1. **Course:** CMMB 545, Petroleum Microbiology - Winter 2024

**Coordinator(s)**

<table>
<thead>
<tr>
<th>Name</th>
<th>Email</th>
<th>Phone</th>
<th>Office</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Lisa Gieg</td>
<td><a href="mailto:lmgieg@ucalgary.ca">lmgieg@ucalgary.ca</a></td>
<td>403 210-7207</td>
<td>BI 228A</td>
<td>By Appointment</td>
</tr>
</tbody>
</table>

**Section(s)**

Lecture 01: MWF 11:00 - 11:50 in MS 319

<table>
<thead>
<tr>
<th>Instructor</th>
<th>Email</th>
<th>Phone</th>
<th>Office</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gurpreet Kharey</td>
<td>TBA</td>
<td>TBA</td>
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</tr>
<tr>
<td>Dr. Lisa Gieg</td>
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</table>

To account for any necessary transition to remote learning for the current semester, courses with in-person lectures, labs, or tutorials may be shifted to remote delivery for a certain period of time. In addition, adjustments may be made to the modality and format of assessments and deadlines, as well as to other course components and/or requirements, so that all coursework tasks are in line with the necessary and evolving health precautions for all involved (students and staff).

**In Person Delivery Details:**

Lectures will be delivered in-person.

Instructors will endeavour to respond to email inquiries about the course/content within 24 hours except on weekend and holidays wherein additional response times should be expected.

**Course Site:**

D2L: CMMB 545 L01 -(Winter 2024)-Petroleum Microbiology

**Note:** Students must use their U of C account for all course correspondence.

**Equity Diversity & Inclusion:**

The University of Calgary is committed to creating an equitable, diverse and inclusive campus, and condemns harm and discrimination of any form. We value all persons regardless of their race, gender, ethnicity, age, LGBTQIA2S+ identity and expression, disability, religion, spirituality, and socioeconomic status. The Faculty of Science strives to extend these values in every aspect of our courses, research, and teachings to better promote academic excellence and foster belonging for all.

The Biological Sciences Equity Committee acknowledges there are persistent barriers that prevent such accessibility and hinder our progress towards EDI. Our representatives (faculty, staff, postdocs, graduate and undergraduate students) are committed to addressing any concerns and work towards proactive solutions that enact necessary change within the department. To submit anonymous questions, comments or concerns regarding EDI related issues, please reach out to our Chair, Arshad Ayyaz (arshad.ayyaz@ucalgary.ca), or a committee representative of your choice at https://science.ucalgary.ca/biological-sciences/about/equity-diversity-and-inclusion

2. **Requisites:**

   See section 3.5.C in the Faculty of Science section of the online Calendar.

   **Prerequisite(s):**

   Cellular, Molecular and Microbial Biology 343.

3. **Grading:**

   The University policy on grading and related matters is described in F.1 and F.2 of the online University Calendar.

   In determining the overall grade in the course the following weights will be used:
<table>
<thead>
<tr>
<th>Course Component</th>
<th>Weight</th>
<th>Due Date (duration for exams)</th>
<th>Modality for exams</th>
<th>Location for exams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term Project</td>
<td>25%</td>
<td>Ongoing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Midterm 1</td>
<td>22.5%</td>
<td>Feb 05 2024 at 11:00 am (50 Minutes)</td>
<td>in-person</td>
<td>In class</td>
</tr>
<tr>
<td>Midterm 2</td>
<td>22.5%</td>
<td>Mar 01 2024 at 11:00 am (50 Minutes)</td>
<td>in-person</td>
<td>In class</td>
</tr>
<tr>
<td>Registrar Scheduled Final Exam</td>
<td>30%</td>
<td>Will be available when the final exam schedule is released by the Registrar</td>
<td>in person</td>
<td>Will be available when the final exam schedule is released by the Registrar</td>
</tr>
</tbody>
</table>

1 Details and due dates will be available on D2L.

Each piece of work (reports, assignments, quizzes, midterm exam(s) or final examination) submitted by the student will be assigned a grade. The student's grade for each component listed above will be combined with the indicated weights to produce an overall percentage for the course, which will be used to determine the course letter grade.

