FOOD 4250  Food Analysis II

Credits:  (00:3L) 3

Description:  Advanced techniques employed in the physicochemical and biological analysis of food products as preparation for research, development and inspection roles in government and in industry.

Prerequisite:  FOOD 4160 - Food Analysis I

Instructor(s):  Usha Thiyam-Hollander
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                   Office:  Rm 204, 196 Innovation Drive, Richardson Centre.
                   Email:  usha.thiyam@umanitoba.ca

Office hours:  Mondays 10:00-11:00 am. Request per e-mail (use Subject: FOOD 4250).

Course website:  Please check the UMLearn portal designated for this course for regular announcements and updates as discussed in first lecture. Postings/announcements/supplemental information posted in UMLEARN will be considered an integral part of the course outline.

<table>
<thead>
<tr>
<th>Class Times &amp; Days of Week: (A01)</th>
<th>8:30 am -9:45 am; Tuesdays and Thursdays</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location for classes:</td>
<td>343, Agriculture</td>
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<tr>
<td>Laboratory Time &amp; Days of Week:</td>
<td></td>
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<tr>
<td>(B01)</td>
<td>2:30 pm-5:25 pm; Tuesdays (2:00 pm for some groups; time change: refer consultation with students and TA/Alison )</td>
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<tr>
<td>Location for lab:</td>
<td>Rm 241, Ellis</td>
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Course Goals and Learning Objectives:  At the end of the course, students should have knowledge of a variety of analytical techniques for evaluation of the chemical and physical properties of food. Specifically each student should be able to:

1.  Describe the principles and application of instrumental analytical techniques
   a.  Explain the principles behind instrumental analytical techniques including spectrophotometry, colorimetry, electrophoresis, chromatography, immunoassays, thermal analysis and rheology
   b.  Contrast/compare the principles behind related techniques (e.g. different types of spectroscopy)

2.  Determine when a specific analytical technique is required
   a.  Compare the outcomes of different analytical techniques
   b.  Justify the choice of method for a given application

3.  Perform fundamental lab skills including solution preparation, dilution and pH adjustment
   a.  Generate data that is reasonable for a given analytical technique
   b.  Demonstrate competence in sample handling

4.  Perform instrumental techniques used in the evaluation of foods.
   a.  Conduct an experiment in a laboratory setting to produce the require data using instrument analytical techniques including spectrophotometry, colorimetry, electrophoresis, chromatography, immunoassays, thermal analysis and rheology
5. Evaluate data resulting from instrumental analytical techniques
   a. Interpret data from instrumental analytical techniques including spectrophotometry, colorimetry, electrophoresis, chromatography, immunoassays, thermal analysis and rheology

6. Use sensory analysis to evaluate food products
   a. Explain the principles of various sensory techniques
   b. Recommend an appropriate sensory technique for a given situation
   c. Conduct a sensory test for a specified product

7. Use computers to run analytical equipment
   a. Analyze food samples using computer controlled analytical equipment

8. Use computers to evaluate and present data from laboratory exercises
   a. Prepare reports summarizing data from experiments with appropriate interpretation
      - Reports should be grammatically, technically (format) and ethically (correct use of literature) sound and demonstrate your ability to interpret the data obtained.

Subject Outline:

Introduction
Spectroscopy: general principles, characteristics of UV/Visible, difference derivative and fluorescence spectroscopy, infrared spectroscopy, atomic absorption spectroscopy, mass spectroscopy and magnetic resonance.

Colour Analysis: general principles, spectroscopic techniques for evaluation of colour.

Electrophoresis: basic theory, PAGE, SDSPAGE, isoelectric focusing, blotting.

Chromatography: general principles (the separation process, resolution, characteristics of the chromatographic peak), selected types gel filtration, ion exchange, affinity.

Gas and High Performance Liquid Chromatography: general description, various aspects of the methodology, application possibilities.

Immunochmical Techniques: definitions and basic immunological principles, polyclonal and monoclonal antibodies, precipitation techniques, radio-immunoassays and enzyme immunoassays.

Thermal Analysis: principles, use of differential scanning calorimetry in food analysis.

Rheology of Food: principles, practical applications in food analysis.

Sensory Analysis: principles, applications in food analysis.

