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MEMORANDUM

ATTENTION	Senate	DATE	September 15, 2023
FROM	Kevin Oldknow, Acting Chair Senate Committee on Undergraduate Studies	PAGES	1/1
RE:	New Course Proposals (SCUS 23-74)		

For information:

Acting under delegated authority at its meeting of September 14, 2023 SCUS approved the following curriculum revisions effective Summer 2024.

a. Faculty of Applied Sciences

1. School of Computing Science

(i) New Course Proposal: CMPT 400-3, 3D Computer Vision

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.

COURSE SUBJECT 3D Computer Vision **NUMBER** 400

COURSE TITLE LONG — for Calendar/schedule, no more than 100 characters including spaces and punctuation

3D Computer Vision

COURSE TITLE SHORT — for enrollment/transcript, no more than 30 characters including spaces and punctuation

3D Computer Vision

CAMPUS where course will be normally taught: ☑ Burnaby ☐ Surrey ☐ Vancouver ☐ Great Northern Way ☐ Off campus

COURSE DESCRIPTION — 50 words max. Attach a course outline. Don't include WQB or prerequisites info in this description box.

Advanced topics in 3D vision covering topics including acquisition, processing, and synthesis of 3D content. The course introduces 3D representations amenable to computer vision (from classical polygonal meshes to neural fields), and fundamentals of non-linear optimization to effectively tackle inverse 3D vision problems.

REPEAT FOR CREDIT ☐ YES ☑ NO Total completions allowed ☐ Within a term? ☐ YES ☐ NO

LIBRARY RESOURCES

NOTE: Senate has approved (S.93-11) that no new course should be approved by Senate until funding has been committed for necessary library materials. Each new course proposal must be accompanied by the email that serves as proof of assessment. For more information, please visit www.lib.sfu.ca/about/overview/collections/course-assessments.

RATIONALE FOR INTRODUCTION OF THIS COURSE

While 3D vision is trending in the literature, in the School of Computing Science we have two courses that only cover a few elements of 3D vision; the only elements available in existing courses, derived from the respective syllabus, are:

– CMPT 412 (Computer Vision) covers camera models, two-view geometry, stereo and camera pose estimation.
– CMPT 464/764 (Geometric Modeling in Computer Graphics) covers geometric representations (polygonal meshes)

Conversely, the proposes course introduces the collection of mathematical tools (i.e. numerical optimization) needed for inverse modelling of ill-posed problems (i.e. estimating a 3D scene from 2D or 2+1/2D measurements), and the use of neural networks as malleable 3D representations. Topic overlap with CMPT412 / 464 is (much) less than 10%, as can be confirmed by their primary lecturers (respectively Prof. Hao Zhang and Prof. Yasutaka Furukawa).

The course is inspired by similar courses at other institutions, including:

TUM: https://uni-tuebingen.de/fakultaeten/mathematisch-naturwissenschaftliche-fakultaet/fa[…]atik/lehrstuehle/autonomous-vision/lectures/computer-vision/
https://www.scenerepresentations.org/courses/inverse-graphics/
MIT: https://professional.mit.edu/course-catalog/modeling-and-optimization-machine-learning

SCHEDULING AND ENROLLMENT INFORMATION

Effective term and year (e.g. FALL 2016) Summer 2024

Term in which course will typically be offered ☑ Spring ☐ Summer ☐ Fall

Other *(describe)*

Will this be a required or elective course in the curriculum? ☐ Required ☑ Elective

What is the probable enrollment when offered? Estimate: 40

UNITS

Indicate number of units: 3

Indicate no. of contact hours: 3 Lecture 0 Seminar 0 Tutorial 0 Lab 0 Other; explain below

OTHER

N/A

FACULTY

Which of your present CFL faculty have the expertise to offer this course?

Yasutaka Furukawa, Richard Hao Zhang, Andrea Tagliasacchi

WQB DESIGNATION

(attach approval from Curriculum Office)

PREREQUISITE AND / OR COREQUISITE

CMPT 361, MACM 316
Recommended: MATH 251

EQUIVALENT COURSES [For more information on equivalency, see Equivalency Statements under Information about Specific Course components.]

1. SEQUENTIAL COURSE [is not hard coded in the student information management system (SIMS).]

Students who have taken (*place relevant course(s) in the blank below (ex: STAT 100)*) **first** may not then take this course for further credit.

N/A

2. ONE-WAY EQUIVALENCY [is not hard coded in SIMS.]

(*Place relevant course(s) in the blank below (ex: STAT 100)*) will be accepted in lieu of this course.

N/A

3. TWO-WAY EQUIVALENCY [is hard coded and enforced by SIMS.]

Students with credit for (*place relevant course(s) in the blank below (ex: STAT 100)*) may not take this course for further credit.

N/A

Does the partner academic unit agree that this is a two-way equivalency? ☐ YES ☐ NO

Please also have the partner academic unit submit a course change form to update the course equivalency for their course(s).

4. SPECIAL TOPICS PRECLUSION STATEMENT [is not hard coded in SIMS.]

Students who have taken CMPT 469 - Special Topics in Computer Graphics - 3D Computer Vision offered Spring 2024 may not take this course for further credit.

FEES

Are there any proposed student fees associated with this course other than tuition fees? ☐ YES ☑ NO

COURSE – LEVEL EDUCATIONAL GOALS (OPTIONAL)

RESOURCES

List any outstanding resource issues to be addressed prior to implementation: space, laboratory equipment, etc:

N/A

OTHER IMPLICATIONS

Final exam required ☐ YES ☑ NO

Criminal Record Check required ☐ YES ☑ NO

OVERLAP CHECK

Checking for overlap is the responsiblity of the Associate Dean.

Each new course proposal must have confirmation of an overlap check completed prior to submission to the Faculty Curriculum Committee.

Name of Originator

Andrea Tagliasacchi