Course Coordinator: Voula Kanelis  
Rm. DV 4042, UTM  
(905) 569-4542  
voula.kanelis@utoronto.ca

Course Description: This course will cover current techniques for studying the structure, chemical properties, and mobility of biological molecules. Techniques will be described in terms of theory and application. Lectures will provide a fundamental understanding of the information potential and limitations of each technique, as well as practical details for applying the techniques. Specific applications from the current literature will be discussed.

Lectures will be taught by faculty with expertise in each of the areas listed under lecture topics.

Lecture Times: One two-hour lecture per week. Tuesdays, 10 am – 12 noon

Lecture Format: Lectures will be taught in various different formats, depending on the faculty. Some faculty members will teach in-person from their campus, providing video conferencing or hybrid capabilities for students located at another campus. Others will teach from Zoom. The course schedule indicates which teaching mode will be employed for each week.

Room on the St George Campus: Sidney Smith Hall, Rm 2104

Room on the UTM Campus: MN2140

Zoom link: https://utoronto.zoom.us/j/88963782449

Evaluation: Problem sets (~1 per lecture) 50%  
Final Exam 50 %

Problem Sets: Problem sets will posted on Quercus. Problem sets are due one week after they are posted. Problem sets are to be submitted through Quercus. They should be typed and submitted as a pdf.

In some cases, you may be asked to submit through Turnitin.

Penalties: Problem sets are due 1 week after the lecture. Late assignments will receive a penalty of 10 % per day late. Assignments more than 5 days late will not be accepted and the student will
receive a mark of 0 for that assignment.

**Final Examination:** A comprehensive, 2 hour, final examination will be given at the end of the course. Questions will be provided by each faculty member teaching in the course; Some questions will be broader scope in nature and will cover more than one technique.
Student Technology Requirements and Connection Tools:
Because some of the lectures will be solely online or in hybrid mode using Zoom, students are expected to review and be in compliance with the University of Toronto’s requirements for online learning, which are available at https://www.viceprovoststudents.utoronto.ca/tech-requirements-online-learning/. Students are also strongly encouraged to familiarize themselves with the resources available on the UTM Library’s Learn Anywhere website (https://utm.library.utoronto.ca/students/quercus/learn-anywhere).

Students are required to register for a UTM Zoom account (Web Portal Login: https://utoronto.zoom.us) prior to the first course meeting.

Note that if you used your utoronto.ca or mail.utoronto.ca email address to set up a zoom account through the zoom.us and not utoronto.zoom.us, you do not have an authenticated account. You can fix this in one of two ways:

(a) If you log out of zoom completely (from all devices) and then go through the portal login, you can associate your utoronto.ca or mail.utoronto.ca email address to a UofT Zoom account. Note that this may take up to 48 hours.

(b) You can change the email address associated with your personal zoom account (by editing your profile). Then you can go to the portal login and use your utoronto.ca or mail.utoronto.ca email address to set up a UTM Zoom account.

On occasion, Blackboard collaborate will be used and instructions will be provided.

