

THE UNIVERSITY OF BRITISH COLUMBIA



1 December 2010

CURRICULUM & ADMISSIONS COMMITTEES
Vancouver Senate
2016 - 1874 East Mall
Vancouver, B.C. Canada V6T 1Z1

To: Vancouver Senate

From: Senate Curriculum & Admission Committees

Re: New Program Proposals for a Master of Engineering in Engineering and Public Policy, and for New Combined Programs of Doctor of Philosophy in Craniofacial Science with Diplomas in Endodontics and Periodontics

Master of Engineering in Engineering and Public Policy

Combined Doctor of Philosophy in Craniofacial Science / Diploma in Endodontics or Periodontics

The Senate Curriculum and Admissions Committees have reviewed the material forwarded to it by the Faculty of Applied Science and the Faculty of Graduate Studies (Faculty of Dentistry), and are pleased to recommend the following:

That Senate approve the new Master of Engineering in Engineering and Public policy and its associated courses; and

That Senate approve the new Combined Doctor of Philosophy in Craniofacial Science / Diploma in Endodontics, and Combined Doctor of Philosophy in Craniofacial Science / Diploma in Periodontics programs.

Respectfully Submitted,

Dr. David W. Fielding, Chair, Senate Admissions Committee
Dr. Peter Marshall, Chair, Senate Curriculum Committee

Master of Engineering in Engineering and Public Policy

Faculty of Applied Science

GRADUATE PROGRAM PROPOSAL

Faculty of Applied Science - M. Eng. Program Proposal

GENERAL INFORMATION

Title: M. Eng. in Engineering and Public Policy

Unit offering the programs: Faculty of Applied Science.

Anticipated Date of Implementation: 2011-12 Academic Year

I. NEED FOR THE PROGRAM

Societies are facing great challenges in pursuing sustainable development, ranging from climate change, degradation of soil, air and water, social disintegration and threats to security, emerging diseases, and persistence of extreme poverty. The past decade has also seen the rise of numerous new technologies and applications that have the potential to help meet these challenges. Traditionally, engineers have focused on making engineering decisions aimed at choosing the “best” technology based primarily on techno-economic considerations. Sustainability and broader and global social implications of new technologies and products were generally considered after the fact not as part of the original design process. Engineers are thus frequently confronted with challenges in seeking engineering solutions to large-scale social and environmental problems involving multifaceted interactions among people, society, social movements and science and technologies.

A 2004 US National Academy of Engineering (NAE) study showed the need for increasing engineering leadership in policy formation in the 21st century, due to the growing role of technology in society and the influences of policies on the development and deployment of new technologies. As a result, engineers do not only need to understand public policy and its impact on their technology work but also need to play a strong role in informing, creating and administering public policy.

In recent years, there has been increasing interest among engineering students in applying engineering skills to address complex real-world problems via involvement in activities such as Engineers Without Borders and campus-wide sustainability activities. For example, a recent cohort of the students in the professional Master of Engineering in Clean Energy Engineering program administered by the Faculty of Applied Science showed tremendous interest in the public policy process related to clean and renewable energy policy development in the Province and Canada.

A new breed of engineers is needed to enable the development of technology and applications that will help maximize societal benefits by taking into consideration of social, legal, ethical, political and economic factors influencing the choice and deployment of technologies. A Master of Engineering in Engineering and Public Policy professional degree will attract scientific and engineering professionals who are concerned with the interaction of their technical fields with the society and have a strong interest in topics such as energy and environment, health and medicine, information and communications, and emerging nano and biotechnologies.

There are job opportunities for students trained from this ENPP specialization in both the public and private sectors, as analysts and decision makers for government agencies, organizations of scientists and engineers, advocacy groups, think tanks and other organizations concerned with aspects of national science and technology policy, as science reporters and writers, as well as in managerial and executive positions in science and technology-oriented businesses which are concerned with government support of R&D, government regulation which is based on scientific or technological knowledge. Engineers have already been filling policy jobs in companies and institutions, such as regional and municipal governments, crown corporations such as ICBC and BC Hydro, and non-government organizations such as Suzuki Foundation, but usually without the benefit of any explicit policy training. UBC is a leading Canadian university, and also has a global reputation especially in Asia and Pacific region. Such a program will strengthen UBC's reputation in interdisciplinary education and research, but also will attract international engineering graduates from Asia countries like China and India, where engineers are highly respected and traditionally occupy senior government and corporate positions.

The first engineering and public policy program was introduced at Carnegie Mellon University over 30 years ago. Similar engineering/technology and public policy programs have been established in schools such as Massachusetts Institute of Technology, University of Maryland, Harvard and Stanford, to list just a few. In Canada, a Masters of Engineering and Public Policy program is run by the Dofasco Centre for Engineering and Public Policy at the Faculty of Engineering, McMaster University, while a research-oriented graduate program has been offered by the Centre for Policy Research on Science and Technology in the Faculty of Applied Science at Simon Fraser University.