Guest lecturers will be delivering certain lectures (subject to availability). In such cases, the guest lecturer and topic will be announced in class or in UMLearn.

Laboratory Information:

Reports: Students will work in groups in the laboratory but will hand in individual assignments. Laboratory submissions will be either as formal reports or detailed answers to specific questions (due 14 days including weekends after each lab). The required style for formal reports is outlined in the laboratory manual. •If you hand in a late report, 10% of the total marks will be subtracted for each day (including weekends). Marks will be deducted for grammatical and technical errors (10-20%).

Topics may include:
   1. UV/VISIBLE spectrophotometry
COURSE OUTLINE Winter 2018

2. Colour Analysis: Analysis of L, a and b value with a colorimeter and data analysis
3. Electrophoresis: Sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE) of selected proteins
4. Chromatography – Use of HPLC and CG to Evaluate Food
5. ELISA to determine to Presence and Quantity of Almond antigen in Food Products
6. Thermal Analysis: The use of DSC to Assess the Impact of Environment Parameters on Starch Gelatinization

Mark Allocation

Laboratory Reports and Performance (8 labs total): 35%
Review Questions/Exam conducted at the end of every chapter: 10%
Midterm Exam (27-02-2018) (All topics on Spectroscopy & Electrophoresis): 25%
Final Exam (All topics except Spectroscopy & Electrophoresis): 30%

A passing grade on the final exam and midterm exams is required to pass the course.

Grading scheme:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Score Range</th>
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<tbody>
<tr>
<td>A+</td>
<td>90-100</td>
</tr>
<tr>
<td>A</td>
<td>80-89</td>
</tr>
<tr>
<td>B+</td>
<td>75-79</td>
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<tr>
<td>B</td>
<td>67-74</td>
</tr>
<tr>
<td>C+</td>
<td>61-66</td>
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<tr>
<td>C</td>
<td>56-60</td>
</tr>
<tr>
<td>D</td>
<td>50-55</td>
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<tr>
<td>F</td>
<td>&lt;50</td>
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</tbody>
</table>

VW date:
March 16, 2018.

Recommended Text (covers most topics):

Nielsen, S. Suzanne 2010, Food Analysis, 4th ed., SpringerLink (Online service)
ISBN 1441914781 (prior hard copy editions would be fine)
http://www.springerlink.com.proxy2.lib.umanitoba.ca/content/mr44w0/#section=722059&page=1&locus=0

Selected References available in University of Manitoba libraries:

James, C. S. 1995. Analytical chemistry of foods; Blackie Academic & Professional.

Lab, Lab Report and Review Question Grading Times

Please review the websites

http://umanitoba.ca/admin/vp_admin/risk_management/ehso/chemical_safety/WHMISProgram.html
http://umanitoba.ca/admin/vp_admin/risk_management/ehso/media/WHMIS_Reference_Chart.pdf

prior to your first lab.

To complete your WHMIS training, follow instructions posted in UMLearn, an online test with a score of 80% or higher is required to attend the lab.

Please submit reports using UM LEARN DROPBOX. UM LEARN and class will be used as a resource for marks and feedbacks. I will not explain/provide justification per e-mail. Please arrange for an appointment if you require discussing.

Policy on Plagiarism and Cheating

“Plagiarism or any other form of cheating in examination or terms tests is subject to serious academic penalty. To plagiarize is to take ideas or words of another person and pass them off as one’s one. Obviously, it is not necessary to state the source of well known or easily verifiable facts, but students are expected to acknowledge the sources of ideas and expressions they use in their written work, whether quoted directly (with quotation marks) or paraphrased.” Paraphrasing by simply changing a word or two is not acceptable.

Any instances of academic dishonesty will be reported to the Department Head for further action. There will be no warnings. The first instance will be reported.

Policies Related to Student Discipline
You should acquaint yourself with the University’s policy as detailed in the General Academic Regulations and Policy section of the University of Manitoba Undergraduate Calendar.

Using Copyrighted Material
Please respect copyright. We will use copyrighted content in this course with acknowledgements and in accordance with copyright laws and University guidelines. Copyrighted works, including those created by me, are made available for private study and research and must not be distributed in any format without permission. Do not upload copyrighted works to a learning management system (such as UMLEARN), or any website, unless an exception to the Copyright Act applies or written permission has been confirmed. For more information, see the University’s Copyright Office website at http://umanitoba.ca/copyright/ or contact um_copyright@umanitoba.ca.

