Faculty of Agricultural and Food Sciences, Department of Soil Science, University of Manitoba  

**Physical Properties of Soils (SOIL 4060)**  
Winter 2023 Course Information and Schedule

<table>
<thead>
<tr>
<th>General Course Objective</th>
<th>Students will be able to understand physical properties of soils, methods for their measurement, their importance to, and strategies for managing them for improved soil physical processes for sustainable management of agroecosystems and the environment at large.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prerequisites</td>
<td>Soils and Landscapes in Our Environment (SOIL 3600), Transport Phenomena (BIOE 2110).</td>
</tr>
<tr>
<td>Course Duration</td>
<td>January 9, 2023 to April 12, 2023</td>
</tr>
<tr>
<td>Course Credits</td>
<td>3</td>
</tr>
</tbody>
</table>
| Class Hours/ Locations                                                                   | Lectures: Mondays, Wednesdays, Fridays; 9:30 am -10:20 am  
Location: 134 Agriculture Building  
Labs: Tuesdays: 2:30 pm - 5:25 pm  
Lab Location: 318 J.H. Ellis Building                                                                                                                                 |

**Contact information**

| Instructor: Dr. Afua Adobea Mante  
Assistant Professor of Soil Physical Processes,  
Department of Soil Science, University of Manitoba | Email: Afua.Mante@umanitoba.ca  
Office Hours: Send an email to set up appointment  
Location: 380 Ellis Building                                                                 |  
| Teaching Assistant: Ishmeet Kaur  
MSc Student, Department of Biosystems Engineering,  
University of Manitoba | Email: Ishmeet.Kaur@umanitoba.ca  
Office Hours: Send email to set up appointment  
Location: EITC E1 353, Engineering Building |  

**Other information**

<table>
<thead>
<tr>
<th>Voluntary Withdrawal Date</th>
<th>March 22, 2023</th>
</tr>
</thead>
</table>
| Midterm 1                 | February 14, 2023 (Tuesday 2:30 - 4:00)  
Location: Rm 220 Animal Science |
| Midterm 2                 | March 14, 2023 (Tuesday 2:30 to 4:00)  
Location: Rm 220 Animal Science |
| Last Day of Classes       | April 12, 2023 |
| Final Exam Period         | April 14 - 28, 2023 |
| Holiday and Closures      | February 20, 2023 (Louis Riel Day); February 21 to February 24, 2023 (Winter break); April 7, 2023 (Good Friday) |

Textbook

There are no required texts for the course. However, the following are good references:  
- Environmental Soil Physics - Daniel Hillel - Academic Press (On reserve at the Ag. Library)  
- Introduction to Environmental Soil Physics - Daniel Hillel - Academic Press (On reserve at the Ag. Library)
Course Web Site | UMLearn