The Faculty of Applied Science has been successfully managing a professional Master of Engineering program, and has recently piloted a multidisciplinary program in clean energy engineering in 2009, with a required component in energy policy. To assess the feasibility of creating an ENPP specialization at UBC, a working group was formed in summer 2009 consulting with the members listed in the table below. The group identified many resources across the UBC campus in support of such a program, e.g. Faculty of Arts, College for Inter-disciplinary Studies and its associated units (Liu Institute for Global Issues, the Institute for Resources, Environment and Sustainability, School of Environmental Health), Faculty of Law, Faculty of Land and Food Systems and the Sauder School of Business. The combination of engineering students' interest in training in public policy and the expertise and teaching-research interests of several faculty members in engineering and public policy, coupled with a range of existing courses, and a perceived need for a new professional M.Eng. specialization in this area, have led to this proposal.

While the six new core courses to be developed for this ENPP specialization (ENPP 501, 502, 503, 504, 596 and 597) are specifically tailored for engineering students, they are expected to appeal to research (M.A.Sc. and Ph.D.) students in the Faculty of Applied Science, as well as to students in other similar programs. Once successfully implemented, these courses can also be introduced to select senior engineering undergraduates as electives. The project course (ENPP 596) will challenge the M.Eng. students to apply their skills in a practical engineering and public policy context. As the program becomes more established, it will lead to closer collaboration with related programs of other faculties at UBC Vancouver.

ENPP working committee members:

Xiaotao (Tony) Bi, Chemical and Biological Engineering, lead coordinator
Jonathan Fannin, Civil Engineering
Eric Hall, Civil Engineering
Greg Lawrence, Civil Engineering
Steven Rogak, Mechanical Engineering
Tarek Sayed, Civil Engineering
Dirk van Zyl, Mining Engineering
Michael Brauer, Bridge Program/School of Environmental Health
Peter Dauvergne, Department of Political Science
Julian Dierkes, Institute of Asian Research
Simon Donner, Department of Anthropology and sociology
Hadi Dowlatabadi, Institute for Resources, Environment and Sustainability (IRES)
Paul Evans, Liu Institute for Global Issues
Lawrence Frank, School of Community and Regional Planning
Sumeet Gulati, Department of Resource Economics
Kathryn Harrison, Department of Political Science
George Hoberg, Department of Forest Resources Management
Shi-Ling Hsu, Faculty of Law
Milind Kandlikar, Liu Institute for Global Issues
Eric Mazzi, Clean Energy Research Centre
Tim McDaniels, Institute for Resources, Environment and Sustainability (IRES)
Karin Mickelson, Faculty of Law
Maged Senbel, School of Community and Regional Planning (SCARP)
Jerry Spiegel, School of Population and Public Health
James Tansey, Sauder School of Business
Hisham Zerriffi, Liu Institute for Global Issues

PROGRAM SPECIFICATIONS

Program Overview:

The Master of Engineering in Engineering and Public Policy will be offered to qualified students grounded in all engineering fields. The program provides a broad overview of the interactions between technologies and public policy on various engineering fields, such as energy, environment, health and biotechnologies, and information technologies. Projects will address practical issues on the development of public policies and its implication to the development, selection and deployment various technologies in specific fields.

Admission Requirements:

Admission to the program will be as specified for other Master of Engineering programs in the Faculty of Applied Science (see IV Calendar Statement). Applicants must hold a four-year Bachelor's degree from a recognized institution in engineering and is recommended that they have a minimum of three years of relevant professional experience. Admission requirements also include successful completion of a minimum of a 3-credit introductory course in microeconomics (equivalent to ECON 101) and a minimum of a 3-credit elementary statistics course (equivalent to STAT 251).

Applicants without adequate engineering background/training may be required to take remedial courses at the undergraduate level in addition to the full program.

Program Requirements:

The program requires completion of at least 30 credits, of which at least 24 must be at the 500-level. These must include the following 19-credits core courses, unique to the program:

- ENPP 501 (3) Law, Public Policy and Governance
- ENPP 502 (3) Public Policy Analysis –Tools and Methods
- ENPP 503 (3) Public Policy Case Studies
- ENPP 504 (3) Applied Economics in Public Policy
- ENPP 596 (6) M.Eng. Project in Engineering and Public Policy
- ENPP 597 (1) Seminar

A minimum of 11 credits of elective courses will be drawn from a list of approved courses covering other policy issues (e.g., energy and environment, health, climate change, information technology, intellectual property, emerging bio and nano-technologies), analysis approaches, and specific technologies (e.g., energy engineering, power generation, mobile computing, green building, environmentally-friendly industrial processing). Among the 11 credits of elective courses, no more than 6 credits can be taken from technologically focused courses in the fields of engineering or technologies.

The following existing courses are likely to be included in the list of approved elective courses. Where applicable, students must meet the pre-requisites for these courses or have permission of the instructor. Student registration into each course will be subject to space availability.

Policies, Ethics and Laws

AGEC 520 (3) **Topics in Land and Forest Resource Economics**

APSC 512 (3) **Intellectual Property Management and Technology Commercialization**

APSC 540 (3) **Business Decisions for Engineering Ventures**

APSC 541 (3) **Technology Entrepreneurship for Engineers**

CIVL 402 (2) **Engineering Law and Contracts in Civil Engineering**

CIVL 522 (3) **Project and Construction Economics**

COMM 495 (3) **Business and Sustainable Development**

CONS 425 (3) **Sustainable Energy: Policy and Governance**

ECON 339 (3) **Economics of Technological Change**

ECON 370 (3) **Benefit-Cost Analysis and the Economics of Project Evaluation**

ECON 371 (3) **Economics of the Environment**

ECON 471 (3) **Economics of Nonrenewable Resources*** with appropriate economics pre-requisites

