Kingdom of Saudi Arabia

The National Commission for

Academic Accreditation & Assessment

COURSE SPECIFICATION

(Inorganic Chemistry 1, 402271-2)

1435 / 1436 H

Course Specification

Institution: **Umm Al-Qura University**
College/Department: **Faculty of Applied Sciences / Chemistry Department**

A. Course Identification and General Information

1. Course title and code: **Inorganic Chemistry 1, 402271-2**
2. Credit hours: **2 theoretical hrs.**
3. Program(s) in which the course is offered (If general elective available in many programs indicate this rather than list programs): **Industrial Chemistry**
4. Name of faculty member responsible for the course: **Dr. Hoda Abou El-Fetouh El-Ghamry**
5. Level/year at which this course is offered: **4th level / 4**
6. Pre-requisites for this course (if any): **General chemistry (402101-4)**
7. Co-requisites for this course (if any): ---------
8. Location if not on main campus: ----------

B. Objectives

1. Summary of the main learning outcomes for students enrolled in the course

By finishing of this course, the students will be able to discuss and understand:

1- Meaning of inorganic chemistry.

2- Main group elements with some introductory knowledge on transition metals chemistry.

3- Atomic bonding and orbital overlap will.

4- Some basic concepts of molecular shapes and symmetry.

5- Energetic of metallic and ionic bonding and their effect on physical and chemical properties of solids

6- How to differentiate between acids and bases, definitions of acids and bases, and acid/base behavior of substances.

2. **Briefly describe any plans for developing and improving the course that are being implemented.** (eg increased use of IT or web based reference material, changes in content as a result of new research in the field)

- Variegation of learning sources for the course, so that students benefit from more than one reference.
- Encourage students to prepare reports include the bonding theories, the prosperities and uses of selected main group and transition metal elements and types of acids and bases.
- The use of teaching intelligent classes for lectures.

C. Course Description (Note: General description in the form to be used for the Bulletin or Handbook should be attached):

1. Topics to be covered:

Topic	No of Weeks	Contact hours
Bonding theories (Lewis dot structures and the octet rule)	**1**	**2**
Bonding theories (VSEPR, hybridization and bond angles in molecules)	**1**	**2**
Bonding theories (valance bond theory)	**2**	**4**
Bonding theories (molecular orbital theory), molecular bond diagrams of homo diatomic molecules of the second raw elements, and molecular geometry)	**2**	**4**
Some descriptive chemistry of selected main group and transition metal elements.	**2**	**4**
Introduction to molecular symmetry, symmetry operations, symmetry elements, and point groups	**2**	**4**
Structures and energetics of metallic and ionic bonding, packing of spheres.	**1**	**2**
structures of the elements, alloys, ionic lattices, lattice energy, and introduction to defects in solid state	**1**	**2**
Acids and bases in aqueous solution, properties of water, Lowry-Brønsted acids and bases, and Lewis acid and base.	**2**	**4**

2. Course components (total contact hours per semester):			
Lecture: **28**	Tutorial: _____	Practical/Fieldwork /Internship:	Other: _____

3. Additional private study/learning hours expected for students per week (this should be an average: for the semester not a specific requirement in each week):

- Students spend two hours during the whole semester to discuss, and resolve questions and duties of the course.

4. Development of learning outcomes in domains of learning for each of the domains of learning shown below indicate:

- A brief summary of the knowledge or skill the course is intended to be developed.
- A description of the teaching strategies to be used in the course to develop that knowledge or skill.
- The methods of student assessment to be used in the course to evaluate learning outcomes in the domain concerned.

a. Knowledge

(i) Description of the knowledge to be acquired

• Bonding theories of covalent compounds and molecular geometry.

• The characteristic properties the main group and transition elements including group relationships and trends in the periodic table.

• Molecular symmetry and symmetry operation.

• Metallic and ionic compounds and alloys

• Types of acids and bases and properties of water.

(ii) Teaching strategies to be used to develop that knowledge:

• Scientific discussions during the lectures.

• The use of library to perform work duties and prepare small research reports about

molecular symmetry and packing of spheres and structures of the elements and defects in solid state.

- Resolve problems and questions concerned with the topics presented during lectures as homework.
- Use of the internet to prepare some reports about bonding theories and the chemistry of the main group and transition elements.

(iii) Methods of assessment of knowledge acquired:

- Written periodic and final exams.
- Scientific discussions and effective participations during the lectures.
- Preparing scientific reports and weekly homework.

b. Cognitive Skills

(i) Cognitive skills to be developed:

- The student learns how to predict the type of hybridization of covalent compounds and deduce their molecular geometry and how to draw the molecular bond diagrams of homo diatomic molecules of the second raw elements.
- The student acquires the ability to recognize the properties of some selective main group and transition elements and the periodic properties.
- The student understands the meaning of Molecular symmetry and how to apply this definition to chemical compounds.