<table>
<thead>
<tr>
<th>Course Assessment</th>
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<tbody>
<tr>
<td>Individual Assignments</td>
<td>15%</td>
</tr>
<tr>
<td>Lab Participation</td>
<td>5%</td>
</tr>
<tr>
<td>Team Assignments</td>
<td>5%</td>
</tr>
<tr>
<td>Peer Evaluation</td>
<td>5%</td>
</tr>
<tr>
<td>Midterm 1</td>
<td>15%</td>
</tr>
<tr>
<td>Midterm 2</td>
<td>15%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>40%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grading Scale for Course</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Letter Grade</td>
<td>Percentage out of 100</td>
</tr>
<tr>
<td>A+</td>
<td>≥ 90</td>
</tr>
<tr>
<td>A</td>
<td>85 - 89</td>
</tr>
<tr>
<td>B+</td>
<td>80 - 84</td>
</tr>
<tr>
<td>B</td>
<td>70 - 79</td>
</tr>
<tr>
<td>C+</td>
<td>60 - 69</td>
</tr>
<tr>
<td>C</td>
<td>55 - 59</td>
</tr>
<tr>
<td>D</td>
<td>46 - 54</td>
</tr>
<tr>
<td>F</td>
<td>≤ 45</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Policies</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Late Assignments</td>
<td>Assignments are due one week after they are assigned. Assignments submitted after the due date will be deducted 10% per school day. Assignments will not be accepted when graded assignments have been returned.</td>
</tr>
<tr>
<td>Attendance and Participation</td>
<td>You are required to attend all classes and to complete all your assigned readings, assignments, labs, and fully participate in discussions. Always notify me and the TA ahead of class if you are unable to attend a class.</td>
</tr>
<tr>
<td>Missed Exam</td>
<td>Make-up exams will not be granted except in the case of a documented emergency</td>
</tr>
<tr>
<td>Classroom and Email conduct</td>
<td>Your full attention is requested during lectures/ labs and all discussions. In accordance with university policy, all email communication for this course shall be conducted using your University of Manitoba email address only.</td>
</tr>
<tr>
<td>Copyright/ Academic integrity</td>
<td>Students do not have ownership rights to materials developed for the course. Posting or any other means of publishing these materials is prohibited. Plagiarism or any other form of cheating in examinations, term tests or academic work is subject to serious academic penalty (e.g., suspension or expulsion from the faculty or university). Cheating in examinations or tests may take the form of copying from another student or bringing unauthorized materials into the exam room (e.g., crib notes, pagers or cell phones), also copying from online sources verbatim without giving credit. Exam cheating can also include exam personation. (Please see Exam Personation, found in the Examination Regulations section of the General Academic Regulations). A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty. Students should acquaint themselves with the University’s policy on plagiarism, cheating, exam impersonation and duplicate submission (<a href="https://umanitoba.ca/student-supports/academic-supports/academic-integrity">https://umanitoba.ca/student-supports/academic-supports/academic-integrity</a>; See Student Academic Misconduct Procedures in the Undergraduate Calendar 21/22 p.91). Take Academic Integrity and Student Conduct Tutorial here</td>
</tr>
<tr>
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<tr>
<td>Respectful Work and Learning Environment Policy</td>
<td>The university prohibits harassment and discriminatory practices. Each individual has a right to learn in an inclusive and respectful environment, hence no disrespectful and dis- criminatory activity towards the instructor or other students will be allowed in this course (See the University’s policy of RWLE : <a href="https://umanitoba.ca/about-um/respectful-work-and-learning-environment-policy">https://umanitoba.ca/about-um/respectful-work-and-learning-environment-policy</a>).</td>
</tr>
<tr>
<td>Course Details</td>
<td>Subject to change</td>
</tr>
</tbody>
</table>
Course Contents

Main topics
1. Introductory class
2. Soil as a complex system
3. Basic relationships
4. Static physical properties
5. Soil structure, Granular aggregates, Soil pores, Soil crusting
6. Soil water content and Energy state
7. Flow of water in soils
8. Solute transport
9. Infiltration
10. Soil aeration and gas transport
11. Plant water availability
12. Soil dynamics
13. Soil temperature and heat transfer

Extra topics
1. Soil amendments to restore soil productivity
2. Use of modeling tools to simulate field hydrologic processes
3. Anthropogenic impacts on soil hydraulic properties
4. Drilling mud disposal effects on soil physical properties
5. Plant functional traits involved in soil erosion mitigation
6. Farm decisions based on soil physical properties
UM COVID-19 Health and Safety Protocols

Mask use

Masks are mandatory in indoor spaces. KN95 masks are highly recommended, but 3-ply medical masks (minimum ASTM Grade 2) are also acceptable.

Two adjustments have been made to the masking protocol beginning in Fall Term:

- Instructors may choose to remove their mask when actively teaching, provided a 2-m distance can be maintained from students.
- Staff may remove their mask when seated at a cubicle-type workspace, provided there is a physical barrier to adjacent workers (e.g., cubicle partition) or a minimum of 2m separation from others.

**Masks must be worn in all indoor spaces** on UM campuses, including:

- all common spaces
- classrooms
- labs doorways
- corridors
- work spaces
- all libraries
- all study spaces

UM will supply all necessary masks, both KN95 masks (highly recommended) and the 3-ply medical masks (minimum ASTM Grade 2), which are also acceptable.

Unless you are in a food-designated area, you must **keep your mask on and covering your mouth and nose** at virtually all times, including:

- indoors even when physical distancing is possible
- trips to the bathroom
- participating in UM-sanctioned activities off-campus at any time when two metres distancing is not possible

**You do not need to wear a mask** if you are alone in a closed space, consuming food/beverages in a food-designated area, or outdoors.

No eye protection is required except that for specific occupational health and safety requirements outside of the COVID-19 context (e.g., safety glasses in labs, clinical skills sessions).
UM Policies

As a student at 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 University of Manitoba (UM) website’s Governing Documents (https://umanitoba.ca/governance/governing-documents) is one important source of information, in particular the Academic and Students sections. The Student Advocacy office can also help you understand policies and procedures; find their information in the UM Learner Supports section below.

