THE UNIVERSITY OF BRITISH COLUMBIA | OKANAGAN

OKANAGAN SENATE SECRETARIAT
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23 September 2009

To: **Okanagan Senate**

From: **Senate Curriculum Committee**

Subject: **September Curriculum Proposals (approval)**

The Senate Curriculum Committee has reviewed the material forwarded to it by the Faculty, and encloses those proposals it deems ready for approval.

As such, the following is recommended to Senate:

Motion: ***That Senate approve the new courses brought forward by the Faculty of Applied Science as set out in the attached proposals.***

Respectfully submitted,
Mr. Christopher Eaton
Acting Chair, Curriculum Committee

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To: **Okanagan Senate**

From: **Senate Curriculum Committee**

Subject: **September Curriculum Proposals**

Attached please find the following for your consideration:

Faculty of Applied Science

1. The following new courses:

a.	ENGR 415	(3)	Reliability Engineering and System Safety/
	ENGR 515	(3)	Reliability Engineering and System Safety
b.	ENGR 510	(3)	Continuum Mechanics
c.	ENGR 520	(3)	Energy Transformations in the Environment
d.	ENGR 532	(3)	Project Planning and Control
e.	ENGR 533	(3)	Construction Engineering and Management
f.	ENGR 534	(3)	Road Safety Planning and Engineering
g.	ENGR 536	(3)	Sustainable Land Use and Transportation
h.	ENGR 538	(3)	Rock Engineering
i.	ENGR 539	(3)	Terrain Modelling and Analysis
j.	ENGR 541	(3)	Water Resource Modelling
k.	ENGR 546	(3)	Biological Treatment Processes
l.	ENGR 549	(3)	Environmental Risk Analysis
m.	ENGR 558	(3)	Power Electronics
n.	ENGR 562	(3)	Information Theory
o.	ENGR 568	(3)	Advanced Digital System Design
p.	ENGR 571	(3)	Radio Frequency Integrated Circuits
q.	ENGR 572	(3)	Photonic Engineering
r.	ENGR 584	(3)	Heat and Mass Transfer
s.	ENGR 592	(3)	Microfluidics
t.	ENGR 593	(3)	Computational Fluid Dynamics

UBC Okanagan Curriculum Proposal Form
New or Change to Course or Program

Category: 1

Faculty/School: Engineering **Department/Unit:** N/A **Faculty/School Approval Date:** 27/05/09 **Effective Session:** 2009W	**Date:** June 10, 2009 **Contact Person:** Dwayne Tannant **Phone:** 250.807.8067 **Email:** dwayne.tannant@ubc.ca
Proposed Calendar Entry: **ENGR 415 (3) Reliability Engineering and System Safety** **Reliability, maintainability and availability of systems, failures models and probabilistic risk analysis, failure mode effect analysis, fault tree analysis and event tree analysis, reliability and system improvement using design of experiments, Taguchi-based methods, quality function deployment. Credit will not be granted for both ENGR 415 and ENGR 515. [3-0-0]** **ENGR 515 (3) Reliability Engineering and System Safety** **Reliability, maintainability and availability of systems, failures models and probabilistic risk analysis, failure mode effect analysis, fault tree analysis and event tree analysis, reliability and system improvement using design of experiments, Taguchi-based methods, quality function deployment. Credit will not be granted for both ENGR 515 and ENGR 415.**	**Draft Calendar URL:** N/A **Present Calendar Entry:** **Type of Action:** New courses. **Rationale:** ENGR 415 is a new technical elective course added to support the B.A.Sc. programs in Civil and Mechanical Engineering at the School of Engineering, Faculty of Applied Science. The course will be cross-listed with a new graduate course, ENGR 515, which will support the M.Eng., M.A.Sc., and Ph.D. programs in the School of Engineering. The undergraduate version of "Reliability Engineering and System Safety" does not require students to present a term paper.

