S.20-114

SFU GRADUATE AND POSTDOCTORAL STUDIES

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MEMORANDUM

ATTENTION Senate

DATE September 17, 2020

FROM Jeff Derksen,
Chair of Senate Graduate Studies Committee (SGSC)

RE: New Course Proposal

For information:
Acting under delegated authority at its meeting of September 8, 2020, SGSC approved the following new course, effective **Summer 2021:**

Faculty of Applied Science
School of Computing Science

1) New course: CMPT 769 Computational Photography and Image Manipulation

Senators wishing to consult a more detailed report of curriculum revisions may do so on the Senate Docushare repository at https://docushare.sfu.ca/dsweb/View/Collection-12682

OFFICE OF THE DEAN
Faculty of Applied Sciences
Simon Fraser University

MEMORANDUM

Attention Dr. Jeff Derksen
Dean, Graduate Studies

Date September 8, 2020

From Dr. Parvaneh Saeedi psaeedi@sfu.ca
Faculty of Applied Science, Graduate Studies Committee

Re: FAS-CMPT's new course proposal - CMPT 769

The faculty of Applied Sciences Graduate Studies Committee would request for including in the calendar for CMPT 769, Computational Photography, effective Summer 2021.

Regards,
Parvaneh Saeedi

SFU

COMPUTING SCIENCE

MEMO

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ATTENTION	**Parvaneh Saeedi, Associate Director**
FROM	Ghassan Hamarneh, Graduate Program Director
RE	New Graduate Course Proposal – CMPT 769
DATE	June 10, 2020

NEW GRADUATE COURSE PROPOSAL - Effective Summer 2021

CMPT 769 – Computational Photography and Image Manipulation

The School would like to offer a new course concerned with overcoming the limitations of traditional photography with computation. This has been approved by the GPC and director.

If you have any questions, please let me know.

Ghassan Hamarneh
Graduate Chair, School of Computing Science

SFU GRADUATE AND POSTDOCTORAL STUDIES

New Graduate Course Proposal

Course Subject (eg. PSYC) CMPT	Number (eg. 810) 769	Units (eg. 4) 3

Course title (max. 100 characters)

Computational Photography and Image Manipulation

Short title (for enrollment/transcript - max. 30 characters) **Computational Photography**

Course description for SFU Calendar (course descriptions should be brief and should never begin with phrases such as "This course will..." or "The purpose of this course is..." If the grading basis is satisfactory/unsatisfactory include this in the description)

Computational Photography is concerned with overcoming the limitations of traditional photography with computation: in optics, sensors, and geometry; and even in composition, style, and human interfaces. The course covers computational techniques to improve the way we process, manipulate, and interact with visual media. The covered topics include image-based lighting and rendering, camera geometry and optics, computational apertures, advanced image filtering operations, high-dynamic range, image blending, texture synthesis and inpainting.

Rationale for introduction of this course

Computational Photography is a modern course offered in many universities with a strong visual computing community. Introduction of this course is a part of our effort to modernize our course offerings in Visual Computing following the addition of new faculty members with a wide range of expertise.

Term of initial offering (eg. Fall 2019) Summer 2021	Course delivery (eg. 3 hrs/week for 13 weeks) 3 hrs/week for 13 weeks
Frequency of offerings/year 1 per year	Estimated enrollment per offering 30

Equivalent courses (courses that replicates the content of this course to such an extent that students should not receive credit for both courses)

CMPT 461 (two-way equivalency)

Prerequisite and/or Corequisite

Criminal record check required? ☐ Yes if yes is selected, add this as prerequisite

Additional course fees? ☐ Yes ☑ No

Campus where course will be taught ☑ Burnaby ☐ Surrey ☐ Vancouver ☐ Great Northern Way ☐ Off campus

Course Components * ☑ Lecture ☐ Seminar ☐ Lab ☐ Independent ☐ Capstone ☐ _____

Grading Basis ☑ Letter grades ☐ Satisfactory/ Unsatisfactory ☐ In Progress / Complete

Repeat for credit? ☐ Yes ☒ No Total repeats allowed: _____ Repeat within a term? ☐ Yes ☑ No

Required course? ☐ Yes ☑ No Final exam required? ☑ Yes ☐ No Capstone course? ☐ Yes ☑ No

Combined with a undergrad course? ☑ Yes ☐ No If yes, identify which undergraduate course and the additional course requirements for graduate students:

CMPT 461. Additional assignments.

* See important definitions on the curriculum website.

RESOURCES

If additional resources are required to offer this course, provide information on the source(s) of those additional resources.

Faculty member(s) who will normally teach this course
Yagiz Aksoy
Additional faculty members, space, and/or specialized equipment required in order to offer this course
Additional faculty members: Yasutaka Furukawa, Manolis Savva

CONTACT PERSON

Academic Unit / Program	Name (typically, Graduate Program Chair)	Email
Computing Science	Ghassan Hamarneh	cs_grad_director@sfu.ca

ACADEMIC UNIT APPROVAL

A course outline must be included.

Non-departmentalized faculties need not sign

Graduate Program Committee Ghassan Hamarneh	Signature	Date 08 Jun. 2020
Department Chair Mohamed Hefeeda	Signature	Date 8 June 2020

FACULTY APPROVAL

The course form and outline must be sent by FGSC to the chairs of each FGSC (fgsc-list@sfu.ca) to check for an overlap in content

Overlap check done? ☑ YES

This approval indicates that all the necessary course content and overlap concerns have been resolved. The Faculty/Academic Unit commits to providing the necessary resources.

Faculty Graduate Studies Committee	Signature	Date
Parvaneh Saeedi		June 2020

A library review will be conducted. If additional funds are necessary, DGS will contact the academic unit prior to SGSC.

SENATE GRADUATE STUDIES COMMITTEE APPROVAL

Senate Graduate Studies Committee	Signature	Date
Jeff Derksen		September 17, 2020

ADMINISTRATIVE SECTION (for DGS office only)
Library Check: Yes
Course Attribute: _____
Course Attribute Value: _____
Instruction Mode: _____
Attendance Type: _____

If different from regular units:
Academic Progress Units: _____
Financial Aid Progress Units: _____

CMPT 769 – Computational Photography

DESCRIPTION

Computational Photography is concerned with overcoming the limitations of traditional photography with computation: in optics, sensors, and geometry; and even in composition, style, and human interfaces. The course covers computational techniques to improve the way we process, manipulate, and interact with visual media. The covered topics include image-based lighting and rendering, camera geometry and optics, computational apertures, advanced image filtering operations, high-dynamic range, image blending, texture synthesis and inpainting.

TOPICS

- Imaging basics
- Camera basics
- Fourier transform and sampling
- High dynamic range imaging
- Tone mapping
- Bilateral filtering
- Color
- Image blending
- Boundary minimization techniques
- Focal stacks and light fields
- Transformations and panoramas
- Camera models
- Optical flow
- Deconvolution and noise

ADDITIONAL ASSINGMENTS

Additional assignments for graduate students may include a presentation on a topic related to the course content, extended programming assignments where students implement a related method or a paper, or extended expectations from the course project such as a harder problem setup or demonstration of additional application scenarios

GRADING

- Programming assignments: 30%
- Final project: 40%
- Final exam: 30%

MATERIAL

Recommended reading: R. Szeliski, Computer Vision: Algorithms and Applications, Springer, London, 2011

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