MECH 580 A01 – Bioprinting – 3D Printing body parts

Term – Fall 2022 (202209)

Instructor	Office Hours
Dr. Karolina Valente	Days: Mondays
Phone:	Time: 12-1 pm
E-mail: kvalente@uvic.ca	Location: EOW 331

ONLINE LEARNING, TEACHING, AND TOOLS

This course will be taught entirely online, making use primarily of BrightSpace and Zoom (and maybe other tools).

This online format is new for many students and instructors. As we move through term, we will learn what works, and what doesn't, and adjustments to the course outline might be necessary. Possible changes will be discussed.

Lectures:

Lectures will be pre-recorded and links posted on BrightSpace. These recordings will be a mix of videos from whiteboard teaching, screen capturing of powerpoint or pdf with speech, and tablet writing. Videos will have a duration of 40-50 minutes per scheduled class (probably split into shorter modules).

Tools required:

- Desktop or Laptop Computer with webcam/microphone/speakers/headsets for online lecture & tutorials (worst case a smartphone will do)
- Scanner (desktop or phone-based)
- Printer (useful but not mandatory)
- Software installed on your computer:
  - Web browser to be able to access/run Zoom, BrightSpace, etc.
  - Pdf viewer
  - Excel, Word, etc might be useful as well
- Please make yourself familiar with Zoom, which we will use for live interaction in tutorial, office hours, etc:* https://www.uvic.ca/systems/services/avmultimedia/zoomvideoconferencing/index.php

TA Name	E-mail
Alastair Mascarenhas	alastairmascar96@uvic.ca
Shamapto Anthon	sganthon@uvic.ca

Required/Optional Text	
Title: Bioprinting: Principles and Applications	
Author: Chee Kai Chua	
Publisher/Year: World Scientific Publishing/2013	

COURSE OBJECTIVES:

This course shows the ways that 3D printing and 3D bioprinting are revolutionizing the available treatments available for medical needs. 3D bioprinting requires collaboration between biomedical engineers, scientists, and critically - clinicians. The clinician identifies the medical need for a 3D printed structure. As this course introduces different projects, a clinician's needs will drive each particular project by identifying the potential advantages of using 3D printing technology to deliver a personalized treatment. During these four modules, the student will learn about how 3D printing has developed into 3D bioprinting. The student will start by learning about 3D printed prosthetics and implants. Next, they will be introduced more specifically to 3D bioprinting technologies. This course will encourage thought about ethical considerations and ramifications of these technological advances and the student will complete a design project to at the end of the course to synthesize what they have learned.

LEARNING OUTCOMES: At the end of this course, students will be able to:
1. Identify the four major steps in bioprinting a 3D structure and explain how bioprinting can be used to address medical needs
2. Differentiate the advantages and limitations of 3D modelling software for bioprinting
3. Identify the ethical and regulatory issues involved in new medical treatments and the future of 3D bioprinting
4. Evaluate the nature and variation of materials for prosthetics and structural supports used in 3D bioprinting
5. Apply the 3D printing process to case studies of biomaterials enhancing lives

Weight & Date(s) of Assessments:	Weight	Date
Assignments:	15%	9/26, 10/24, 11/28
Labs	10%	TBA
Mid-term	25%	11/24 6 pm to 8 pm
Critiques	25%	11/07, 11/21
Project	25%	10/3 (outline), 12/5 (final project)

ASSIGNMENTS
All assignments, papers, critique instructions, and project instructions will be posted to Brightspace.

NOTES:

NOTES ON WORK COMPELETION
Failure to complete all laboratory requirements will result in a grade of N being awarded for the course.

NOTES
The final grade obtained from the above marking scheme for the purpose of GPA calculation will be based on the percentage-to-grade point conversion table as listed in the current Undergraduate Calendar.

COURSE LECTURE NOTES
Unless otherwise noted, all course materials supplied to students in this course are intended for use in this course only. These materials are NOT to be re-circulated digitally, whether by email or by uploading or copying

to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar.

Course Schedule

(May be subject to change)

Module	Topics	Date/Week
1	3D Printing and Bioprinting	Until 9/24
2	Implants	Until 10/15
3	Tissue Regeneration	Until 11/05
4	Future Application	Until 11/14

General Information

Note to Students: Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Assistant to the Chair to set up an appointment.

Centre for Accessible Learning (CAL) https://www.uvic.ca/services/cal/

Accommodation of Religious Observance (AC1210) Read it here

Discrimination and Harassment Policy (GV0205) Read it here

Sexualized Violence Prevention and Response at UVic:
UVic takes sexualized violence seriously, and has raised the bar for what is considered acceptable behaviour. We encourage students to learn more about how the university defines sexualized violence and its overall approach by visiting https://www.uvic.ca/sexualizedviolence/. If you or someone you know has been impacted by sexualized violence and needs information, advice, and/or support please contact the sexualized violence resource office in Equity and Human Rights (EQHR). Whether or not you have been directly impacted, if you want to take part in the important prevention work taking place on campus, you can also reach out:
Where: Sexualized violence resource office in EQHR; Sedgewick C119
Phone: 250.721.8021
Email: svpcoordinator@uvic.ca
Web: https://www.uvic.ca/sexualizedviolence/

Office of the Ombudsperson:
The Office of the Ombudsperson is an independent and impartial resource to assist with the fair resolution of student issues. A confidential consultation can help you understand your rights and responsibilities. The Ombudsperson can also clarify information, help navigate procedures, assist with problem-solving, facilitate communication, provide feedback on an appeal, investigate and make recommendations.
Phone: 250-721-8357
Email: ombuddy@uvic.ca
Web: https://uvicombudsperson.ca/

Electronic devices in labs and lectures: No unauthorized audio or video recording of lectures is permitted.

