**COURSE SYLLABUS**

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| **Subject: Inorganic Chemistry** | **Academic field: Chemistry** |
| **Lecturer: Dr. Tran Dinh Phong****Department of Advanced Materials Science and Nanotechnology****University of Science and Technology of Hanoi**  |  |
| **Phone: 096 46 021 46****E-mail:** **tran-dinh.phong@usth.edu.sg** |  |
| **Academic year: 2015-2016** |  |

**COURSE DESCRIPTION**

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| **Credit points** | 4 |
| **Level** | Undergraduate |
| **Teaching time** **Location** | University of Science and Technology of Hanoi |
| **Time Commitment** | Lecture |  30 hrs |
| Tutorial/Exercise | 6 hrs |
| Lab-work |  8 hrs |
| Total |  44 hrs |
| **Prerequisites** | General chemistry  |
| **Recommended background knowledge** | * General knowledge of chemistry such as principles of acids, bases, pH, polarity, polymer, and organic compounds.
* General lab skills for preparations of solutions and samples.
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| **Subject description:** | This course is emphasis on coordination chemistry. Students will learn the fundamental of inorganic chemistry, including the atomic and molecular orbital theories, chemical bonding, symmetry and group theory. The current topics in inorganic chemistry will be presented in a logical fashion, emphasizing trends rather than memorization of reactions.  |
| **Objectives & Out-come** | The students will be able to describe:1. Atomic structure
2. Simple bonding theory
3. Symmetry and group theory
4. Molecular orbitals
5. Acid-base and donor-acceptor chemistry
6. The crystalline solid state
7. Coordination chemistry including structures, bonding, reaction, preparation methods and characterizations
8. Current trenches in development of inorganic compounds and application
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| **Assessment/ Evaluation** | Attendance/Attitude | 10 %  |
| Lab Reports  | 20 %  |
| Mid-term exam (in class) | 30 %  |
| Final exam (in class) | 40 %  |
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| **Prescribed Textbook(s)** | 1. Inorganic Chemistry, Gary L. Miessler and Donald A. Tarr, 5rd edition, 2014, Prentice Hall.
2. The organometallic chemistry of transition metals, Robert H. Crabtree, 4th Edition, 2005 by John Wiley & Sons
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**COURSE CONTENTS & SCHEDULE**

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| **Class No.** | **Contents** | **No. of Hours** | **Ref./****Resources** | **Assignment(s)****End-of-Chapter Problems**  |
| **Lect.** | **Exr.** | **Prc.** |
| 1 | Introduction to Inorganic Chemistry | 1h |  |  |  |  |
| 1 | Atomic structure, Bonding Theory (Revisited General Chemistry problems)  | 2h | 1 |  |  |  |
| 2 | Molecular orbitals (Small molecules, ligands) | 3h | 1 |  |  |  |
| 3 | Organometallic chemistry 1 (acid-base and donor-acceptor chemistry, coordination bond) | 3h |  |  |  |  |
| 4 | Organometallic Chemistry 2 (geometry, 18 electron rule, *etc*)  | 3h | 1 |  |  |  |
| 5 | Symmetry and group theory | 3h | 1 |  |  |  |
| 6 | Organometallic Chemistry 3 (crystal field, ligand field and properties) | 3h | 1 |  |  |  |
| 7 | Thermodynamic and kinetic of chemical reaction (revisited General chemistry) | 3h |  |  |  |  |
| 8 | Current trenches in organometallic chemistry (synthesis, characterization, applications in catalysis, magnetic, optoelectronic) | 3h | 1 |  | *1* |  |
| 9 | The crystal of solid state | 3h |  |  |  |  |
| 10 | Chemistry of some elements in main groups (Si, C (CNTs, graphene, Diamond), etc) | 3h |  |  |  |  |

*Notes:*

* *Abbreviation: Lect. (lecture), Exr. (Exercise), Prc. (Practise).*
* *Exercises may include assignment, reports, student’s presentation, homework, class exercises... for each class sessions.*
* *Practical mostly refer to Lab-work or outside practice such as field trip.*
* *Assignments may include assignments, practical work, reports, exercises ...for each class sessions*

**Reference Literature:**

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| [1]. Inorganic Chemistry, Gary L. Miessler and Donald A. Tarr, 4rd edition, 2011, Prentice Hall. |
| [2]. Inorganic Chemistry Laboratory Manual |