Recording Class Lectures
Usha Thiyam-Hollander (and Dr. Arntfield) holds copyright over the course materials, presentations and lectures which form part of this course. No audio, smartphone clip/picture or video recording
of lectures or presentations is allowed in any format, openly or surreptitiously, in whole or in part without permission of Usha Thiyam-Hollander. Course materials (both paper and digital) are for the participant’s private study and research.

Student Accessibility Services
If you are a student with a disability, please contact SAS for academic accommodation supports and services such as note-taking, interpreting, assistive technology and exam accommodations. Students who have, or think they may have, a disability (e.g. mental illness, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation.

*Student Accessibility Services* http://umanitoba.ca/student/saa/accessibility/
520 University Centre
204 474 7423
Student_accessibility@umanitoba.ca

Other Student Services

Writing and Learning Support:
The Academic Learning Centre (ALC) offers services that may be helpful to you throughout your academic program. Through the ALC, you can meet with a learning specialist to discuss concerns such as time management, learning strategies, and test-taking strategies. The ALC also offers peer supported study groups called Supplemental Instruction (SI) for certain courses that students have typically found difficult. In these study groups, students have opportunities to ask questions, compare notes, discuss content, solve practice problems, and develop new study strategies in a group-learning format.

You can also meet one-to-one with a writing tutor who can give you feedback at any stage of the writing process, whether you are just beginning to work on a written assignment or already have a draft. If you are interested in meeting with a writing tutor, reserve your appointment two to three days in advance of the time you would like to meet. Also, plan to meet with a writing tutor a few days before your paper is due so that you have time to work with the tutor’s feedback.

These Academic Learning Centre services are free for U of M students. For more information, please visit the Academic Learning Centre website at: http://umanitoba.ca/student/academiclearning/

You can also contact the Academic Learning Centre by calling 204-480-1481 or by visiting 201 Tier Building.

University of Manitoba Libraries (UML):
As the primary contact for all research needs, your liaison librarian can play a vital role when completing academic papers and assignments. Liaisons can answer questions about managing citations, or locating appropriate resources, and will address any other concerns you may have, regarding the research process. Liaisons can be contacted by email or phone, and are also available to meet with you in-person. A complete list of liaison librarians can be found by subject or name: http://bit.ly/1tJ0bB4. In addition, general library assistance is provided in person at 19 University Libraries, located on both the Fort Garry and Bannatyne campuses, as well as in many Winnipeg hospitals. For a listing of all libraries, please consult the following: http://bit.ly/1sXe6RA. When working remotely, students can also receive help online, via the Ask-a-Librarian chat found on the Libraries’ homepage:www.umanitoba.ca/libraries. HNSC 1210 A02: Nutrition for Health and Changing Lifestyles 8
Student Counselling Centre (SCC):
Contact SCC if you are concerned about any aspect of your mental health, including anxiety, stress, or depression, or for help with relationships or other life concerns. SCC offers crisis services as well as individual, couple, and group counselling. Student Counselling Centre:
http://umanitoba.ca/student/counselling/index.html
474 University Centre or S207 Medical Services
(204) 474-8592

Student Support Case Management:
Contact the Student Support Case Management team if you are concerned about yourself or another student and don’t know where to turn. SSCM helps connect students with on and off campus resources, provides safety planning, and offers other supports, including consultation, educational workshops, and referral to the STATIS threat assessment team.
Student Support Intake Assistant http://umanitoba.ca/student/case-manager/index.html
520 University Centre
(204) 474-7423

For 24/7 mental health support, contact the Mobile Crisis Service at 204-940-1781.
University Health Service:
Contact UHS for any medical concerns, including mental health problems. UHS offers a full range of medical services to students, including psychiatric consultation.
University Health Service http://umanitoba.ca/student/health/
104 University Centre, Fort Garry Campus
(204) 474-8411 (Business hours or after hours/urgent calls)

Health and Wellness:
Contact our Health and Wellness Educator if you are interested in information on a broad range of health topics, including physical and mental health concerns, alcohol and substance use harms, and sexual assault.
Health and Wellness Educator http://umanitoba.ca/student/health-wellness/welcome.html
Katie.Kutryk@umanitoba.ca
469 University Centre
(204) 295-9032