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Faculty/School: Engineering **Department/Unit:** N/A **Faculty/School Approval Date:** 27/05/09 **Effective Session:** 2009W	**Date:** May 15, 2009 **Contact Person:** Dwayne Tannant **Phone:** 250.807.8067 **Email:** dwayne.tannant@ubc.ca
Proposed Calendar Entry: **ENGR 510 (3) Continuum Mechanics** **Continuum concept. Introduction to tensor algebra and calculus. Kinematics of deformation and motion, stress and strain principles, fundamental laws and equations of continuum media. Linear elasticity. Classical fluids.**	**Draft Calendar URL:** N/A **Present Calendar Entry:** **Type of Action:** New course. **Rationale:** The creation of a new graduate course will strengthen and diversify the course selection available for graduate students in the School of Engineering, Faculty of Applied Science. Both Civil and Mechanical Engineering graduate students will benefit from having this course.

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Proposed Calendar Entry: **ENGR 520 (3) Energy Transformations in the Environment** **Engineering applications of energy transformations in terrestrial systems. Earth thermodynamics, heat transfer, atmospheric circulation, thermal and wave energy in oceans, energy released via plate tectonic and volcanic activities.**	**Draft Calendar URL:** N/A **Present Calendar Entry:** **Type of Action:** New course. **Rationale:** The creation of a new graduate course will strengthen and diversify the course selection available for graduate students in the School of Engineering, Faculty of Applied Science.

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Category: 1

Faculty/School: Engineering **Department/Unit:** N/A **Faculty/School Approval Date:** 27/05/09 **Effective Session:** 2009W	**Date:** May 15, 2009 **Contact Person:** Dwayne Tannant **Phone:** 250.807.8067 **Email:** dwayne.tannant@ubc.ca
Proposed Calendar Entry: **ENGR 532 (3) Project Planning and Control** **Project planning and alignment, project control standards and deliverables, project selection process, project definition rating index, and risk management. Analytical heirachical processes, and Monte-Carlo simulation in scheduling and costing.**	**Draft Calendar URL:** N/A **Present Calendar Entry:** **Type of Action:** New course. **Rationale:** The creation of a new graduate course will strengthen and diversify the course selection available for graduate students in the School of Engineering, Faculty of Applied Science.

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Proposed Calendar Entry: **ENGR 533 (3) Construction Engineering and Management** **Management of the firm: strategic planning, marketing, organizational structure and behaviour. Project delivery systems: traditional, construction management, turnkey. Network planning methods. Activity planning, including construction methods selection. Estimating, bidding and bonding. Project control tools and procedures. Safety and quality control. Credit will not be granted for both ENGR 533 and ENGR 433.**	**Draft Calendar URL:** N/A **Present Calendar Entry:** **Type of Action:** New course. **Rationale:** The creation of a new graduate course will strengthen and diversify the course selection available for graduate students in the School of Engineering, Faculty of Applied Science. Note: this course will be cross-listed with ENGR 433: Construction Engineering and Management, which is a technical elective in the Civil Engineering program. The graduate version contains additional materials and design projects.

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Faculty/School: Engineering **Department/Unit:** N/A **Faculty/School Approval Date:** 10/07/09 **Effective Session:** 2009W	**Date:** July 10, 2009 **Contact Person:** Dwayne Tannant **Phone:** 250.807.8067 **Email:** dwayne.tannant@ubc.ca
Proposed Calendar Entry: **ENGR 534 (3) Road Safety Planning and Engineering** **Quantifying the link between built form (land use) and road safety levels; data extraction, stratification, and aggregation; micro and macro-level generalized linear regression modeling; and road safety applications.**	**Draft Calendar URL:** N/A **Present Calendar Entry:** **Type of Action:** New course. **Rationale:** The creation of a new graduate course will strengthen and diversify the course selection available for graduate students in the School of Engineering, Faculty of Applied Science.

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Category: 1

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Proposed Calendar Entry: **ENGR 536 (3) Sustainable Land Use and Transportation** **Principles, data, and economics pertaining to the planning, design, and management of sustainable community land use and transportation systems. Credit will not be granted for both ENGR 536 and ENGR 436.**	**Draft Calendar URL:** N/A **Present Calendar Entry:** **Type of Action:** New course. **Rationale:** The creation of a new graduate course will strengthen and diversify the course selection available for graduate students in the School of Engineering, Faculty of Applied Science. Note: this course will be cross-listed with ENGR 436: Transportation Planning and Design. The graduate version contains additional course materials and projects.

