UNIVERSITY OF CALGARY
SCHOOL OF ARCHITECTURE, PLANNING AND LANDSCAPE

Course Title:	**Site Technology I: Grading & Landform**	
Course Number:	LAND 606	
Professor:	Mathis Natvik	mathis.natvik@ucalgary.ca
	(825) 561-8232	Office: PF 3196
Teaching Assistant:	Jenna McIntyre	jenna.mcintyre@ucalgary.ca
Lecture Days:	Tuesdays & Thursdays	
Lecture Times:	10:00-12:00 Mountain Time	
Class Location:	PF 2165	

Online Delivery (if applicable)

If classes are required to go online, students will be required to join via zoom using a computer equipped with a web cam, microphone, and reliable internet connection. If unable to participate live due to unforeseen circumstances, inform the instructor in advance to work out an alternative participation activity (e.g., watch the recordings, submit a brief reflection, and actively contribute to the follow-up online discussion). The following zoom invite and passcode will be used if lectures are held online:

https://ucalgary.zoom.us/j/3671473933
Meeting ID: 367 147 3933
Passcode (Case Sensitive): **LAND606**

Course Description:
(https://sapl.ucalgary.ca/evds_info/courses/f20/LAND606?destination=courses%2Ff20)

Provides a working knowledge of grading, landform and storm water management systems and techniques. Covers fundamentals and advanced technologies including GPS grading and landform manipulation. Through this course, we will explore different ways to visualize, manipulate, design and form the surface of the earth to achieve functional, aesthetic and ecological design solutions through the mastery of the principles and techniques of grading and drainage.

We will work at developing sound expertise in grading elements in the landscape such as pedestrian walks, ramps, steps, roads, walls, berms, flat areas, slopes, drainage swales and stormwater management elements. The approach for each assignment will emphasize an experiential design process approach (aka “learning by doing”) with a balance of in-class tutorials, individual take home assignments and a couple of short field trips on campus and in the northwest of Calgary.

Grading and landform (aka site engineering) will be presented as the technical art of molding and shaping the earth emphasizing that this is one of the most powerful design tools available to the landscape architect. Technical and expressive grading distinguishes landscape architecture from its allied professions, is one of the principal components of form-giving to a site and is a critical component of spatial design. A well-executed site design creates spatial dialogs between all its components that starts with the ground plane and continues with all of the components layered upon it: planting, built landscape elements and structures.

This course is the first in a series that will address the technical aspects of design and its changing role as our profession continues to mature; specifically, how to blend an increasing awareness of sustainable building practices with traditional design approaches. In contemporary site design stormwater management, green infrastructure and their catalog of built elements are now a critical component that drives design concepts, form-giving, the site engineering process

and materials selection. This dialog of selecting and crafting materials and built elements will start in this course and continue next semester in Site Technology II: Construction and Materials.

Course Hours: 4 (2-2 Lecture, Lab)

Course Learning Outcomes:

Upon successful completion of the course, you should have developed an understanding of the knowledge, skills, and technologies involved in the following:

1. Illustrate that site engineering is an integral part of the design process that addresses both environmental and aesthetic concerns.
2. Interpolate from spot elevation data to produce topographic contour plans.
3. Perform the calculations necessary to manipulate and determine slopes, slope angles, and percentages.
4. Develop grading concepts that respond to specific design goals while maintaining technical site engineering requirements (including earthwork volumes and soil characteristics).
5. Compute storm water runoff volumes and drainage techniques.
6. Demonstrate an understanding of 2D and 3D representation techniques in the context of grading, landform and drainage applications, utilizing both hand and digital graphics.

Learning Resources

Readings will be assigned to complement the lectures. Students will be required to complete these readings prior to the related lecture. You may be questioned in class regarding these readings -- come prepared.

The following text is required for the course:

- Strom, Steven, Kurt Nathan and Jake Woland. 2013. Site Engineering for Landscape Architects, 6th Edition. New York: John Wiley & Sons, Inc. http://site.ebrary.com.ezproxy.lib.ucalgary.ca/lib/ucalgary/detail.action?docID=10650019

The following text is recommended but not required:

- Woland, Jake. 2013. Site Engineering for Landscape Architects: Workbook, 2nd Edition. New York: John Wiley & Sons, Inc. http://site.ebrary.com.ezproxy.lib.ucalgary.ca/lib/ucalgary/detail.action?docID=10648912

Course Bibliography:

- Alberta Barrier-Free Design Guide (2008). PDF available online.
- 2010 ADA Standards for Accessible Design. PDF available online.
- Calkins, Meg. (2008) Materials for Sustainable Sites: A Complete Guide to the Evaluation, Selection and Use of Sustainable Construction Materials.
- Calkins, Meg. (2012) The Sustainable Sites Handbook: A Complete Guide to the Principles, Strategies, and Best Practices for Sustainable Landscapes
- Harris, Charles W. & Dines, Nicholas T. (1997) Time-Saver Standards for Landscape Architecture.