Live Well @ UofM:
For comprehensive information about the full range of health and wellness resources available on campus, visit the Live Well @ UofM site:
http://umanitoba.ca/student/livewell/index.html

Your Rights and Responsibilities:
As a student of the University of Manitoba you have rights and responsibilities. It is important for you to know what you can expect from the University as a student and to understand what the University expects from you. Become familiar with the policies and procedures of the University and the regulations that are specific to your faculty, college or school. The Academic Calendar http://umanitoba.ca/student/records/academiccalendar.html is one important source of information. View the sections University Policies and Procedures and General Academic Regulations.
While all of the information contained in these two sections is important, the following information is highlighted.

You are expected to view the General Academic Regulation section within the Academic Calendar and specifically read the Academic Integrity regulation. Consult the course syllabus or ask your instructor for additional information about demonstrating academic integrity in your academic work. Visit the Academic Integrity Site for tools and support http://umanitoba.ca/academicintegrity/ View the Student Academic Misconduct procedure for more information.

The University is committed to a respectful work and learning environment. You have the right to be treated with respect and you are expected conduct yourself in an appropriate respectful manner. Policies governing behavior include:

Respectful Work and Learning Environment
http://umanitoba.ca/admin/governance/governing_documents/community/230.html

Student Discipline
http://umanitoba.ca/admin/governance/governing_documents/students/student_discipline.html and,

Violent or Threatening Behaviour
http://umanitoba.ca/admin/governance/governing_documents/community/669.html

For information on regulations that are specific to your academic program, read the section in the Academic Calendar and on the respective faculty/college/school web site http://umanitoba.ca/faculties/ Contact an Academic Advisor within our faculty/college or school for questions about your academic program and regulations http://umanitoba.ca/academic-advisors/

Student Advocacy:
Contact Student Advocacy if you want to know more about your rights and responsibilities as a student, have questions about policies and procedures, and/or want support in dealing with academic or discipline concerns.
http://umanitoba.ca/student/advocacy/
520 University Centre
204 474 7423
student_advocacy@umanitoba.ca

Course Technology
Laptops and notebooks may be used only for course goals and note-taking, provided it does not disrupt the class. All devices must be in mute mode (same for cell phones). It is general University of Manitoba policy that all technology resources are to be used in a responsible, efficient, ethical and legal manner. Students may use technology in the classroom setting only for educational purposes approved by the instructor and/or the University of Manitoba Disability Services. The instructor will monitor the use of technology in class. Students should not participate in personal direct electronic messaging/posting activities (e-mail, texting, video or voice chat, wikis, blogs, social networking [e.g. Facebook], online and offline “gaming”) during the scheduled class time. If a student is seen using non-permitted technology in class without the instructor’s permission, the student will be asked to
leave the classroom and will receive a 5% deduction on his/her final grade. Exceptions will apply for emergency situations, and the instructor must be notified in advance of such situations.

**Expectations: What I Expect of You**

- Regular and punctual attendance is expected (please refer to University of Manitoba policy).
- Students may use their computers and laptops for taking notes (muted mode).
- Cell phones must be switched off.
- I do not expect you to interrupt others, and those that do so will be asked to leave the classroom. Appropriate action will follow if disruptions continue in the same manner.
- Ask questions at the end of the lecture. If I have discussed our question in class or posted information in response to your/another student’s query, I will not answer your e-mails.
- Give yourself 24-48hrs before you contact me (after marks are posted).
- Do not ask for justifications/explanations per e-mail for your marks. I will usually note your questions or respond to your questions towards the end of the class time.
- I will treat you with respect and would appreciate the same courtesy in return. See Respectful Work and Learning Environment Policy.

**Expectations: You Can Expect Me To**

- I will be asking questions and will expect students to respond at any time during class (although I do not expect perfection). The instructor will aim to facilitate constructive criticism and share experiences (food analysis, instrumental errors, etc.).
- I will distribute “additional” handouts, examples of sample papers, presentations and related resources in response to your questions.
- YouTube lecture videos will be used to support class lectures and/or posted in UMLearn to facilitate learning. These videos can generally be viewed after class.
- The instructor may finish class early to solicit and address student questions/discussions.
- The instructor reserves the right to course content and delivery.