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Category: 1

Faculty/School: Engineering **Department/Unit:** N/A **Faculty/School Approval Date:** 27/05/09 **Effective Session:** 2009W	**Date:** May 15, 2009 **Contact Person:** Dwayne Tannant **Phone:** 250.807.8067 **Email:** dwayne.tannant@ubc.ca
Proposed Calendar Entry: **ENGR 538 (3) Rock Engineering** **Rock and rock mass properties and classifications. Structural mapping and stereonets. Rock and rock mass strength criteria. In situ stresses and excavation-induced stresses in rock masses. Rock slope stability analysis. Empirical, analytical and numerical analysis techniques for underground excavations. Rock support and stabilization. Credit will not be granted for both ENGR 538 and ENGR 438.** ENGR 438 (3) Rock Mechanics and Rock Engineering Mechanical properties of intact rock. Rock mass properties and classifications. Structural mapping and stereonets. Rock and rock mass strength criteria. Stresses in rock masses. Rock slope stability analysis. Empirical, analytical, and numerical analysis techniques for underground excavations. Rock support and stabilization. **Credit will not be granted for both ENGR 438 and ENGR 538.** [3-2*-0] *Prerequisite:* ENGR 340.	**Draft Calendar URL:** N/A **Present Calendar Entry:** **Type of Action:** New course. **Rationale:** The creation of a new graduate course will strengthen and diversify the course selection available for graduate students. Note: this course will be cross-listed with ENGR 438: Rock Mechanics and Rock Engineering, which is a technical elective in the Civil Engineering program. The graduate version contains additional materials and design projects using specialized geotechnical engineering software.

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Proposed Calendar Entry: **ENGR 539 (3) Terrain Modelling and Analysis** **Digital terrain models. Photogrammetry and lidar principles. Extraction of geometric and geological data from digital terrain and 3D photogrammetry models. Surface and underground engineering applications of terrain modelling.**	**Draft Calendar URL:** N/A **Present Calendar Entry:** **Type of Action:** New course. **Rationale:** Creation of a new graduate course will strengthen and diversify the course selection available for graduate students.

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Category: 1

Faculty/School: Engineering **Department/Unit:** N/A **Faculty/School Approval Date:** 27/05/09 **Effective Session:** 2009W	**Date:** May 15, 2009 **Contact Person:** Dwayne Tannant **Phone:** 250.807.8067 **Email:** dwayne.tannant@ubc.ca
Proposed Calendar Entry: **ENGR 541 (3) Water Resource Modelling** **Water resources modelling as related to civil and environmental engineering applications. Physical and mathematical modelling of hydraulic systems. Water quality in estuaries, lakes, rivers, and distribution systems. Sedimentation and erosion processes.**	**Draft Calendar URL:** N/A **Present Calendar Entry:** **Type of Action:** New course. **Rationale:** The creation of a new graduate course will strengthen and diversify the course selection available for graduate students in the School of Engineering, Faculty of Applied Science.

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Category: 1

Faculty/School: Engineering **Department/Unit:** N/A **Faculty/School Approval Date:** 27/05/09 **Effective Session:** 2009W	**Date:** May 15, 2009 **Contact Person:** Dwayne Tannant **Phone:** 250.807.8067 **Email:** dwayne.tannant@ubc.ca
Proposed Calendar Entry: **ENGR 546 (3) Biological Treatment Processes** **Theory and practice of biological wastewater treatment including aerobic and anaerobic processes in suspended and attached growth reactors, treatment models, advanced treatment, sludge handling, and treatment plant design.**	**Draft Calendar URL:** N/A **Present Calendar Entry:** **Type of Action:** New course. **Rationale:** The creation of a new graduate course will strengthen and diversify the course selection available for graduate students in the School of Engineering, Faculty of Applied Science.