ECON 472 (3) **Economics of Renewable Resources*** with appropriate economics pre-requisites

FRST 523 (3) **Forest and Environmental Policy**

IHHS 401 (3) **Health Care Ethics**

LAW 386C (3) **Sustainable Development Law**

LAW 387C (3) **Environmental Law**

LAW 392B (3) **Natural Resources Law**

LAW 394 (2) **Mining Law**

LIBR 561 (3) **Information Policy**

LIBR 563 (3) Information Ethics
PLAN 506 (3) The Legal Context of Planning
PLAN 548T/RMES 500J (3) Decision Insights for Planning and Policy Analysis
POLI 350A (3) Public Policy
POLI 351 (3) Environmental Politics and Policy
POLI 352A (3) Comparative Politics of Public Policy
PSYC 507 (3) Cultural Psychology
RMES 500G (3) Climate Change: Global Challenges and Local Responses
RMES 500Q (3) Gender, Space, Inequality and Environment (Equivalency: WMST 503D)
RMES 500T (3) Biofuels for Transport
RMES 500U (3) Law and Climate Change
RMES 520 (3) Climate Change in the 21st Century
RMES 530 (3) Knowledge, Policy and Values in Risk and Resource Management
RMES 542 (3) Integrated Assessment
SPHA 510 (1.5) Canadian Health Policy and the Healthcare System
SPHA 562 (1.5) Health Care Law
SPPH 542 (3) Seminar: Issues in Canadian Health Policy

Energy and Clean Technologies

CEEN 501 (3) Thermal Energy Systems
CEEN 502 (3) Alternative Energy Technologies
CEEN 523 (3) Energy and the Environment
CHBE 484 (3) Green Engineering Principles and Applications for Process Industries
CHBE 577 (3) Electrochemical Science, Engineering and Technology
CHBE 583 (3) Energy Engineering
EECE 492 (3) Distributed Energy Systems Management
EECE 553 (3) Advanced Power Systems Analysis
EECE 561 (3) Alternative Energy Sources
EOSC 432 (3) Fossil Fuels
MECH 470 (3) Energy Conversion Systems
MECH 545 (3) Fuel Cell Systems
MECH 578 (3) Internal Combustion Engines
MINE 584 (3) Energy from the Earth: Renewable Versus Conventional

Biotech, Nanotech and IT

EECE 412 (3) Introduction to Computer Security
EECE 432 (3) Biological Micro-Electro-Mechanical Systems
EECE 513 (3) Fault Tolerant Digital Systems
EECE 532 (3) Biomedical Microdevices
EECE 573 (3) Micro and Nano Fabrication Technologies
LIBR 561 (3) Information Policy
LIBR 563 (3) Information Ethics

Health and Environment

ARCH 513 (3) Environmental Systems and Controls 1
CHBE 479 (3) Chemical Engineering Aspects of Occupational Health and Safety
CHBE 575 (3) Air Pollution Control

CIVL 405 (3) **Environmental Impact Studies**
CIVL 415 (3) **Water Resource Engineering**
CIVL 557 (2) **Toxic and Hazardous Waste Treatment and Disposal**
GEOG 319 (3) **Environmental Impact Assessment**
GEOG 410 (3) **Environment and Society**
GEOG 517 (3) **Environmental Sustainability**
MINE 574 (3) **Mining Environment Case Studies**
OCCH 501 (3) **Principles of Occupational and Environmental Hygiene**
OCCH 510 (3) **Topics in Environmental Health**
PLAN 514 (3) **Impact Analysis for Planning**
PLAN 580 (3) **Urban Transportation Planning**
PLAN 581 (3) **Urban Infrastructure Planning and Development**
PLAN 599 (3) **Environmental Policy Analysis** (Equivalency: RMES 550)
RMES 501 (3) **Perspectives on Resources and Environment**
SPPH 502 (3) **Epidemiological Methods 1**
SPPH 532B (3) **Environmental Health Risk Assessment and Communication**
WOOD 491 (3) **Environmental Facilities Design**

Contact Information:

Faculty of Applied Science
Deb Feduik, Manager, MEng & Graduate Program
5000 - 2332 Main Mall, Vancouver, BC V6T 1Z4
Email: deb.feduik@ubc.ca 604-822-8386

II. CALENDAR STATEMENT

Proposed Calendar Entry:

URL: <http://www.students.ubc.ca/calendar/index.cfm?tree=12,195,838,0>

The Master of Engineering (M.Eng.) program is suited to students who wish to pursue their engineering education in a preferred area of specialization beyond the undergraduate level, but who do not wish to pursue a thesis research program. Applicants who are considering taking a Doctor of Philosophy (Ph.D.) in the future should apply for admission to the Master of Applied Science (M.A.Sc.) through the Faculty of Graduate Studies.

Typical completion time for full-time Master of Engineering students is 12-16 months.

The Faculty of Applied Science administers the Master of Engineering program. Please visit the [Program](#) for a full listing program policies and procedures.

Admission Requirements

Note: Master of Engineering degrees alone do not form an acceptable basis for application to associations of professional engineers in Canada.

Applicants to the Master of Engineering program in all specializations except Engineering and Public Policy must hold a credential deemed academically equivalent to a four-year bachelor's degree from UBC, in engineering or a related discipline.