Academic Calendar
The Academic Calendar (https://umanitoba.ca/registrar/academic-calendar) is the University’s official publication containing course descriptions, program and graduation requirements, as well as UM and faculty/school-specific rules, regulations and policies. In particular, familiarize yourself with the sections University Policies and Procedures and General Academic Regulations.

Academic Integrity
In addition to reviewing your instructor’s academic integrity policy listed in their syllabus, you are expected to view the General Academic Regulation section within the Academic Calendar (https://umanitoba.ca/registrar/academic-calendar) and specifically read the regulation pertaining to Academic Integrity. Ask your instructor for additional information about demonstrating academic integrity in your academic work, and consult the following UM resources for more information and support:

- Academic Integrity (https://umanitoba.ca/student-supports/academic-supports/academic-integrity)
  - Student Resources (https://umanitoba.ca/student-supports/academic-supports/academic-integrity#resources-to-conduct-academic-work-with-integrity)
  - Academic Misconduct and How to Avoid It (https://umanitoba.ca/student-supports/academic-supports/academic-integrity#academic-misconduct-and-how-to-avoid-it)
- Student Advocacy Office (https://umanitoba.ca/student-supports/academic-supports/student-advocacy)

Copyright
All students are required to respect copyright as per Canada’s Copyright Act. Staff and students play a key role in the University’s copyright compliance as we balance user rights for educational purposes with the rights of content creators from around the world. The Copyright Office (https://umanitoba.ca/copyright/) provides copyright resources and support for all members of the University of Manitoba community.

Grade Appeals
If you have questions about your grades, talk to your instructor. There is a process for term work and final grade appeals. Note that you have the right to access your final examination scripts. See the Registrar’s Office (https://umanitoba.ca/registrar/grades/appeal-grade) for more information including appeal deadline dates and the appeal form.

Intellectual Property
For information about rights and responsibilities regarding intellectual property view the Intellectual Property Policy (https://umanitoba.ca/governance/governing-documents/governing-documents-university-community#intellectual-property)
Program-Specific Regulations
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 website (https://umanitoba.ca/academics).

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

- [Respectful Work and Learning Environment](https://umanitoba.ca/about-um/respectful-work-and-learning-environment-policy)
- [Student Discipline](https://umanitoba.ca/governance/governing-documents-students#student-discipline)
- [Violent or Threatening Behaviour](https://umanitoba.ca/governance/governing-documents-students#violent-or-threatening-behaviour)

The UM website, [Engaging in Respectful Conduct](https://umanitoba.ca/student-supports/respectful-conduct), includes more details about expectations for behaviours related to university activities.

Sexual Violence Policies
The UM has several policies and procedures that deal with the rights and responsibilities of the University community with regards to all forms of sexual violence. For a comprehensive list of policies and associated resources, visit the [Sexual Violence Resource Centre’s information page](https://umanitoba.ca/student-supports/sexual-violence-support-and-education/sexual-violence-get-informed). Please note that there are many supports available in addition to these policy documents (see UM Learner Supports).

Voluntary Withdrawal
Voluntary withdrawal (VW) is a way for students to leave a class without academic penalty once the Registration Revision Period has ended. If you opt to voluntarily withdraw from a course, you will not be eligible for a refund and, if applicable, will still be required to pay any outstanding tuition fees for the course. On your transcript, the course you have withdrawn from will be listed; however, “VW” will appear in lieu of a grade. If you do not drop a course before the VW deadline, you will receive a final grade in the course on your transcript.

Please note that there are separate deadlines for dropping a course early in a term during the Registration Revision Period. Dropping a course means you are removing that course from your schedule, will not be charged tuition fees for that course, and the course will not appear on your transcript.

The Registrar’s Office website, [Withdraw from a Course](https://umanitoba.ca/registrar/withdraw-course), includes more information on the different ways in which you can withdraw from a course and important dates and deadlines to do so.

UM Learner Supports
Below you will find a select list of important supports for learners at the UM, both academic supports and otherwise. For a complete listing of all learner supports at the University of Manitoba, visit the [Student Supports website](https://umanitoba.ca/student-supports).
Academic Advising
Contact an Academic Advisor (https://umanitoba.ca/student-supports/academic-supports/academic-advising) for support with degree planning and questions about your academic program and regulations.

Academic Learning Centre (ALC)
The Academic Learning Centre (https://umanitoba.ca/student-supports/academic-supports/academic-learning) offers one-to-one tutoring, groups study sessions and workshops, as well as video and tip-sheet resources to help you throughout your academic program. All Academic Learning Centre programs, supports, and services are free for UM students.

