

## Course Schedule of MST Program ,TIGP

Semester: Fall, 2011(100 學年度上學期)

Course(科目): Advanced Physical Chemistry (I)-高等物化(I)

Time(時間): 9:1 0~12:00 am, Tuesday(T2T3T4) or 10:00~11:30 am, Tuesday ,  
10:00~11:30 am, Friday(T3T4,R3R4)

Room(教室): 311 IAMS 中研院原分所 R311(台大校園)

NTHU coordinator(清大教師): 倪其焜

Course speakers(授課老師): Michitoshi Hayashi 林倫年、Yen-Chu Hsu 許豔珠

Required(必修課), credit(學分): 3

Course No.(科號): TIGP727100

Date	lecturer	Date	lecturer
9/13 Tuesday 9:1 0~12:00	Prof. Michitoshi Hayashi	12/06 Tuesday 10:00~12:00	Prof. Yen-Chu Hsu
9/20 Tuesday 9:1 0~12:00	Prof. Michitoshi Hayashi	12/06 Tuesday 13:30~14:30	Prof. Yen-Chu Hsu
9/27 Tuesday 9:1 0~12:00	Prof. Michitoshi Hayashi	12/13 Tuesday 10:00~12:00	Prof. Yen-Chu Hsu
10/4Tuesday 9:1 0~12:00	Prof. Michitoshi Hayashi	12/13 Tuesday 13:30~14:30	Prof. Yen-Chu Hsu
10/11 Tuesday 9:1 0~12:00	Prof. Michitoshi Hayashi	12/20 Tuesday 10:00~12:00	Prof. Yen-Chu Hsu
10/18 Tuesday 9:1 0~12:00	Prof. Michitoshi Hayashi	12/20 Tuesday 13:30~14:30	Prof. Yen-Chu Hsu
10/25 Tuesday 9:1 0~10:30	Prof. Michitoshi Hayashi	12/27 Tuesday 10:00~12:00	Prof. Yen-Chu Hsu
11/01 Thursday 9:1 0~10:30	Prof. Michitoshi Hayashi	12/27 Tuesday 13:30~14:30	Prof. Yen-Chu Hsu
11/08 Tuesday 9:1 0~12:00	Prof. Michitoshi Hayashi	1/03/2012 Tuesday 10:00~12:00	Prof. Yen-Chu Hsu
11/15 Tuesday 9:1 0~12:00	Prof. Michitoshi Hayashi	1/03/2012 Tuesday 13:30~14:30	Prof. Yen-Chu Hsu
11/22 Tuesday 9:1 0~12:00	Prof. Michitoshi Hayashi	1/10/2012 Tuesday 10:00~12:00	Prof. Yen-Chu Hsu
11/29 Tuesday 9:1 0~12:00	Prof. Michitoshi Hayashi	1/10/2012 Tuesday 13:30~14:30	Prof. Yen-Chu Hsu

Speaker	Part 1 (Week 1-week12) Prof. Michitoshi Hayashi 林倫年教授
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Class Outline	<p>&lt;The first 3 weeks&gt;</p> <p>Quantum mechanical principles</p> <ul style="list-style-type: none"> <li>→ Uncertainty principle and relations</li> <li>→ The principle of superposition</li> </ul> <p>The dynamics of microscopic systems</p> <ul style="list-style-type: none"> <li>→ Schrödinger equation</li> <li>→ Wave function</li> <li>→ Operator algebra</li> <li>→ Eigenvalues and eigenvectors</li> <li>→ Observables</li> <li>→ Stationary states</li> <li>→ The Virial Theorem</li> </ul> <p>&lt;The last 3 weeks&gt;</p> <p>Approximations</p> <ul style="list-style-type: none"> <li>→ Perturbation method</li> <li>→ Variational principle</li> </ul> <p>Simple applications</p> <ul style="list-style-type: none"> <li>→ Harmonic oscillator</li> <li>→ Diatomic systems</li> </ul> <p>Introduction to many electron systems</p> <ul style="list-style-type: none"> <li>→ Independent particle approximation</li> <li>→ Correlation effects</li> </ul>
Introduction	<p>This course consists of two parts: introduction of (1) the basic principles of quantum mechanics and (2) the essentials of the solving methods of Schrödinger equation and its applications to simple and important systems.</p> <p>The first 3 weeks, we will discuss the dynamics of microscopic systems and quantum mechanical principles. The last 3 weeks, we will see how quantum mechanics works for some of the simplest systems including hydrogen atom, hydrogen molecules using several approximation techniques.</p>
Grading	<p>Problem sets will be provided weekly to trace understanding of the materials.</p> <p>The final grade will be determined by</p> <p>Problem sets (60%)</p> <p>Exam (40%)</p>
Textbook	<p>Lecture Notes</p> <p>Reference</p> <p>Atkins' Physical Chemistry</p>

Speaker	<p>Part 2 (Week 13-week18)</p> <p>Prof. Yen-Chu Hsu</p> <p>許豔珠教授</p>
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<b>Class Outline</b>	<ol style="list-style-type: none"> <li>1. Symmetry and symmetry classification</li> <li>2. Group theory</li> <li>3. Symmetry in Quantum Theory</li> <li>4. Rotational spectroscopy: selection rules, line width and stark effect.</li> <li>5. Rotational spectroscopy and Astrophysics</li> </ol>
<b>Introduction</b>	This part will follow closely the textbook (chapter 12 and section 1-8 of chapter 13). Additional handout will be given in the classes.
<b>Grading</b>	<ol style="list-style-type: none"> <li>1. Homework (40%).</li> <li>2. Attendance (25%).</li> <li>3. Examination (35%).</li> </ol>
<b>Textbook</b>	Atkin's Physical Chemistry, 8 <sup>th</sup> edition(Oxford Univ., 2006)