Applicants to the Engineering and Public Policy specialization must hold a credential deemed academically equivalent to a four-year bachelor's degree from UBC in engineering. Admission requirements also include successful completion of a minimum of a 3-credit introductory course in microeconomics (equivalent to ECON 101) and a minimum of a 3-credit elementary statistics course (equivalent to STAT 251).

The minimum admission requirement for students with degrees from North American institutions is an average of 76% (UBC-equivalency), calculated from senior-level coursework. An applicant with an average less than 76% may be admitted if they have achieved 80% or higher in at least 12 credits (UBC equivalency) of senior-level coursework, and at least 74% in the remaining senior-level coursework, in the prospective area of study.

The minimum admission requirement for applicants with degrees from outside North America is an overall average of 76% (UBC-equivalency).

For all specializations relevant professional experience is considered an asset.

Applicants holding a four-year bachelor's degree who do not meet the admissions minimum, but who have had sufficient formal training and relevant professional experience to offset the academic deficiency, may be granted admission on the recommendation of the graduate advisor in the area of specialization and the approval of the Master of Engineering Program Office.

For the Clean Energy Engineering specialization, applicants must have taken at least 3 credits (UBC-equivalency) of thermodynamics at the second- or third-year level.

Applicants from a university outside Canada in which English is not the primary language of instruction must present evidence of competency prior to being extended an offer of admission. Acceptable English language proficiency tests for applicants to graduate studies include the TOEFL, IELTS, and MELAB. The required minimum is determined by the Graduate program office in the area of specialization, but must be at or above the university minimum for graduate-level study.

Students interested in applying to the Master of Engineering program must contact the individual graduate program office for their area of specialization. Students who are planning on taking the program on a part-time basis must obtain approval from their graduate program advisor prior to the commencement of the program. Lists of the required application documents are available on the respective websites. Each graduate program office in an area of specialization is responsible for collection and assessment of application documents. The Master of Engineering Program Office issues the offer of admission letter.

Transfer Credit

Courses taken as an Access Studies or non-degree student may be approved for transfer toward a graduate program with the permission of the graduate program and the Master of Engineering Program Office.

Consistent with standard transfer credit regulations, students are limited to transferring a maximum of 12 credits or up to 40% of the program credit requirements, whichever is more, toward their master's program. No more than 6 credits of transfer credit may be at the undergraduate level (300-/400-level). In order to be eligible for transfer, the course(s):

- must be completed with a minimum "B" standing (UBC equivalent)
- must not have been counted toward the completion of another degree or program
- must have been completed no more than five years prior to the time the student commences the degree program
- must not be used as a basis for admission to the graduate program

Financial Assistance

Financial assistance is generally not available to students in the Master of Engineering program.

Program Requirements

The program requires completion of at least 30 credits. In some program areas, minimum requirements may be higher than 30 credits:

- At least 24 credits must be at the 500-level.
- A minimum of 18 of the 24 credits must be in the program area at the 500-level, including a project, if required, up to a maximum 6 credits.
- A maximum of 6 credits may be taken at the 300-/400-level.
- A maximum of 6 credits of 500-level directed studies courses may be counted toward the program requirements.

Students should consult each program area website for more information. Each student's coursework must be approved by the graduate program office for that area.

Specializations

[Biomedical Engineering](#)
[Chemical and Biological Engineering](#)
[Civil Engineering](#)
[Clean Energy Engineering](#)
[Electrical and Computer Engineering](#)
[Engineering and Public Policy](#)
[Geological Engineering](#)
[Materials Engineering](#)
[Mechanical Engineering](#)
[Mechatronics Design](#)
[Mining Engineering](#)

Engineering Management

The [Engineering Management](#) sub-specialization requires 12 credits of courses in management-related subjects, with a minimum of 6 credits of core courses and a maximum of 6 credits of elective courses. The chosen program area requirements must also be satisfied.

Contact Information

Master of Engineering Program Office

5000-2332 Main Mall

Vancouver, BC V6T 1Z4

Tel: 604.822.8386

Fax: 604.822.7006

Email: gradprog@apsc.ubc.ca

Web: www.engineering.ubc.ca/prospective_students/graduate/index.php

Deb Feduik, Coordinator

III. PRESENT and PROJECTED RESOURCES

i. Budget

The new courses in the program will be funded initially by a special allocation from the Faculty of Applied Science. The fees are being set at a level necessary to allow the program to be financially self-sufficient. Government sponsorship will be sought to provide additional support, allowing the program to be strengthened further. Elective courses will largely be existing courses offered by the various departments in Applied Science and in other faculties such as Commerce, Art, Forestry, CFIS, Law, and Science. (see Appendix A). After deducting the cost of administering the program, revenues will be distributed amongst faculties based on an agreed upon distribution commensurate with the teaching provided to the program.

Administration. A program coordinator will be appointed to run the new program under the APSC Dean's Office Master of Engineering Program jurisdiction. A program committee will be established reflecting the faculties participating in the program. We will work to secure additional faculty, jointly appointed with other relevant units, as the program grows and as UBC puts increased emphasis on policy educational and research initiatives.

New faculty member appointments. So far, at least 20 faculty members across the campus have contributed to the ENPP committee, and will be potentially appointed as the faculty associates of the new ENPP specialization. A significant number has educational background in both engineering and public policy and have shown very strong interest in active participation in the program design and delivery. Additional faculty members who are interested in contributing to this program will be added as the program is established.