- Hopper, Leonard J. (2007) Landscape Architectural Graphic Standards, Student Edition. (Note: you should seek out the regular edition of this book and other titles by Hopper for unabridged technical reference material.)
- Marsh, Willam. (2010) Landscape Planning: Environmental Applications, 5th Ed.
- Petschek, Peter. (2014) Grading: LandscapingSMART, 3D-Machine Control Systems, Stormwater Management (2nd Ed.)
- Petschek, Peter. (2008) Grading for Landscape Architects and Architects. (1st Ed.)
- Sharky, Bruce. (2014) Landscape Site Grading Principles: Grading with Design in Mind.
- University of Arkansas Community Design Center. (2010) Low Impact Development: A Design Manual for Urban Areas.

Technology and Equipment Needed

In addition to the required texts, you will need the drafting tools and computer with equipped with AutoCAD and 3D software of your choice (e.g., Rhino, Sketchup). Please have drafting tools on hand and available at all times during class hours. Assignments 1-6 will be drafted by hand. Assignment 7 will be drafted using a combination of hand drafting, AutoCAD, and 3D software of your choice.

Drafting supplies:

- A calculator with trig functions
- Metric scales (scales ranging from 1:25 to 1:1000 will be used)
- Rolling ruler with rubber, no-slip wheels (optional, but helpful)
- Mechanical pencils (.3, .5, .7 and .9 recommended). Lead holders also work if kept sharpened.
- Erasers – white plastic best and Erasing Shield – cheap and very helpful for precision erasing
- Drafting brush (optional, but helpful)
- Drafting (or painters) tape or dots, (tape is more flexible and can be used for model building)
- Tracing paper and/or vellum: tracing paper for practice, vellum for final assignment drafts (comes in 11x17 pads)
- Triangles: 45/45/90 degree and 30/60/90 degree (with inking edges) - optional
- Circle Templates – Large and small (with inking ‘bumps’)
- Colored pencils / markers (Prismacolor or equivalent)

Assessment and Evaluation Information

LAND 606 is a graded course. Incomplete (INC) and deferred term (DT) grades will be issued only for documented circumstances for which the student is clearly not able to complete the work due to significant illness, injury, etc. (please refer to Note #2 below). The course evaluation will be based on the assignments completed during the term. The basis for evaluation of each assignment issued will be present on the project brief. A passing grade is required for Assignment 7 in order to pass the course. There will be no final examination.

Teaching Approach

Through lectures, working through exercises in class, site specific field demonstrations and assignments, we will explore different ways to develop understanding of the relation between

design thinking, grading plans and built form. Landscape Architects must be able to generate design ideas in the context of a landscape setting. Understanding grading, landforms, and drainage are critical components in this process.

Guidelines for Submitting Assignments

In-Class Exercises will be used systematically to introduce new concepts, techniques and methodologies. Worksheets will be distributed to students. Take Home Assignments will apply the knowledge gained from lectures and in-class exercises to specific site contexts. Take home assignments will be discussed in class and are due as both a hardcopy and a scanned PDF file. All assignments are to be uploaded to the course D2L site.

Late Assignments

Unless agreed to by the Instructor on compassionate grounds, illness, or for reasons of academic accommodation (see note 2 below), assigned work that is handed in late will be penalized 10% of the total available grade per calendar day late (this includes weekends and holidays). Assignments more than two calendar days late will not be accepted and no credit will be given for them. Assignments must be handed in or presented during scheduled class hours.

Assignment	Title	Value
1	Topography, Landform and Interpolation	10%
2	Developing Grading Plans for Roadways	8%
3	Developing Grading Plans for Terraces and Pads on Slopes	10%
4	Developing a Grading Plan for a Roadway and Parking Lot	10%
5	Developing a Grading Plan a House with a Swale	15%
6	Developing Grading Plans for Stairs, Ramps and Walls	15%
7	Comprehensive Grading Design Project	32%
		Total 100%

Grading Scale

Grade	GPV	4-Point Range	Percent	Description
A+	4.00	4.00	95-100	Outstanding - evaluated by instructor
A	4.00	3.85-4.00	90-94.99	Excellent - superior performance showing comprehensive understanding of the subject matter
A-	3.70	3.50-3.84	85-89.99	Very good performance
B+	3.30	3.15-3.49	80-84.99	Good performance
B	3.00	2.85-3.14	75-79.99	Satisfactory performance
B-	2.70	2.50-2.84	70-74.99	Minimum pass for students in the Faculty of Graduate Studies
C+	2.30	2.15-2.49	65-69.99	All final grades below B- are indicative of failure at the graduate level and cannot be counted toward Faculty of Graduate Studies course requirements.
C	2.00	1.85-2.14	60-64.99	
C-	1.70	1.50-1.84	55-59.99	
D+	1.30	1.15-1.49	50-54.99	
D	1.00	0.50-1.14	45-49.99	
F	0.00	0-0.49	0-44.99	

