UNIVERSITY OF CALGARY
FACULTY OF SCIENCE
DEPARTMENT OF COMPUTER SCIENCE
COURSE OUTLINE

1. **Course:** CPSC 591: Rendering
CPSC 691: Rendering
Lecture Sections:
L01, MWF 11:00-11:50, MS 217, Mario Costa Sousa, MS 628, 220-6783, mario@ucalgary.ca
Office Hours: MW 13:30-14:30

Course Website: http://www.cpsc.ucalgary.ca/~mario/teaching/591-691/F16

Computer Science Department Office, ICT 602, 220-6015, cpsc@cpsc.ucalgary.ca

2. **Prerequisites:** CPSC 591: CPSC 453
CPSC 691: Consent of the Department
(http://www.ucalgary.ca/pubs/calendar/current/computer-science.html#3620)

3. **Grading:** The University policy on grading and related matters is described in sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:

CPSC 591		CPSC 691	
Assignments	30%	Assignments	30%
Project	40%	Project	50%
Midterm Exam	10%	Midterm Exam	10%
	(In-Class Friday October 28th, 2016)		
Final Exam	20%	Final Exam	10%
	(Part 1: In-Class Wednesday December 7th, 2016)		
	(Part 2: In-Class Friday December 9th, 2016)		

This course **will not** have a Registrar's Scheduled Final Exam.

Special Regulations affecting Final grade: Each of the above components will be given a numeric percentage based on their corresponding weights. The total percentages will be reconverted to a final letter grade using the attached conversion table.

4. **Missed Components of Term Work:** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar. Section 3.6. It is the student's responsibility to familiarize theirself with these regulations. See also Section E.6 of the University calendar.

5. **Scheduled Out-of-Class Activities:** REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME ACTIVITY. If you have a clash with this out-of-class activity, please inform your instructor as soon as possible so that alternative assignments can be arranged.

6. **Course Materials:**
None.

Online Course Components:
Course notes, slides and supplementary materials will be available on the course webpage. References to suitable technical/research papers will be provided by the instructor.

7. **Examination Policy:** Closed book. Students will be allowed to bring one leter-sized page of notes to both the midterm and final exams. Students should also read the Calendar, Section G, on examinations.

8. **Approved Mandatory and Optional Course Supplemental Fees:** None.

9. **Writing across the Curriculum Statement:** In this course, the quality of the student's writing in the weighted components of the course will be a factor in the evaluation of these components. See also Section E.2 of the University Calendar.

10. **Human Studies Statement:** Students will be expected to participate as subjects or participants in projects. See also Section E.5 of the University Calendar.

11. **OTHER IMPORTANT INFORMATION FOR STUDENTS:**

a) **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offense that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under Section K, Student Misconduct to inform yourself of definitions, processes and penalties.

b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points which can be found in each classroom and building.

c) **Student Accommodations:** Students needing an Accommodation because of a Disability or medical condition should contact Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities available at http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf. 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 the Associate Head of Computer Science.

d) **Safewalk:** Campus Security will escort individuals day or night (http://www.ucalgary.ca/security/safewalk/). Call 403-220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.

e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information see also http://www.ucalgary.ca/secretariat/privacy

f) **Student Union Information:** VP Academic (403) 220-3911 suvpaca@ucalgary.ca SU Faculty Rep (403) 220-3913 science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca, Student Ombuds Office: (403) 220-6420 ombuds@ucalgary.ca, http://ucalgary.ca/provost/students/ombuds

g) **Internet and Electronic Device Information:** You can assume that in all classes that you attend your cell phone should be turned off unless instructed otherwise. All communications with other individuals via laptop computers, cell phones or other devices connectable to the internet in not allowed during class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.

h) **U.S.R.I.:** At the University of Calgary feedback provided by students through the Universal Student ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses (www.ucalgary.ca/usri). Your responses make a difference – please participate in USRI surveys.

Department Approval_____Date_____

Associate Dean's Approval for
out of regular class-time activity: _____Date:_____

Associate Dean's Approval for
Alternate final examination
arrangements:_____Date:_____

A signed copy of this document is kept on file in the Computer Science main Office ICT 602

CPSC 591/691 Percentage to Letter Grade Conversion Table

A+	96-100
A	90-95
A-	84-89
B+	78-83
B	72-77
B-	68-71
C+	64-67
C	60-63
C-	56-59
D+	53-55
D	50-52
F	<50

CPSC 591/691 Syllabus

Tentative Topics Covered:

Core Topics

- Light/Object Interaction (Lighting Models, Cook-Torrance, BRDF, Layered Materials)
- Mapping Techniques (Image Texturing, Attribute-based Texturing, View-dependent Mapping, Procedural Textures/3D textures)
- Ray Tracing (Backwards, Distributed)
- Real-Time Rendering (Spatial Data Structures)
- Global Illumination Models (Radiosity, Path Tracing, Photon Mapping)

Rendering Avenues

- Non-Photorealistic Rendering (Feature Lines, Object/Image-based Approaches, Tone-based Shading, G-buffer Approach)
- Data Types & Representations: Image, Point, Grid, Volume, Implicit
- Applications: Entertainment, Design, Architecture, Medicine, Science, Engineering
- Rendering for Modeling, Visualization and Animation.
- Advanced Rendering Interfaces

Learning Outcomes:

Rendering is present in applications ranging from entertainment to product design, science and engineering. The goal of this course is twofold: (1) to provide a solid understanding of the fundamental mathematical and physical principles that are the basis of rendering algorithms; (2) the different rendering approaches based on the visual communication goals, the application domains + requirements, and the data modalities + representations.

- By the end of this course, students should be able to describe the interaction of light with matter in terms of radiometric quantities.
- By the end of this course, students are expected to implement a rendering technique of their choice, and summarize their results in a project report.
- By the end of this course, students should be able to recognize the qualitative differences between and applications of photorealistic, realtime, and non-photorealistic rendering techniques.
- By the end of this course, students should be able to apply Monte Carlo integration to numerically solve the equations of light transport to synthesize images recorded by a realistic photographic camera.
- By the end of this course, students should be able to apply the rendering pipeline in modern graphics processing units to implement realtime approaches to global illumination.