Development and delivery of new courses. Six new courses need to be established specifically for this specialization. The courses will be developed and presented in partnership with participating faculties. Teaching cost will be guaranteed by APSC and recuperated from program revenues.

Increased enrollments in existing courses. It is expected that enrollments in some existing courses outside the Faculty of Applied Science, most notably in the Faculty of Arts and College for

Interdisciplinary Studies, may be increased modestly through students enrolled in this Program taking them as electives. It is expected that the new budget model would account for the cost of such increases. It is proposed that enrollment changes be monitored for the first two years of the program, and that any unresolved budget issues arising from increased enrollment in elective courses be discussed at that time. Registration in any of the elective courses remains subject to space availability and approval of the faculty offering the course.

Tuition Fees. Tuition fees assessed for international and domestic status and are within the range of other professional Master's programs at the University of British Columbia. The domestic tuition will be \$15,239 per year for full-time study and \$8,980.37 per year for part-time study. The international tuition will be \$25,429 per year for full-time study and \$14,985.32 per year for part-time study. These fees are equivalent to that of the Master of Engineering in Clean Energy Engineering program. We will work to secure work terms, to be either paid by the employer or sponsors of the program. These work terms will reduce the net fees for the most qualified students. Tuition flowback and application fees will be used for funding additional resources. This is the model which has been successfully used for the Master of Engineering in Clean Energy Engineering program. A comparison of similar professional programs shows that the M.Eng. in Engineering and Public Policy (ENPP) will be highly competitive with programs in North America and world-wide. (See Appendix B – Full-time Tuition Comparison).

ii Space

Desk space will be provided for students within the newly established M.Eng. program space located in 2360 East Mall.

iii. Library

There are four new lecture courses associated with the ENPP specialization. However, these courses fall within the expertise of existing professors and as such have general resources in the Library. The Library in their consultations support the courses offered in this new program with the Library materials it currently offers. (See Appendix F).

IV. CONSULTATION WITH OTHER DEPARTMENTS, PUBLIC INSTITUTIONS, AND PROFESSIONAL ORGANIZATIONS

Consultation requests were sent to the following (see Appendix C):

Faculty of Applied Science
Clean Energy Research Centre
Department of Chemical and Biological Engineering
Department of Civil Engineering
Department of Electrical and Computer Engineering
Department of Materials Engineering
Department of Mechanical Engineering
Department of Mining Engineering
School of Architecture and Landscape Architecture
College for Interdisciplinary Studies
Institute of Asian Research

Institute for Resources, Environment and Sustainability
Liu Institute for Global Issues
School of Community and Regional Planning
School of Environmental Health
Faculty of Arts
Department of Economics
Department of Political Sciences
Faculty of Forestry
Faculty of Land and Food Systems
Global Resource Systems
Faculty of Law
Faculty of Medicine
School of Population and Public Health
Faculty of Science
Faculty of Commerce
Sauder School of Business
Province of British Columbia
BC Ministry of Energy, Mines & Petroleum Resources
Bioenergy & Renewables Branch
BC Hydro - Power Smart Program, Codes & Standards
University of Victoria
Pacific Institute for Climate Solutions
Province of Alberta
Alberta Research Council, Foresight

V. NEW COURSES

(see Appendix D - New Code Rationale, Appendix E I ,ii ,iii – Calendar Descriptions, , Course Supporting Materials)

ENPP 501 (3) Law, Public Policy and Governance

Policy process and parliamentary government, federalism and multilevel governance, bureaucracy and public service, charter and rights-based litigation, interest groups and collective action, mechanisms for interest group consultation and input, policy instruments, environmental law, international law and climate change.

ENPP 502 (3) Public Policy Analysis –Tools and Methods

Epistemology; policy analysis basics: policy paradigms based on utility maximization; equity and rights based frameworks; tools, methods and applications of quantitative policy analysis: cost-benefit approaches, risk analysis, decision analysis, values, tradeoffs and multi-attribute utility theory, modeling uncertainty; critiques and limitations of tools: psychology, perception and decision making, ethical challenges. *Pre-requisite:* ENPP 501

ENPP 503 (3) Public Policy Case Studies

Policy analysis case studies in various technology areas including: energy & environment, climate change and adaptation, information technology, intellectual property law, health and medicine, biotechnology, nanotechnology, infrastructure and material supply. Emphasis will be on policy dimensions of technology development and commercialization, and the interactions between

policy process and technology selection and deployment. *Pre-requisite:* ENPP 501 and *Co-requisite:* ENPP 502.

ENPP 504 (3) Applied Economics in Public Policy

Applied multivariate statistics: factor analysis, multiple regression, non-linear regression, multivariate ANOVA, spatial econometric modeling. Applied economics for public policy: market concentration, externalities and imperfect information, tools to restrict monopolies and other restrictive industrial policies, tools to treat market failures due to externalities, quotas, standards, tradable permits, taxes and subsidies, unbiased labelling and government provision, cost effectiveness analysis, cost-benefit analysis, economic impact analysis, life cycle cost analysis.

ENPP 596 (6) M.Eng. Project in Engineering and Public Policy

Carry out a project and prepare an engineering report under the supervision of faculty members and/or researchers/scientists from project sponsoring organizations.