A student who receives a "C+" or lower in any one course will be required to withdraw regardless of their grade point average (GPA) unless the program recommends otherwise. If the program permits the student to retake a failed course, the second grade will replace the initial grade in the calculation of the GPA, and both grades will appear on the transcript. The School of Architecture, Planning and Landscape will not permit the Flexible Grade Option (CG Grade) for any course offered by the School. (https://www.ucalgary.ca/pubs/calendar/current/salp-3-3.html).

Topic Areas and Detailed Course Schedule*

Date	Lecture Topic	Readings	Assignments
JAN 10	Course overview Introduction: Contours, Landforms	CH 3	*A#1 – issued*
JAN 12	Contours, Landforms & Watersheds	CH 3	
JAN 17	Interpolation and Slope Formula Intro	CH 4	*A#2 – issued*
JAN 19	Slope Formula, Grading of Roadways	CH 5 Pg 77-89	**A#1 Due**
JAN 24	Slope Formula, Terrace Grading, Drainage and Swales	CH 5, Pg 90-99	*A#3 – issued*
JAN 26	Work Day Technical Drawings and Conventions	CH 15	**A#2 Due**
JAN 31	Grading of Parking Lots		*A#4 – issued*
FEB **02**	Grading of Parking Lots Work Day		**A#3 Due**
FEB 07	Grading Process; Drainage and Buildings Parking Lot (A – 4) Work Day	CH 6	*A#5 – issued*
FEB 09	Review of Assignments; In-Class Exercise		*A#7 – issued* **A#4 Due**
FEB 14	Assignments 5 & 7 Work Day		
FEB 16	Stairs, Ramps and Walls Accessibility Guides (AB, BC, ADA, LARE)	Review Guides	*A#6 – issued* **A#5 Due**
	FEB 20-25 - READING WEEK		
MAR 28	Stairs / Ramps (A – 6) Work Day		
MAR 02	Storm Water Management	CH 9-10 LID Manual	
MAR 07	SWM (cont'd), Rational Method		
MAR 09	A – 7 Work Day		**A#6 Due**
	MAR 13-17 - BLOCK WEEK		
MAR 21	Soils for Landscape Construction and Erosion / Sedimentation Control	CH 7-8 Ch 11	
MAR 23	**Assignment 7** ***-draft grading plan reviews***		
MAR 28	Cut / Fill Calculations – Work Day		
MAR 30	A -7 Work Day		
APR 04	Storm Water Management Case Studies		
APR 06	Planting Plans and Planting Details		
APR 11	**Assignment 7** ***-final grading plan presentations***		**FINAL COPY of A#7 -** **Due April 14, 2023**

* Note: Dates, lectures and guest speakers subject to change.

Guidelines for Zoom Sessions

Zoom is a video conferencing program that will allow us to meet at specific times for a "live" video conference, so that we can have the opportunity to meet each other virtually and discuss relevant course topics as a learning community.

To help ensure Zoom sessions are private, do not share the Zoom link or password with others, or on any social media platforms. Zoom links and passwords are only intended for students registered in the course. Zoom recordings and materials presented in Zoom, including any teaching materials, must not be shared, distributed or published without the instructor's permission.

The use of video conferencing programs relies on participants to act ethically, honestly and with integrity; and in accordance with the principles of fairness, good faith, and respect (as per the Code of Conduct). When entering Zoom or other video conferencing sessions (such as MS Teams), you play a role in helping create an effective, safe and respectful learning environment. Please be mindful of how your behaviour in these sessions may affect others. Participants are required to use names officially associated with their UCID (legal or preferred names listed in the Student Centre) when engaging in these activities. Instructors/moderators can remove those whose names do not appear on class rosters. Non-compliance may be investigated under relevant University of Calgary conduct policies (e.g, Student Non-Academic Misconduct Policy). If participants have difficulties complying with this requirement, they should email the instructor of the class explaining why, so the instructor may consider whether to grant an exception, and on what terms. For more information on how to get the most out of your zoom sessions visit: https://elearn.ucalgary.ca/guidelines-for-zoom/

If you are unable to attend a Zoom session, please contact your instructor in advance to arrange an alternative activity for the missed session (e.g., to review the recorded session). Please be prepared, as best as you are able, to join class in a quiet space that will allow you to be fully present and engaged in Zoom sessions. Students will be advised by their instructor when they are expected to turn on their webcam (for group work, presentations, etc.).

