, 3rd edition, 2000. Moon QC879.6 .W39 2000
Essential References Materials	Houghton, J. Global Warming: The Complete Briefing. Moon and Sci-Tech QC981.8.G56 H68 2004 (see also 1st and 3rd edition)
Electronic Materials	**Internet websites.**
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	**Lecture room with max 20 seats.**
Technology Resources (AV, data show, Smart Board, software, etc.)	**Laptop and data show for teaching and demonstration of topics related to the course.**
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Course contents covering	**Students (direct through meetings, or indirect using the central online questionnaires**	**Online questionnaire and Students- faculty meetings (advisory committee)**
Quality of teaching	**" " " " "**	**Online questionnaire and students- faculty meetings (advisory committee)**
Office hours commitment	**" " " " "**	**Online questionnaire and Students- faculty meetings (advisory committee)**

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	**END Dept. Council and Faculty Academic Accreditation Committee**
Reference No.	

Date	**April, 2021**