Make an appointment for free one-to-one tutoring (https://umanitoba.ca/student-supports/academic-supports/academic-learning/tutoring-group-study#individual-tutoring). Content tutors (over 90 UM courses) can help you understand concepts and learn problem-solving strategies. Study skills tutors can help you improve your skills such as time management and goal setting, reading and note-taking, as well as learning and test-taking strategies. Writing tutors can give you feedback on your academic writing, whether you are just getting started on a written assignment or already have a draft. English as an Additional Language specialist, Antoanela Denchuk, is available for one-to-one tutoring to help you improve your English-language academic writing skills. Use the drop-down menu, read the tutor biographies, and make an appointment for tutoring on the Academic Learning Centre schedule (https://manitoba.mywconline.com/).

Attend Supplemental Instruction (SI) (https://umanitoba.ca/student-supports/academic-supports/academic-learning/tutoring-group-study) sessions in historically difficult courses (including Chemistry, Engineering, and Computer Science). These free weekly review sessions are facilitated by a peer mentor who has previously taken the course and provide an opportunity to discuss course content, ask questions, compare notes, solve practice problems, and develop study strategies. See online for a list of SI courses and meeting times.

Register for an Academic Success Workshop (https://umanitoba.ca/student-supports/academic-supports/academic-success-workshops), where you can learn strategies to improve your writing and studying. More information on topics, dates, and registration, are found online.

Register for Faculty of Graduate Studies Grad Steps Workshops (https://umanitoba.ca/graduate-studies/student-experience/graduate-student-workshops). These workshops are specifically designed for students working towards Master’s degrees or PhDs. More information on topics, dates, and registration can be found online.

Access the Academic Learning Centre’s collection of videos and tip sheets (https://umanitoba.ca/student-supports/academic-supports/academic-learning#tip-sheets-for-writing-and-study-skills) to help you with many of the academic tasks you’ll encounter in university.

Contact the Academic Learning Centre by calling 204-480-1481 or emailing academic_learning@umanitoba.ca. Bannatyne students can contact the Bannatyne Student Services office at 204-272-3190.

Basic Needs
It can be difficult to learn and succeed in courses when you are struggling to meet your or your family’s basic needs. Several UM and community resources are listed below if you would benefit from support with regards to housing, food, finances, and/or childcare:

- Housing
  - UM Housing (https://umanitoba.ca/housing)
• Winnipeg Rental Network (https://www.winnipegrentnet.ca/)
• Manitoba Residential Tenancies Branch (https://www.gov.mb.ca/cca/rtb/)
• HOPE End Homelessness Winnipeg Services & Supports (https://umanitoba.ca/housing)

• Food
  o Food Matters Manitoba (https://foodmattersmanitoba.ca/find-emergency-food-in-winnipeg/)

• Finances
  o Manitoba Student Aid (https://www.edu.gov.mb.ca/msa/)

• Child Care
  o UM Child Care (https://umanitoba.ca/about-um/child-care)
  o Manitoba Child Care Subsidy (https://bit.ly/3yG3ijy)
  o Manitoba Child Care Association (https://mccahouse.org/looking-for-child-care/)

English Language Centre
The English Language Centre (ELC) (https://umanitoba.ca/english-language-centre) provides courses, tests, accommodations and individual support to students whose first language is not English in order to support academic success and participation in the University of Manitoba community.

Health and Wellness
Physical, mental, emotional, and spiritual health and wellness play a critical role in student success. See all of UM’s resource on their Health and Wellness (https://umanitoba.ca/student-supports/student-health-and-wellness) website, and make note of several specific UM and community supports listed below.

Winnipeg Urgent Physical and Mental Health Care
If you are an adult experiencing a mental health or psychosocial crisis, contact the Klinic Community Health (https://klinic.mb.ca/crisis-support/) 24/7 crisis line at 204-786-8686, visit the Crisis Response Centre (https://sharedhealthmb.ca/services/mental-health/crisis-response-centre/) located at 817 Bannatyne Avenue, or contact the Mobile Crisis Service at 204-940-1781.

To speak with a nurse for guidance on what health-care path to take for the issue you are facing or for general information about health resources available in Manitoba, contact Health Links (https://misericordia.mb.ca/programs/phce/health-links-info-sante/) at 1-888-315-9257 (toll free). If you need urgent medical care, visit the Winnipeg Regional Health Authority’s Emergency Department & Urgent Care Wait Times webpage (https://wrha.mb.ca/wait-times/) for a list of locations and current wait times.