The conversion between a percentage grade and letter grade is as follows.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Minimum % Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>A+</td>
<td>93 %</td>
</tr>
<tr>
<td>A</td>
<td>85 %</td>
</tr>
<tr>
<td>A-</td>
<td>80 %</td>
</tr>
<tr>
<td>B+</td>
<td>77 %</td>
</tr>
<tr>
<td>B</td>
<td>73 %</td>
</tr>
<tr>
<td>B-</td>
<td>70 %</td>
</tr>
<tr>
<td>C+</td>
<td>67 %</td>
</tr>
<tr>
<td>C</td>
<td>63 %</td>
</tr>
<tr>
<td>C-</td>
<td>60 %</td>
</tr>
<tr>
<td>D+</td>
<td>55 %</td>
</tr>
<tr>
<td>D</td>
<td>50 %</td>
</tr>
</tbody>
</table>

This course will have a Registrar Scheduled Final exam that will be delivered in-person and on campus. The Final Examination Schedule will be published by the Registrar’s Office approximately one month after the start of the term. The final exam for this course will be designed to be completed within 2 hours.

The University of Calgary offers a flexible grade option, Credit Granted (CG) to support student’s breadth of learning and student wellness. Faculty units may have additional requirements or restrictions for the use of the CG grade at the faculty, degree or program level. To see the full list of Faculty of Science courses where CG is not eligible, please visit the following website: https://science.ucalgary.ca/current-students/undergraduate/program-advising/flexible-grading-option-cg-grade

4. Missed Components Of Term Work:

In the event that a student legitimately fails to submit any online or in-person assessment on time (e.g. due to illness, domestic affliction, etc...), please contact the course coordinator, or the course instructor if this course does not have a coordinator to arrange for a re-adjustment of a submission date, or possible exemption and reweighing of components. Absences not reported within 48 hours will not be accommodated. Students may be asked to provide supporting documentation (Section M.1) for an excused absence, See FAQ.

If an excused absence is approved, options for how the missed assessment is dealt with is at the discretion of the coordinator or course instructor. Some options such as an exemption and pro-rating among the components of the course may not be a viable option based on the design of this course.

Students who miss lectures due to illness or other reason will have access to Powerpoint slides pertaining to those lectures on D2L. Students in lecture may record lectures in an unobtrusive way, provided they sign a standard waiver, or make notes on behalf of one unable to attend due to illness.

5. Scheduled Out-of-Class Activities:

There are no scheduled out of class activities for this course.

6. Course Materials:

All materials for this course will be available on D2L.

In order to successfully engage in their learning experiences at the University of Calgary, students taking online, remote and blended courses are required to have reliable access to the following technology:

- A computer with a supported operating system, as well as the latest security, and malware updates;
- A current and updated web browser;
- Webcam/ Camera (built-in or external);
- Microphone and speaker (built-in or external), or headset with microphone;
- Current antivirus and/or firewall software enabled;
- Stable internet connection.

For more information please refer to the UofC ELearning online website.

7. Examination Policy:

No aids are allowed on tests or examinations.

Students should also read the Calendar, Section G, on Examinations.
8. **Approved Mandatory And Optional Course Supplemental Fees:**

There are no mandatory or optional course supplemental fees for this course.

9. **Writing Across The Curriculum Statement:**

For all components of the course, in any written work, the quality of the student's writing (language, spelling, grammar, presentation etc.) can be a factor in the evaluation of the work. See also Section E.2 of the University Calendar.

10. **Human & Living Organism Studies Statements:**

Students will not participate as subjects or researchers in human studies.

See also Section E.5 of the University Calendar.

