Lectures times are scheduled twice a week (Tue, Wed 9:30-10:20, ABB-431). Tutorials are scheduled once per week (Fri 9:30-10:20, ABB-431).

**Course Content:**
(Note: Reading suggestions are only approximate and will be clarified during class. Not all given references are required to pass the course!! [1] is required, however, and some additional reading advisable. Further references might be given throughout the course.)

**Part 1: Surface Structure and Properties**
Week 1: Introduction; Common structures of single crystals; Unreconstructed surfaces; k-space
(tutorial: choice of project topics; strategies for literature search)
Week 2: Surface reconstructions; LEED
(tutorial: project chapter 1 - practical relevance of chosen topics)
Week 3: Electronic structure of surfaces; MO theory of extended structures
(tutorial: Library session - database searches, in ABB-411, held by Regina Bendig)
Week 4: Real surfaces (contamination, defects, etc.); Surface preparation (annealing, sputtering)
(28 January 2005: 1st Midterm during tutorial time)

**Part 2: Surface Analysis**
Week 5: Vibrational Spectroscopy (RAIRS, ATR-IR, HREELS, SERS)
(tutorial: discussion - 1st midterm, Chapters 1-4 of projects)
Week 6: Electron & X-ray Spectroscopy (AES, UPS, XPS, NEXAFS)
(tutorial: tour of facilities @ Mac)
Week 7: Optical & Electron Microscopy (SEM, SAM, PEEM)
(tutorial: review of surface analytical methods)
Week 8: Scanning Probe Microscopy (STM, STS, AFM, NSOM, related)
(04 March 2005: 2nd Midterm during tutorial time)

**Part 3: Surface Processes, Growth and Reactions**
Week 9: Adsorption & Desorption
(tutorial: discussion - 2nd midterm, Chapters 5-8 of projects)
Week 10: Surface reaction mechanisms
[1]3/4 (selected)
(tutorial: t.b.a.)
Week 11: Epitaxy
[1]6.1, 6.2, 6.3, 6.4, 6.5, 6.6, [7]
(no tutorial - Easter)
Week 12: Self-Assembled Monolayers & Langmuir-Blodgett Films
[1] 6.7, 6.8, 6.9
(tutorial: wrap-up projects)

Week 13: Selected applications of surface chemistry; Review
[1] 5 (selected)
(no tutorial - end of classes)

**Final exam** during exam period

**Textbook:**

**Other Useful Resources:**

**Course project:**
You will pick a project topic for this course by focusing on a particular surface/adsorbate system. A list of suitable topics for course projects will be published separately. The selection of topics and expected project work will be discussed at the end of the first week of lectures.

**Timetable for course projects (Deadlines):**
Week 1 - pick topic
Week 2 - Chapter 1: “Introduction: Practical Relevance & Context”
Week 3 - Chapter 2: “The clean surface: structure, reconstruction & properties”
Week 4 - Chapter 3: “Surface preparation & Dosing”
Week 5 - Chapter 4: “LEED studies of the clean & reacted surfaces”
Week 6 - Chapter 5: “Vibrational spectroscopy”
Week 7 - Chapter 6: “Electron/X-ray spectroscopy”
Week 8 - Chapter 7: “STM studies”
Each chapter as well the final revision are due on the Thursday of the given week at 9:30pm. (i.e. 12 hours before the Friday class) The text of the chapter must be publicly posted in the appropriate discussion group on the WebCT course website at or before that time. It is difficult to give absolute rules for the length of each chapter, but at least 1000 words plus appropriate figures should be doable. Figures can typically be taken from the original references (properly label the figures to indicate their origin!), but avoid any literal citations of text. (On very rare occasions, a single and well-marked sentence may be appropriate.)

For each chapter, a minimum of 3-5 references should be included in the report. The best online database to use for the purpose of this course is INSPEC. (SciFinder or Web of Science might be o.k. too, but I can't guarantee that.) The use of Google or similar general search engines is not recommended since it usually results in non-citable sources. All references must be from the peer-reviewed literature (original research papers). Websites are not peer-reviewed and hence not acceptable as references in this course. Btw., most books and review-articles are not peer-reviewed either! However, all of those (websites, books, review articles) are good starting points for tackling a new topic.

Furthermore, you are encouraged to provide constructive feedback to your peers. Weekly, you will be required to provide a brief review of the work of two of your classmates. A schedule for the required feedback will be published during the second week of class. The reviews must be posted in the appropriate discussion group on the WebCT course website at the latest by 9:30pm of the Thursday after the critiqued piece of work was due, but may be posted earlier. You may post additional feedback at any time. You will receive a weekly grade based on the quality of the feedback that you have given. (1% of final grade each in weeks 3 through 12 for critiques of work that was due in weeks 2 through 11) Keep in mind that your feedback should be constructive and help your classmates. Every student should use the feedback from the instructor (given by private email) and other students (given publicly in the discussion forum) to update the chapters of the report for the final version.

**Grading**
The exact format of the midterm and final exams will be announced at an appropriate time.

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<th>Percentage</th>
<th>Description</th>
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<tr>
<td>30% (2x15%)</td>
<td>2 Midterms</td>
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<tr>
<td>30%</td>
<td>Final Exam</td>
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<tr>
<td>20% (10x2%)</td>
<td>Project (10 weekly chapters)</td>
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<td>10% (10x1%)</td>
<td>Project (weekly peer review of 2 other projects)</td>
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<td>10%</td>
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**Disclaimer:** Changes to the course schedule and marking scheme may be made at the discretion of the instructor and announced to the students at any time during the course. An effort will be made to keep inconveniences from changes to a minimum.

**Academic dishonesty:** Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: “Grade of F assigned for academic dishonesty”), and/or suspension or expulsion from the university.
It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, specifically Appendix 3, located at http://www.mcmaster.ca/senate/academic/ac_integrity.htm. In particular reference to the student work in this course, on midterm and final examinations only use the aids explicitly permitted by the instructor. Properly reference your sources for everything related to your project work and honestly acknowledge any help you got from other people.