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

- Provide the students with examples and practical tasks that performed under the supervision of lecturers.
- Assigning student's duties that include open tasks designed for the application of prediction and analysis skills, problem solving.
- Giving some applied examples and problem and ask the students to find a strategic plan to resolve them.

(iii) Methods of assessment of student cognitive skills:

- Periodic exams and oral discussions.
- Measuring the response of students for the assignments.

c. Interpersonal Skills and Responsibility

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

- Evaluate and develop the student's ability to work in a team.
- The development of the ability of students to think and work in individual manner.

(ii) Teaching strategies to be used to develop these skills and abilities

- Divide the students into team works to evaluate their ability to work in groups.
- Periodic duties that carried out in individual manner to evaluate the ability of students to take responsibility and self-reliance.

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

- Evaluation of the individual tasks such as homeworks and duties and to determine the student's ability to self-reliance.

d. Communication, Information Technology and Numerical Skills:

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

- The ability to perform the mathematical calculations and data analysis and introduce it in a statistical way
- The skill to deal with computer and internet in order to download the research papers and articles that related to the course.

(ii) Teaching strategies to be used to develop these skills:

• The use of computers in the training room of the department.

• Organization of group visits to the central Library.

• The use of the international information network (internet).

(iii) Methods of assessment of students numerical and communication skills:

• Ask questions that measure the student's ability to interpret simple statistical information.

• Evaluate the homeworks and duties associated with the proper use of communication skills and numerical process.

e. Psychomotor Skills (if applicable)

(i) Description of the psychomotor skills to be developed and the level of performance required:

• It is not requirement for this course.

(ii) Teaching strategies to be used to develop these skills:

• It is not requirement for this course.

(iii) Methods of assessment of students psychomotor skills

• It is not requirement for this course.

5. Schedule of Assessment Tasks for Students During the Semester

Assessment	Assessment task (eg. essay, test, group project, examination etc.)	Week due	Proportion of Final Assessment
1	**Class activities, attendances and duties**	**throughout the term**	**10%**
2	**Periodic exam-1**	**After 5 weeks**	**20%**
3	**Periodic exam-2**	**After 10 weeks**	**20%**
4	**Final examination**	**End of the term**	**50%**
5	**Total**		**100**%

D. Student Support

1. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week):

- The presence of Staff members during the work hours to provide students with guidance and advice.
- Provide the students with the academic mentoring from the suitable members.
- Office hours: during the days of the week work days.

E. Learning Resources

1. Required Text(s):

- Inorganic Chemistry, Catherine Housecroft and Alan G. Sharpe, 4th ed. Pearson, 2012.

2. Essential References

- D. A. McQuarrie, J. D. Simon. Physical Chemistry: A Molecular Approach. University Science Books, 1997.
- R. L. DeKock, H. B. Gray, Chemical Structure and Bonding. University Science Books, 1989.
- J. D. Lee, Concise Inorganic Chemistry, 5th ed., Wiley-Blackwell, 1998.

3. Recommended Books and Reference Material (Journals, Reports, etc)

- H. B. Gray. Chemical Bonds: An Introduction to Atomic and Molecular Structure, University Science Books, 1994.
- R. G. Mortimer. Physical Chemistry, 2nd ed. Elsevier Inc., 2000.

4. Electronic Materials, Web Sites etc:

- http://www.chem1.com.
- www.webelements.com.

5. Other learning material such as computer-based programs/CD, professional standards/regulations

- CDs contain programs specified to molecular structure and symmetry in compounds.

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie

number of seats in classrooms and laboratories, extent of computer access etc**.)**
1. Accommodation (Lecture rooms, laboratories, etc.): • Equipped lecture halls.
2. Computing resources: • 30 computers, one slide show (Data Show) and TV.
3. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list**):** • None.

G. Course Evaluation and Improvement Processes

1. Strategies for obtaining student feedback on effectiveness of teaching: • The educational process is evaluated using questionnaire forms or panel discussions with students in order to identify and address weakness and strength points.
2. Other strategies for evaluation of teaching by the instructor or by the department: • Prepare a course report based on the results of the students to give us an indication about the planned outputs.
3. Processes for improvement of teaching: • Training programs and workshops for staff members to improve the educational process level.
4. Processes for verifying standards of student achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution): • We will try to carry it but it does not applied until now.
5. Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement: • A comparison of the course level should be made with similar courses at foreign universities.