**STUDIES IN THE BIOLOGICAL SCIENCES INVOLVE THE USE OF LIVING AND DEAD ORGANISMS.** Students taking laboratory and field-based courses in these disciplines can expect involvement with and experimentation on such materials. Students perform dissections on dead or preserved organisms in some courses. In particular courses, students experiment on living organisms, their tissues, cells, or molecules. Sometimes field work requires students to collect a variety of living materials by many methods, including humane trapping.

All work on humans and other animals conforms to the Helsinki Declaration and to the regulations of the Canadian Council on Animal Care. The Department strives for the highest ethical standards consistent with stewardship of the environment for organisms whose use is not governed by statutory authority. Individuals contemplating taking courses or majoring in one of the fields of study offered by the Department of Biological Sciences should ensure that they have fully considered these issues before enrolling. Students are advised to discuss any concern they might have with the Undergraduate Program Director or the Department.

Students are expected to be familiar with Section SC.4.1 of the University Calendar.

11. **Reappraisal Of Grades:**

A student wishing a reappraisal, should first attempt to review the graded work with the Course coordinator/instructor or department offering the course. Students with sufficient academic grounds may request a reappraisal. Non-academic grounds are not relevant for grade reappraisals. Students should be aware that the grade being reappraised may be raised, lowered or remain the same. See Section I.3 of the University Calendar.

   a. **Term Work:** The student should present their rationale as effectively and as fully as possible to the Course coordinator/instructor within ten business days of either being notified about the mark, or of the item's return to the class. If the student is not satisfied with the outcome, the student shall submit the Reappraisal of Graded Term work form to the department in which the course is offered within 2 business days of receiving the decision from the instructor. The Department will arrange for a reappraisal of the work within the next ten business days. The reappraisal will only be considered if the student provides a detailed rationale that outlines where and for what reason an error is suspected. See sections I.1 and I.2 of the University Calendar.

   b. **Final Exam:** The student shall submit the request to Enrolment Services. See Section I.3 of the University Calendar.

12. **Other Important Information For Students:**

   a. **Mental Health** The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness and academic success, and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, Mental Health Services Website) and the Campus Mental Health Strategy website (Mental Health).

   b. **SU Wellness Services:** For more information, see their website or call 403-210-9355.

   c. **Sexual Violence:** The Sexual Violence Support Advocate, Carla Bertsch, can provide confidential support and information regarding sexual violence to all members of the university community. Carla can be reached by email (svsa@ucalgary.ca) or phone at 403-220-2208. The complete University of Calgary policy on sexual violence can be viewed here.

   d. **Student Ombuds Office:** A safe place for all students of the University of Calgary to discuss student related issues, interpersonal conflict, academic and non-academic concerns, and many other problems.

   e. **Student Union Information:** SU contact. Email your SU Science Reps: science1@su.ucalgary.ca, science2@su.ucalgary.ca, science3@su.ucalgary.ca.

   f. **Academic Accommodation Policy:**
Course Outcomes:

- Be able to read and comprehend media reports and literature associated with the petroleum industry as presented in the oral presentation or a poster presentation.
- Through a group project, communicate a topic or seminal scientific paper related to petroleum microbiology through either an oral presentation or a poster presentation.
- Explain how Alberta’s oil sands are recovered, the environmental issues associated with the oil sands industry, and how microorganisms play a role in the management of oil sands tailings ponds.
- Understand the microbial processes that can lead to the corrosion of steel surfaces within petroleum industry infrastructure (microbial influenced corrosion, MIC).
- Explain oilfield souring, and the various microbial-based approaches that can be used to control souring.
- Describe how microorganisms can be used to enhance oil recovery (microbial enhanced oil recovery, MEOR).
- Describe the main metabolic pathways for the aerobic and anaerobic biodegradation of hydrocarbons.
- Explain bioremediation, the various approaches that can be used (natural versus engineered) to clean up hydrocarbon-contaminated environments, and the numerous tools that can be used to monitor for evidence of bioremediation.
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