ENPP 597 (1) Seminar

Presentations and discussions of current topics in the area of engineering and public policy.

VI. APPENDICES

Appendix A – Budget Impact of Curriculum Proposals – not included

Appendix B – Tuition Comparison – Professional Degrees – not included

Appendix C – Curriculum Consultations – Report, Request Responses, APSC Replies – not included

Appendix D – New Course Code Rationale

Appendix E – i Calendar Entry – Master of Engineering

ii Calendar Entry – New Courses

iii New Course Supporting Materials – not included

Appendix F – Library Consultations – not included

Appendix D - New Course Code Rationale

To: Senate Curriculum Committee
Senate Curriculum Sub-Committee Graduate

Re: new Master of Engineering in Engineering and Public Policy (ENPP)

The proposed new Master of Engineering (MEng) specialization in Engineering and Public Policy is designed to be a collaborative offering between the Faculty of Applied Science and a number of related units at UBC (as listed in the proposal). It will be administered by the Faculty of Applied Science through the Master of Engineering Program Office.

We understand that a request for a new course code cannot be made purely for administrative reasons and also is not based on the potential number of students enrolled in the program or any one course. There is no minimum number of courses that must be offered to qualify for a new course code. To use an existing departmental course code would imply to both students and faculty that the program is more closely affiliated with that department than the others, reducing the likelihood of attracting students from other disciplines, and having a negative impact on the buy-in from faculty from the other engineering departments. Providing a unique identity will also be helpful for the faculty from outside the Faculty of Applied Science that are involved in the delivery of courses so that they can accurately list these courses as part of their teaching loads.

The discontinued Master of Engineering program in Pulp and Paper Engineering carried its own code (PPEN). The Master of Engineering in Clean Energy Engineering was approved a new course code CEEN in 2009. There is continued support in the Faculty of Applied Science for new programs to create their own codes.

UBC Senate has approved new course codes for similar areas and professional programs. The Faculty of Commerce, College of Interdisciplinary Studies, Department of Computer Science and several specializations such as Cell & Developmental Biology and Oncology have multiple course codes.

The code **ENPP** will be recognizable nationally and internationally with other Engineering and Public Policy (EPP) programs.

Appendix E - i Calendar Entry – Master of Engineering

Category: (1)

<p>Faculty: Applied Science Department: Dean's Office Faculty Approval Date: November 3, 2010 Effective Session: 2011 Winter (Term 1) Year for Change: 2011</p>	<p>Date: October 25 2010 Contact Person: Deb Feduik Phone: 604.822.8386 Email: deb.feduik@ubc.ca</p>
<p>Proposed Calendar Entry: URL: http://www.students.ubc.ca/calendar/index.cfm?tree=12,195,838,0</p> <p>The Master of Engineering (M.Eng.) program is suited to students who wish to pursue their engineering education in a preferred area of specialization beyond the undergraduate level, but who do not wish to pursue a thesis research program. Applicants who are considering taking a Doctor of Philosophy (Ph.D.) in the future should apply for admission to the Master of Applied Science (M.A.Sc.) through the Faculty of Graduate Studies.</p> <p>Typical completion time for full-time Master of Engineering students is 12-16 months.</p> <p>The Faculty of Applied Science administers the Master of Engineering program. Please visit the Program for a full listing program policies and procedures.</p> <p>Admission Requirements</p> <p>Note: Master of Engineering degrees alone do not form an acceptable basis for application to associations of professional engineers in Canada.</p> <p>Applicants to the Master of Engineering program in all specializations except Engineering and Public Policy must hold a credential deemed academically equivalent to a four-year bachelor's degree from UBC, in engineering or a related discipline.</p> <p>Applicants to the Engineering and Public Policy specialization must hold a credential deemed academically equivalent to a four-year bachelor's degree from UBC in engineering. Admission requirements also include successful completion of a minimum of a 3-credit introductory course in microeconomics (equivalent to ECON 101) and a minimum of a 3-credit elementary statistics course (equivalent to STAT 251).</p>	<p>Present Calendar Entry: URL: http://www.students.ubc.ca/calendar/index.cfm?tree=12,195,838,0</p> <p>The Master of Engineering (M.Eng.) program is suited to students who wish to pursue their engineering education in a preferred area of specialization beyond the undergraduate level, but who do not wish to pursue a thesis research program. Applicants who are considering taking a Doctor of Philosophy (Ph.D.) in the future should apply for admission to the Master of Applied Science (M.A.Sc.) through the Faculty of Graduate Studies.</p> <p>Typical completion time for full-time Master of Engineering students is 12-16 months.</p> <p>The Faculty of Applied Science administers the Master of Engineering program. Please visit the Program for a full listing program policies and procedures.</p> <p>Admission Requirements</p> <p>Note: Master of Engineering degrees alone do not form an acceptable basis for application to associations of professional engineers in Canada.</p> <p>Applicants to the Master of Engineering program must hold a four-year bachelor's degree from a recognized institution, in engineering or a related discipline.</p> <p>The minimum admission requirement for students with degrees from North American institutions is an average of 76%, calculated from senior-level coursework. An applicant with an average less than 76% may be admitted if they have achieved 80% or higher in a least 12 credits (UBC equivalency) of senior-level coursework, and at least 74% in the remaining senior-level coursework, in the prospective area of study.</p> <p>The minimum admission requirement for applicants with degrees from outside North America is an</p>