The instructor may record online Zoom class sessions for the purposes of supporting student learning in this class – such as making the recording available for review of the session or for students who miss a session. Students will be advised before the instructor initiates a recording of a Zoom session. These recordings will be used to support student learning only and will not be shared or used for any other purpose.

University of Calgary Policies and Supports

COVID-19 PROCEDURE FOR SICK STUDENTS: https://www.ucalgary.ca/risk/covid-19-procedure-for-sick-students

UNIVERSITY OF CALGARY COVID-19 UPDATES: https://www.ucalgary.ca/risk/emergency-management/covid-19-response

ACADEMIC ACCOMMODATION
It is the student's responsibility to request academic accommodations according to the University policies and procedures listed below. The student accommodation policy can be found at: https://www.ucalgary.ca/legal-services/university-policies-procedures/student-accommodation-policy

Students needing an accommodation because of a disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities: https://www.ucalgary.ca/legal-services/university-policies-procedures/accommodation-students-disabilities-procedure
Students needing an accommodation in relation to their coursework or to fulfil requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to their instructor (contact information on first page above).
SAS will process the request and issue letters of accommodation to instructors. For additional information on support services and accommodations for students with disabilities, visit www.ucalgary.ca/access/

ACADEMIC MISCONDUCT
Academic Misconduct refers to student behavior which compromises proper assessment of a student's academic activities and includes: cheating; fabrication; falsification; plagiarism; unauthorized assistance; failure to comply with an instructor's expectations regarding conduct required of students completing academic assessments in their courses; and failure to comply with exam regulations applied by the Registrar.

For information on the Student Academic Misconduct Policy and Procedure please visit:
https://ucalgary.ca/policies/files/policies/student-academic-misconduct-policy.pdf
https://ucalgary.ca/policies/files/policies/student-academic-misconduct-procedure.pdf
Additional information is available on the Academic Integrity Website at
https://ucalgary.ca/student-services/student-success/learning/academic-integrity

COPYRIGHT LEGISLATION
All students are required to read the University of Calgary policy on Acceptable Use of Material Protected by Copyright (www.ucalgary.ca/policies/files/policies/acceptable-use-of-material-protected-by-copyright.pdf) and requirements of the copyright act (https://laws-lois.justice.gc.ca/eng/acts/C-42/index.html) to ensure they are aware of the consequences of unauthorised sharing of course materials (including instructor notes, electronic versions of textbooks etc.). Students who use material protected by copyright in violation of this policy may be disciplined under the Non-Academic Misconduct Policy (https://www.ucalgary.ca/pubs/calendar/current/k.html).

INSTRUCTOR INTELLECTUAL PROPERTY
Course materials created by instructors (including presentations and posted notes, labs, case studies, assignments and exams) remain the intellectual property of the instructor. These materials may NOT be reproduced, redistributed or copied without the explicit consent of the instructor. The posting of course materials to third party websites such as note-sharing sites without permission is prohibited. Sharing of extracts of these course materials with other students enrolled in the course at the same time may be allowed under fair dealing.

FREEDOM OF INFORMATION AND PROTECTION OF PRIVACY
Student information will be collected in accordance with typical (or usual) classroom practice. Students' assignments will be accessible only by the authorized course faculty. Private information related to the individual student is treated with the utmost regard by the faculty at the University of Calgary.

SEXUAL VIOLENCE POLICY
The University recognizes that all members of the University Community should be able to learn, work, teach and live in an environment where they are free from harassment, discrimination, and violence. The University of Calgary's sexual violence policy guides us in how we respond to incidents of sexual violence, including supports available to those who have experienced or witnessed sexual violence, or those who are alleged to have committed sexual violence. It provides clear response procedures and timelines, defines complex concepts, and addresses incidents that occur off-campus in certain circumstances. Please see the policy available at https://www.ucalgary.ca/policies/files/policies/sexual-violence-policy.pdf

UNIVERSITY STUDENT APPEALS OFFICE: If a student has a concern about a grade that they have received, they should refer to Section I of the Undergraduate Calendar (https://www.ucalgary.ca/pubs/calendar/current/i-3.html) which describes how to have a grade reappraised. In addition, the student should refer to the SAPL's Procedure for reappraisal of grades

OTHER IMPORTANT INFORMATION
Please visit the Registrar's website at: https://www.ucalgary.ca/registrar/registration/course-outlines for additional important information on the following:

- Wellness and Mental Health Resources
- Student Success
- Student Ombuds Office
- Student Union (SU) Information
- Graduate Students' Association (GSA) Information
- Emergency Evacuation/Assembly Points
- Safewalk