Privacy and Use of Course Materials
Notice of Video Recording and Sharing
When Zoom is being used, this course, including your participation, will be recorded on video and will be available to students in the course for viewing remotely and after each session. Course videos and materials belong to your instructor, the University, and/or other sources depending on the specific facts of each situation, and are protected by copyright. Do not download, copy, or share any course or student materials or videos without the explicit permission of the instructor. For questions about recording and use of videos in which you appear please contact your instructor.
<table>
<thead>
<tr>
<th>Lecture</th>
<th>Date</th>
<th>Lecture Topics</th>
<th>Faculty</th>
<th>Teaching Mode</th>
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<tbody>
<tr>
<td></td>
<td>Sept. 6</td>
<td>No class</td>
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<tr>
<td>1</td>
<td>Sept. 13</td>
<td>Introduction&lt;br&gt;Review of methods for protein isolation and purification&lt;br&gt;Review of methods for assessing protein purity and quantity</td>
<td>Kanelis</td>
<td>Hybrid – in person part at UTM campus</td>
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<tr>
<td>2</td>
<td>Sept. 20</td>
<td>Electrophoresis techniques&lt;br&gt;Native PAGE for protein-protein and protein-DNA complexes&lt;br&gt;Introduction to DNA methods</td>
<td>Kanelis</td>
<td>Hybrid – in person part at UTM campus</td>
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<td>3</td>
<td>Sept. 27</td>
<td>Mass spectrometry as a tool for biological chemistry</td>
<td>Jockusch</td>
<td>Hybrid – in person part at St. George campus</td>
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<td>4</td>
<td>Oct. 4</td>
<td>Methods for assessing molecular size</td>
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<td>Hybrid – in person part at St. George campus</td>
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<tr>
<td>5</td>
<td>Oct. 11</td>
<td>NMR spectroscopy to probe ligand binding&lt;br&gt;Determination of Kd values&lt;br&gt;Identification of binding sites</td>
<td>Prosser</td>
<td>Zoom</td>
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<tr>
<td>6</td>
<td>Oct. 18</td>
<td>Chemical modification of proteins&lt;br&gt;Protein modification reagents&lt;br&gt;Assessing level and location of modifications</td>
<td>Kluger</td>
<td>Zoom</td>
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<td>7</td>
<td>Oct. 25</td>
<td>Isothermal titration calorimetry</td>
<td>Kanelis</td>
<td>Hybrid – in person part at UTM campus</td>
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<td>8</td>
<td>Nov. 1</td>
<td>Modelling of protein structures</td>
<td>Kanelis</td>
<td>Hybrid – in person part at UTM campus</td>
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<tr>
<td>9</td>
<td>Nov. 8</td>
<td>Circular dichroism spectroscopy&lt;br&gt;Protein secondary structure&lt;br&gt;Protein stability</td>
<td>Woolley</td>
<td>Zoom</td>
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<tr>
<td>Date</td>
<td>Nov. 15</td>
<td>Fluorescence spectroscopy to study protein structure, stability, interactions</td>
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<td>Nitz</td>
<td>Zoom</td>
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<td>Intrinsic Trp fluorescence - folding &amp; binding</td>
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<td>Fluorescent ligand analogues</td>
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<td>Fluorescence quenching</td>
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<td>Date</td>
<td>Nov. 22</td>
<td>Fluorescence methods for expression and interactions</td>
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<td>Fluorescent tags</td>
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<td>Design of Bioprobe</td>
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<tr>
<td>Date</td>
<td>Nov. 28</td>
<td>Confocal microscopy - theory, workflow, Z-stacks, FRAP, analysis, limitations, super-resolution</td>
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<td>Cui</td>
<td>Hybrid – in person part at St. George campus</td>
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Voula Kanelis is inviting you to a scheduled Zoom meeting.

Topic: CHM1056 Lecture
Time: Sep 17, 2020 10:00 AM Eastern Time (US and Canada)
   Every week on Thu, until Dec 3, 2020, 12 occurrence(s)
   Sep 17, 2020 10:00 AM
   Sep 24, 2020 10:00 AM
   Oct 1, 2020 10:00 AM
   Oct 8, 2020 10:00 AM
   Oct 15, 2020 10:00 AM
   Oct 22, 2020 10:00 AM
   Oct 29, 2020 10:00 AM
   Nov 5, 2020 10:00 AM
   Nov 12, 2020 10:00 AM
   Nov 19, 2020 10:00 AM
   Nov 26, 2020 10:00 AM
   Dec 3, 2020 10:00 AM

Please download and import the following iCalendar (.ics) files to your calendar system.
Weekly: https://utoronto.zoom.us/meeting/tJIucu2sqz8qEtYxy9HsOzmkEjn-wKdn57z/ics?icsToken=98tyKuCurT4uHtGRsBGFRowAA4_4LOjwmClfj7dkhAa8KzN8eA79E-hMf6VUFNbe

Join Zoom Meeting
https://utoronto.zoom.us/j/96354454082
Meeting ID: 963 5445 4082
One tap mobile
+1 647 558 0588 # Canada
+1 778 907 2071 # Canada

Dial by your location
+1 647 558 0588 Canada
+1 778 907 2071 Canada
+1 438 809 7799 Canada
+1 587 328 1099 Canada
+1 613 209 3054 Canada
+1 647 374 4685 Canada
+1 301 715 8592 US (Germantown)
+1 312 626 6799 US (Chicago)
+1 346 248 7799 US (Houston)
+1 470 250 9358 US (Atlanta)
+1 470 381 2552 US (Atlanta)
+1 602 753 0140 US (Phoenix)
+1 646 518 9805 US (New York)
+1 646 558 8656 US (New York)
+1 651 372 8299 US (St. Paul)
+1 669 219 2599 US (San Jose)
+1 669 900 6833 US (San Jose)
+1 720 928 9299 US (Denver)
+1 786 635 1003 US (Miami)
+1 971 247 1195 US (Portland)
+1 206 337 9723 US (Seattle)
+1 213 338 8477 US (Los Angeles)
+1 253 215 8782 US (Tacoma)
+1 267 831 0333 US (Philadelphia)

Meeting ID: 963 5445 4082
Find your local number: https://utoronto.zoom.us/u/abxRdWbnN0
Join by SIP
96354454082@zoomcrc.com

Join by H.323
162.255.37.11 (US West)
162.255.36.11 (US East)
69.174.57.160 (Canada)
Meeting ID: 963 5445 4082

Join by Skype for Business
https://utoronto.zoom.us/skype/96354454082