<p>The minimum admission requirement for students with degrees from North American institutions is an average of 76% (UBC-equivalency), calculated from senior-level coursework. An applicant with an average less than 76% may be admitted if they have achieved 80% or higher in at least 12 credits (UBC equivalency) of senior-level coursework, and at least 74% in the remaining senior-level coursework, in the prospective area of study.</p> <p>The minimum admission requirement for applicants with degrees from outside North America is an overall average of 76% (UBC-equivalency).</p> <p>For all specializations relevant professional experience is considered an asset.</p> <p>Applicants holding a four-year bachelor's degree who do not meet the admissions minimum, but who have had sufficient formal training and relevant professional experience to offset the academic deficiency, may be granted admission on the recommendation of the graduate advisor in the area of specialization and the approval of the Master of Engineering Program Office.</p> <p>For the Clean Energy Engineering specialization, applicants must have taken at least 3 credits (UBC-equivalency) of thermodynamics at the second- or third-year level.</p> <p>Applicants from a university outside Canada in which English is not the primary language of instruction must present evidence of competency prior to being extended an offer of admission. Acceptable English language proficiency tests for applicants to graduate studies include the TOEFL, IELTS, and MELAB. The required minimum is determined by the Graduate program office in the area of specialization, but must be at or above the university minimum for graduate-level study.</p> <p>Students interested in applying to the Master of Engineering program must contact the individual graduate program office for their area of specialization. Students who are planning on taking the program on a part-time basis must obtain approval from their graduate program advisor prior to the commencement of the program. Lists of the required application documents are available on the respective websites. Each graduate program office in an area of specialization is responsible for collection</p>	<p>overall average of 76%.</p> <p>Applicants holding a four-year bachelor's degree who do not meet the admissions minimum, but who have had sufficient formal training and relevant professional experience to offset the academic deficiency, may be granted admission on the recommendation of the graduate advisor in the area of specialization and the approval of the Master of Engineering Program Office.</p> <p>For the Clean Energy Engineering specialization, applicants must have taken at least 3 credits (UBC-equivalency) of thermodynamics at the second- or third-year level.</p> <p>Applicants from a university outside Canada in which English is not the primary language of instruction must present evidence of competency prior to being extended an offer of admission. Acceptable English language proficiency tests for applicants to graduate studies include the TOEFL, IELTS, and MELAB. The required minimum is determined by the Graduate program office in the area of specialization, but must be at or above the university minimum for graduate-level study.</p> <p>Students interested in applying to the Master of Engineering program must contact the individual graduate program office for their area of specialization. Students who are planning on taking the program on a part-time basis must obtain approval from their graduate program advisor prior to the commencement of the program. Lists of the required application documents are available on the respective websites. Each graduate program office in an area of specialization is responsible for collection and assessment of application documents. The Master of Engineering Program Office issues the offer of admission letter.</p> <p>Financial assistance is generally not available to students in the Master of Engineering program.</p> <p>Program Requirements</p> <p>The program requires completion of at least 30 credits. In some program areas, minimum requirements may be higher than 30 credits:</p> <ul style="list-style-type: none"> • At least 24 credits must be at the 500-level. • A minimum of 18 of the 24 credits must be in the program area at the 500-level, including a project, if required, up to a maximum 6 credits.
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and assessment of application documents. The Master of Engineering Program Office issues the offer of admission letter.

Transfer Credit

Courses taken as an Access Studies or non-degree student may be approved for transfer toward a graduate program with the permission of the graduate program and the Master of Engineering Program Office.

Consistent with standard transfer credit regulations, students are limited to transferring a maximum of 12 credits or up to 40% of the program credit requirements, whichever is more, toward their master's program. No more than 6 credits of transfer credit may be at the undergraduate level (300-/400-level). In order to be eligible for transfer, the course(s):

- must be completed with a minimum "B" standing (UBC equivalent)
- must not have been counted toward the completion of another degree or program
- must have been completed no more than five years prior to the time the student commences the degree program
- must not be used as a basis for admission to the graduate program

Financial Assistance

Financial assistance is generally not available to students in the Master of Engineering program.

Program Requirements

The program requires completion of at least 30 credits. In some program areas, minimum requirements may be higher than 30 credits:

- At least 24 credits must be at the 500-level.
- A minimum of 18 of the 24 credits must be in the program area at the 500-level, including a project, if required, up to a maximum 6 credits.
- A maximum of 6 credits may be taken at the 300-/400-level.
- A maximum of 6 credits of 500-level directed studies courses may be counted toward the program requirements.

- A maximum of 6 credits may be taken at the 300-/400-level.
- A maximum of 6 credits of 500-level directed studies courses may be counted toward the program requirements.

Students should consult each **program area** website for more information. Each student's coursework must be approved by the graduate program office for that area.

Program Areas:

[Biomedical Engineering](#)
[Chemical and Biological Engineering](#)
[Civil Engineering](#)
[Clean Energy Engineering](#)
[Electrical and Computer Engineering](#)
[Geological Engineering](#)
[Materials Engineering](#)
[Mechanical Engineering](#)
[Mechatronics Design](#)
[Mining Engineering](#)

Engineering Management

The [Engineering Management](#) sub-specialization requires 12 credits of courses in management-related subjects, with a minimum of 6 credits of core courses and a maximum of 6 credits of elective courses. The chosen program area requirements must also be satisfied.