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Category: 1

Faculty/School: Engineering **Department/Unit:** N/A **Faculty/School Approval Date:** 27/05/09 **Effective Session:** 2009W	**Date:** May 15, 2009 **Contact Person:** Dwayne Tannant **Phone:** 250.807.8067 **Email:** dwayne.tannant@ubc.ca
Proposed Calendar Entry: **ENGR 549 (3) Environmental Risk Analysis** **Hazards, toxicity, exposure, vulnerability, and risk. Contaminant fate and transport, exposure and toxicity assessment, risk characterization. Risk assessment frameworks, uncertainty and sensitivity analyses, risk management and multi-criteria decision-making, risk communication, and case studies.**	**Draft Calendar URL:** N/A **Present Calendar Entry:** **Type of Action:** New course. **Rationale:** The creation of a new graduate course will strengthen and diversify the course selection available for graduate students in the School of Engineering, Faculty of Applied Science.

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Faculty/School: Engineering **Department/Unit:** N/A **Faculty/School Approval Date:** 27/05/09 **Effective Session:** 2009W	**Date:** May 15, 2009 **Contact Person:** Dwayne Tannant **Phone:** 250.807.8067 **Email:** dwayne.tannant@ubc.ca
Proposed Calendar Entry: **ENGR 558 (3) Power Electronics** **Applications and roles of power electronics, power semiconductor devices, diode rectifiers, phase-controlled rectifiers, DC-DC converters, DC-AC converters, resonant converters. Examples drawn from residential and industrial applications. Credit will not be granted for both ENGR 558 and ENGR 458.**	**Draft Calendar URL:** N/A **Present Calendar Entry:** **Type of Action:** New course. **Rationale:** This new course is added to support the M.Eng., M.A.Sc., and Ph.D. programs in the School of Engineering, Faculty of Applied Science. Note: this course will be cross-listed with ENGR 458: Power Electronics, which is a technical elective in the Electrical Engineering program. The graduate version requires students to present a paper from the IEEE Transactions on Power Electronics, or a related conference.

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Proposed Calendar Entry: **ENGR 562 (3) Information Theory** **Entropy, relative entropy, mutual information; entropy rates of a stochastic process; optimal codes and Huffman codes; channel capacity; channel coding theorem; differential entropy, Gaussian channel; rate distortion theory.**	**Draft Calendar URL:** N/A **Present Calendar Entry:** **Type of Action:** New course. **Rationale:** This new course is added to support the M.Eng., M.A.Sc., and Ph.D. programs in the School of Engineering, Faculty of Applied Science.

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Category: 1

Faculty/School: Engineering **Department/Unit:** N/A **Faculty/School Approval Date:** 27/05/09 **Effective Session:** 2009W	**Date:** May 15, 2009 **Contact Person:** Dwayne Tannant **Phone:** 250.807.8067 **Email:** dwayne.tannant@ubc.ca
Proposed Calendar Entry: **ENGR 568 (3) Advanced Digital System Design** **Design flows, system-on-chip design practices, timing, clock domains, high-speed data links, intellectual property reuse and platform-based design, application-specific integrated circuit and field-programmable gate array technologies, and hardware/software co-design. Credit will not be granted for both ENGR 568 and ENGR 468.**	**Draft Calendar URL:** N/A **Present Calendar Entry:** **Type of Action:** New course. **Rationale:** This new course is added to support the M.Eng., M.A.Sc., and Ph.D. programs in the School of Engineering, Faculty of Applied Science. Note: this course will be cross-listed with ENGR 468: Advanced Digital System Design, which is a technical elective in the Electrical Engineering program. The graduate version requires students to present a paper from the IEEE Transactions, or a related conference.