Electronic devices in midterms and exams: Calculators are only permitted for examinations and tests if explicitly authorized and the type of calculator permitted may be restricted. No other electronic devices (e.g. cell phones, pagers, PDA, etc.) may be used during examinations or tests unless explicitly authorized.

Faculty of Engineering, University of Victoria Standards for Professional Behavior
It is the responsibility of all members of the Faculty of Engineering, students, staff, and faculty, to adhere to and promote standards of professional behavior that support an effective learning environment that prepares graduates for careers as professionals...
You are advised to read the Faculty of Engineering document *Standards for Professional Behaviour* which contains important information regarding conduct in courses, labs, and in the general use of facilities.

Graduate Students' Society
The Graduate Students' Society (GSS) serves all students registered in an Graduate degree program. For information on GSS activities, events and services navigate to https://gss.uvic.ca/

Grading System
The University of Victoria follows a percentage grading system in which the instructor will submit grades in percentages. The University will use the following Senate approved standardized grading scale to assign letter grades. Both the percentage mark and the letter grade will be recorded on the academic record and transcripts. Read the policy here

Course Experience Survey (CES)
We value your feedback on this course. Towards the end of term you will have the opportunity to complete a confidential course experience survey (CES) regarding your learning experience. The survey is vital to providing feedback to me regarding the course and my teaching, as well as to help the department improve the overall program for students in the future. When it is time for you to complete the survey, you will receive an email inviting you to do so. If you do not receive an email invitation, you can go directly to the http://ces.uvic.ca

You will need to use your UVic NetLink ID to access the survey, which can be done on your laptop, tablet or mobile device. I will remind you closer to the time, but please be thinking about this important activity, especially the following three questions, during the course.
- What strengths did your instructor demonstrate that helped you learn in this course?
- Please provide specific suggestions as to how the instructor could have helped you learn more effectively.
- Please provide specific suggestions as to how this course could be improved.

Attendance
Students are expected to attend all classes in which they are enrolled. An academic unit may require a student to withdraw from a course if the student is registered in another course that occurs at the same time...
An Instructor may refuse a student admission to a lecture, laboratory, online course discussion or learning activity, tutorial or other learning activity set out in the course outline because of lateness, misconduct, inattention or failure to meet the responsibilities of the course set out in the course outline. Students who neglect their academic work may be assigned a final grade of N or debarred from final examinations. Students who do not attend classes must not assume that they have been dropped from the course by an academic unit or an instructor. Courses that are not formally dropped will be given a failing grade, students may be required to withdraw and will be required to pay the tuition fee for the course. Read the policy here.

Academic Integrity
Academic integrity is intellectual honesty and responsibility for academic work that you submit individual or group work. It involves commitment to the values of honesty, trust, and responsibility. It is expected that students will respect these ethical values in all activities related to learning, teaching, research, and service. Therefore, plagiarism and other acts against academic integrity are serious academic offences.

> **The responsibility of the institution** Instructors and academic units have the responsibility to ensure that standards of academic honesty are met. By doing so, the institution recognizes students for their hard work and assures them that other students do not have an unfair advantage through cheating on essays, exams, and projects.

> **The responsibility of the student** Plagiarism sometimes occurs due to a misunderstanding regarding the rules of academic integrity, but it is the responsibility of the student to know them. If you are unsure about the standards for citations or for referencing your sources, ask your instructor. Depending on the severity of the case, penalties include a warning, a failing grade, a record on the student's transcript, or a suspension.
> It is your responsibility to understand the University's policy on [Academic Integrity](#)

Equality
This course aims to provide equal opportunities and access for all students to enjoy the benefits and privileges of the class and its curriculum and to meet the syllabus requirements. Reasonable and appropriate accommodation will be made available to students with documented disabilities (physical, mental, learning) in order to give them the opportunity to successfully meet the essential requirements of the course. The accommodation will not alter academic standards or learning outcomes, although the student may be allowed to demonstrate knowledge and skills in a different way. It is not necessary for you to reveal your disability and/or confidential medical information to the course instructor. If you believe that you may require accommodation, the course instructor can provide you with information about confidential resources on campus that can assist you in arranging for appropriate accommodation. Alternatively, you may want to contact the Centre for Accessible Learning (formerly the Resource Centre for Students with a Disability) located in the Campus Services Building.

The University of Victoria is committed to promoting, providing, and protecting a positive, and supportive and safe learning and working environment for all its members.