1. Course Details
   Instructor: Professor Caroline Taylor
   email: cmtaylor@mtu.edu
   Phone: 7-1645
   Office: ChemSci 701C
   Office Hours: Monday, Wednesday 2pm – 3pm, or by appointment
   Lecture: ChemSci 101
   Monday, Wednesday, Friday 1:05pm – 1:55pm
   Required Text: *Physical Chemistry* 5th Ed.,
   Ira N. Levine, McGraw-Hill.
   H. Callen, *Thermodynamics*
   These texts will be on reserve in the library. While not required; they may prove helpful
   in understanding the material.
   Webpage: http://www.chemistry.mtu.edu/pages/courses/class.php?class=CH3510&sem=20071
   In addition, an electronic mailing list will be created for the course.
   Prerequisites: Introductory-level chemistry and calculus (multi-variable).

2. Lecture
   The central component of this course is the lecture. It will meet three times a week (MWF) for 50 minutes,
   and will run the entire allotted course time. While attendance will not be taken, participation can affect the
   final grade. It is expected that the relevant chapters will have been read before lecture.

3. Assignments & Grading
   Problem Sets: During the course of the semester there will be six graded problem sets. These will be dis-
   tributed in class and posted on the web site, and will count toward the overall course grade.
   Exams: There will be two one-hour mid-term examinations during the semester, covering material
   from lecture, the textbook, and problem sets. Both will be held during the lecture period; the
   first on **Friday, February 16, 2007** and the second on **Monday, March 26, 2007**.
   Research Paper: There will be no final examination in the course. In place of a final examination, a for-
   mal, research-based paper of about 10 double-spaced pages (in 12pt) will be required, due
   on **Wednesday, May 2, 2007**, during finals week. General topic areas for this paper will
   be distributed separately; all topics must be approved in advance. It is strongly encour-
   aged that you take advantage of the resources and assistance available in the Writing Center
   (http://www.hu.mtu.edu/wc/).
   Grade: The course grade will be determined from the two mid-term exams, cumulative problem set
   scores, the final research paper, and participation in lecture. The anticipated (tentative)
   breakdown is:
   5% participation
   25% problem sets
   22% exam I
   22% exam II
   26% research paper
   Late work will not be accepted, and there are no make-up exams.

4. Academic Integrity
   Collaboration is both expected and encouraged. However, every student must submit their own
   work. This extends to the final research paper, where scholarly standards must be met. Any
   violations will be subject to the full range of penalties, from a zero score on the assignment or exam
   to failure of the course and an indication on the permanent record. Please review the University’s
   policy on Academic Integrity, available at
   http://www.studentaffairs.mtu.edu/dean/judicial/policies/academic_integrity.html.
   
   If you are at all uncertain, please speak to me.
5. **Tentative Schedule**

The material in the course is broken down into several areas, each covering approximately four chapters of the text; they are:

(a) Principles of thermodynamics processes (Levine, Chapters 1–4);
(b) Chemical processes and phase equilibria (Levine, Chapters 5–8);
(c) Ideal and non-ideal solutions (Levine, Chapters 9–11); and
(d) Statistical thermodynamics and kinetics (Levine, Chapters 22 and 17).

A tentative schedule with required and suggested readings is provided below; the suggested readings dealing with the related information in Denbigh’s text are given in parentheses. Dates are subject to change; announcements about the schedule will be made in lecture.

<table>
<thead>
<tr>
<th>Week(s) of</th>
<th>General Topics (abridged)</th>
<th>Chapters</th>
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<tbody>
<tr>
<td>1/17</td>
<td>Thermodynamic definitions, the 0th Law, temperature, Equations of State and state variables, work</td>
<td>1, 2 (D 1.1-1.6)</td>
</tr>
<tr>
<td>1/22</td>
<td>Changes of state, work and heat, internal energy and enthalpy, the 1st Law</td>
<td>2, 3 (D 1.7-1.12)</td>
</tr>
<tr>
<td>1/29</td>
<td>Entropy, the 2nd Law, reversibility and irreversibility</td>
<td>3 (D 1.13-1.18)</td>
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<tr>
<td>2/5</td>
<td>Thermodynamic postulates, fundamental relations, Gibbs equations, thermodynamic transformations</td>
<td>4 (D 2.1-2.7)</td>
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<tr>
<td>2/12</td>
<td>Conditions for equilibrium</td>
<td>4, 5 (D 2.8-2.14, D 4.1-4.8)</td>
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<td></td>
<td>Thermodynamic functions for reactions</td>
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**Midterm 1: Friday, 16 February 2007**
Principles of Thermodynamics and physical processes. Levine, Chapters 1-4 and related material.

<table>
<thead>
<tr>
<th>Week(s) of</th>
<th>General Topics (abridged)</th>
<th>Chapters</th>
</tr>
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<tbody>
<tr>
<td>2/19</td>
<td>Gas mixtures and equilibrium, phase equilibria</td>
<td>6, 7 (D 3, 5, 6)</td>
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<tr>
<td>2/26</td>
<td>gas mixtures and liquid solutions</td>
<td>7, 8 (D 4, 7)</td>
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<tr>
<td>3/5</td>
<td>Nonideal solutions</td>
<td>10 (D 9)</td>
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<tr>
<td>3/19</td>
<td>Electrolytes</td>
<td>11 (D 10)</td>
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**Midterm 2: Monday, 26 March 2007**
Mixtures, solutions, and equilibria. Levine, Chapters 5-11 and related material.

<table>
<thead>
<tr>
<th>Week(s) of</th>
<th>General Topics (abridged)</th>
<th>Chapters</th>
</tr>
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<tbody>
<tr>
<td>3/26</td>
<td>Multicomponent Phase equilibria</td>
<td>12 (D 8)</td>
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<tr>
<td>4/2, 4/9</td>
<td>Statistical Thermodynamics</td>
<td>22 (D 11, 12)</td>
</tr>
<tr>
<td>4/16, 4/23</td>
<td>Molecular reactions: Kinetics and rates</td>
<td>17 (D 15)</td>
</tr>
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**Final Papers Due Wednesday, 2 May 2007**