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Faculty/School: Engineering **Department/Unit:** N/A **Faculty/School Approval Date:** 27/05/09 **Effective Session:** 2009W	**Date:** May 15, 2009 **Contact Person:** Dwayne Tannant **Phone:** 250.807.8067 **Email:** dwayne.tannant@ubc.ca
Proposed Calendar Entry: **ENGR 571 (3) Radio Frequency Integrated Circuits** **Introduction to radio frequency systems, RF transceiver architectures, analysis of gain, noise figure and linearity, monolithic active and passive components, low noise amplifiers, mixers, oscillators, and power amplifiers. Credit will not be granted for both ENGR 571 and ENGR 471.**	**Draft Calendar URL:** N/A **Present Calendar Entry:** **Type of Action:** New course. **Rationale:** This new course is added to support the M.Eng., M.A.Sc., and Ph.D. programs in the School of Engineering, Faculty of Applied Science. This course will be cross-listed with ENGR 471: Radio Frequency Integrated Circuits, an existing undergraduate course.

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Proposed Calendar Entry: **ENGR 572 (3) Photonic Engineering** **Integrated and fibre optic transmission structures, resonant and non-resonant optical sources and amplifiers, engineering and design issues for photonic receivers. Credit will not be granted for both ENGR 572 and ENGR 472.**	**Draft Calendar URL:** N/A **Present Calendar Entry:** **Type of Action:** New course. **Rationale:** This new course is added to support the M.Eng., M.A.Sc., and Ph.D. programs in the School of Engineering, Faculty of Applied Science. Note: this course will be cross-listed with ENGR 472: Fibre Optics and Photonics, which is a technical elective in the Electrical Engineering program. In addition to the extended assignments, graduate students will be assigned a term paper on a topic of their choosing that is relevant to the applied focus of the photonics material.

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Faculty/School: Engineering **Department/Unit:** N/A **Faculty/School Approval Date:** 27/05/09 **Effective Session:** 2009W	**Date:** May 19, 2009 **Contact Person:** Dwayne Tannant **Phone:** 250.807.8067 **Email:** dwayne.tannant@ubc.ca
Proposed Calendar Entry: **ENGR 584 (3) Heat and Mass Transfer** **Heat exchanger design, heat transfer with phase change, radiation heat transfer, steady and transient mass diffusion, convective mass transfer, simultaneous heat and mass transfer. Credit will not be granted for both ENGR 584 and ENGR 484.**	**Draft Calendar URL:** N/A **Present Calendar Entry:** **Type of Action:** New course. **Rationale:** This new course is added to support the M.Eng. M.A.Sc., and Ph.D. programs in the School of Engineering, Faculty of Applied Science. Note: this course will be cross-listed with ENGR 484: Heat and Mass Transfer, which is a technical elective in the Mechanical Engineering program. The graduate version contains additional materials and design projects.

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Proposed Calendar Entry: **ENGR 592 (3) Microfluidics** **Lab-on-a-chip technology; hydrodynamics of microfluidic systems; fabrication of microfluidic devices; microfluidics for external and internal flow control; diffusion, mixing, and separation in microsystems; digital microfluidics; electrowetting theory; lab-on-a-chip applications in engineering, biomedical science, and chemistry.**	**Draft Calendar URL:** N/A **Present Calendar Entry:** **Type of Action:** New course. **Rationale:** This new course is added to support the M.Eng. M.A.Sc., and Ph.D. programs in the School of Engineering, Faculty of Applied Science.

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Faculty/School: Engineering **Department/Unit:** N/A **Faculty/School Approval Date:** 27/05/09 **Effective Session:** 2009W	**Date:** May 15, 2009 **Contact Person:** Dwayne Tannant **Phone:** 250.807.8067 **Email:** dwayne.tannant@ubc.ca
Proposed Calendar Entry: **ENGR 593 (3) Computational Fluid Dynamics** **Partial differential equations applied to flow and heat mass transfer modeling. Discrete systems, grid generation, finite volume method for diffusion, convection-diffusion problems, solution algorithms, finite element formulation. Finite element method for diffusion, convection-diffusion problems, case studies.**	**Draft Calendar URL:** N/A **Present Calendar Entry:** **Type of Action:** New course. **Rationale:** This new course is added to support the M.Eng., M.A.Sc., and Ph.D. programs in the School of Engineering, Faculty of Applied Science.