Student Counselling Centre (SCC)
The Student Counselling Centre (https://umanitoba.ca/student-supports/student-health-and-wellness/student-counselling-centre-scc) provides free counselling and mental health support to UM, English Language Centre, and International College of Manitoba (ICM) students. We are open year-round, Monday through Friday from 8:30 am to 4:30 pm. Our commitment is to offer a support service to every student who contacts us.

Visit the SCC’s For Urgent Help (https://umanitoba.ca/student-supports/student-health-and-wellness/student-counselling-centre-scc#for-urgent-help) webpage or the urgent care resources listed above if you require immediate support.
Visit the SCC’s [Our Services](https://umanitoba.ca/student-supports/student-health-and-wellness/student-counselling-centre-scc#for-urgent-help) webpage for more information on accessing a variety of services including individual counselling, counselling workshops and groups, support resources, and learning disability assessment services.

The SCC is located at 474 UMSU University Centre (Fort Garry Campus).

**Health and Wellness Office**
Students often juggle multiple demands, and we recognize that it can be difficult to find balance. For any changes you want to make to your health and wellness, the Health and Wellness Office at the University of Manitoba would like to support you in your journey. We are here to help you take control of your own health and make your own decisions. We are a judgment-free space and we avoid labels whenever possible. For more information, please visit the [Health and Wellness Office](https://umanitoba.ca/student-supports/health-wellness) website.

**Spiritual Care and Multifaith Centre**
Spiritual care services are available to all, whether you identify as spiritual, atheist, religious or agnostic. [Spiritual Services](https://umanitoba.ca/student-supports/spiritual-services) also offer specific denominational support for certain religious groups and by Indigenous Elders-in-Residence.

**Student Support Case Management (SSCM)**
Contact the [Student Support Case Management team](https://umanitoba.ca/student-supports/academic-supports/student-advocacy/case-management) 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.

**University Health Service (UHS)**
The [University Health Service](https://umanitoba.ca/student-supports/health-wellness/university-health-service) offers a full range of medical services to students, including psychiatric consultation, via two health clinics:
- Fort Garry Campus: (204) 474-8411, ACW-Lot temporary trailer (behind the Isbister building)
- Bannatyne Campus: (204) 474-8411, P309 – Pathology Building

**Student Services at Bannatyne Campus**
Student Services at Bannatyne Campus (SSBC) offers a full range of mental health supports to students and residents in the Rady Faculty of Health Sciences, along with other academic and personal supports. Visit the [SSBC website](https://umanitoba.ca/student-supports/student-services-bannatyne-campus) for a list of services available.

**Indigenous Students**
Staff, faculty and Elders are well-equipped to ensure your university experience is as beneficial, accessible, and successful as possible. Visit the Indigenous [Student Experience](https://umanitoba.ca/indigenous/student-experience) website for more information on the supports and services available.

**International Students**
The transition to a new country and a new academic system can be both exciting and overwhelming. The International Centre (IC) is here to help you settle into life at University of Manitoba. Visit the [International Students](https://umanitoba.ca/current-students/international) website for more information.
Sexual Violence Support and Education
Sexual violence affects people of all ages, sexual orientations, genders, gender identities, abilities and relationship statuses. At the U of M, we are committed to ensuring a respectful work and learning environment for all. We want to build a safe and inclusive campus community where survivors of sexual violence know they can receive the supports they need to succeed, both academically and personally.

The Sexual Violence Resource Centre (https://umanitoba.ca/sexual-violence), located at 537 UMSU University Centre (Fort Garry campus) provides support, resources, information and referral services for any student, faculty or staff member who has been affected by sexual violence.

Student Accessibility Services (SAS)
The University of Manitoba is committed to providing an accessible academic community. Student Accessibility Services (https://umanitoba.ca/student-supports/accessibility) offers 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 health, learning, medical, hearing, injury-related, visual) are invited to contact SAS to arrange a confidential consultation. SAS is located at 520 University Centre (Fort Garry Campus).

Student Advocacy
Student Advocacy (https://umanitoba.ca/student-supports/academic-supports/student-advocacy) is a safe place for students. We help you navigate university processes and advocate for your rights as a student at UM. If anything in your personal or academic life is affecting your studies, contact our confidential intake assistant by phone (204-474-7423) or email (stadv@umanitoba.ca).

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 (http://bit.ly/WcEbA1) can be found by subject.

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 UM Libraries and Departments (https://libguides.lib.umanitoba.ca/c.php?g=298526) webpage. When working remotely, students can also receive help online, via the Ask-a-Librarian chat found on the University of Manitoba Libraries’ homepage (https://umanitoba.ca/libraries/).