Contact Information

Master of Engineering Program Office
 5000-2332 Main Mall
 Vancouver, BC V6T 1Z4
 Tel: 604.822.8386
 Fax: 604.822.7006
 Email: gradprog@apsc.ubc.ca
 Web: www.engineering.ubc.ca/prospective_students/graduate/index.php
Deb Feduik, Coordinator

Type of Action:

- (1) Update general MEng information;
- (2) New Master of Engineering Specialization in Engineering and Public Policy (ENPP),

Rationale:

<p>Students should consult each specialization website for more information. Each student's coursework must be approved by the graduate program office for that area.</p> <p>Specializations</p> <p>Biomedical Engineering Chemical and Biological Engineering Civil Engineering Clean Energy Engineering Electrical and Computer Engineering Engineering and Public Policy (link) Geological Engineering Materials Engineering Mechanical Engineering Mechatronics Design Mining Engineering</p> <p>Engineering Management</p> <p>The Engineering Management sub-specialization requires 12 credits of courses in management-related subjects, with a minimum of 6 credits of core courses and a maximum of 6 credits of elective courses. The chosen program area requirements must also be satisfied.</p> <p>Contact Information</p> <p>Master of Engineering Program Office 5000-2332 Main Mall Vancouver, BC V6T 1Z4 Tel: 604.822.8386 Fax: 604.822.7006 Email: gradprog@apsc.ubc.ca Web: www.engineering.ubc.ca/prospective_students/graduate/index.php Deb Feduik, Coordinator</p>	<p>Update general MEng information to be more in line with other similar University units.</p> <p>Applicants to the Engineering and Public Policy (ENPP) specialization follow the existing Master of Engineering admissions standards.</p> <p>Document ID#: Nov10 U/G G2</p>
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Appendix E - ii Calendar Entry – New Courses

Category: (1)

<p>Faculty: Applied Science Department: Dean's Office Faculty Approval Date: November 3, 2010 Effective Session 2011 Winter (Term 1) Year for Change: 2011</p>	<p>Date: October 25, 2010 Contact Person: Deb Feduik Phone: 604-822-8386 Email: deb.feduik@ubc.ca</p>
<p>Proposed Calendar Entry:</p> <p>ENPP 501 (3) Law, Public Policy and Governance Policy process and parliamentary government, federalism and multilevel governance, bureaucracy and public service, charter and rights-based litigation, interest groups and collective action, mechanisms for interest group consultation and input, policy instruments, environmental law, international law and climate change. <i>This course is not eligible for Credit/D/Fail grading.</i></p> <p>ENPP 502 (3) Public Policy Analysis –Tools and Methods Epistemology; policy analysis basics: policy paradigms based on utility maximization; equity and rights based frameworks; tools, methods and applications of quantitative policy analysis: cost-benefit approaches, risk analysis, decision analysis, values, tradeoffs and multi-attribute utility theory, modeling uncertainty; critiques and limitations of tools: psychology, perception and decision making, ethical challenges. <i>This course is not eligible for Credit/D/Fail grading. Pre-requisite: ENPP 501</i></p> <p>ENPP 503 (3) Public Policy Case Studies Policy analysis case studies in various technology areas including: energy & environment, climate change and adaptation, information technology, intellectual property law, health and medicine, biotechnology, nanotechnology, infrastructure and material supply. Emphasis will be on policy dimensions of technology development and commercialization, and the interactions between policy process and technology selection and deployment. <i>This course is not eligible for Credit/D/Fail grading. Pre-requisite: ENPP 501 and Co-requisite: ENPP 502.</i></p> <p>ENPP 504 (3) Applied Economics in Public Policy</p>	<p>URL: N/A</p> <p>Present Calendar Entry: None</p> <p>Action: New courses</p> <p>Rationale: Six core courses for new M.Eng. specialization in Engineering and Public Policy (ENPP). Applicants to the specialization Engineering and Public Policy (ENPP) follow the existing Master of Engineering admissions standards.</p> <p>The Master of Engineering in Engineering and Public Policy will be offered to qualified students grounded in all engineering fields. The program provides a broad overview of the interactions between technologies and public policy on various engineering fields, such as energy, environment, health and biotechnologies, and information technologies. Projects will address practical issues on the development of public policies and its implication to the development, selection and deployment various technologies in specific fields.</p> <p>While the six new core courses to be developed for this ENPP specialization (ENPP 501, 502, 503, 504, 596 and 597) are specifically tailored for engineering students, they are expected to appeal to research (M.A.Sc. and Ph.D.) students in the Faculty of Applied Science, as well as to students in other similar programs. Once successfully implemented, these courses may also be introduced to select senior engineering undergraduates as electives. The project course (ENPP 596) will challenge the M.Eng. students to apply their skills in a practical engineering and public policy context. As the program becomes more established, it will lead to closer collaboration with related programs of other faculties at UBC.</p> <p>For all courses X Not available for Cr/D/F grading.</p>

<p>Applied multivariate statistics: factor analysis, multiple regression, non-linear regression, multivariate ANOVA, spatial econometric modeling. Applied economics for public policy: market concentration, externalities and imperfect information, tools to restrict monopolies and other restrictive industrial policies, tools to treat market failures due to externalities, quotas, standards, tradable permits, taxes and subsidies, unbiased labelling and government provision, cost effectiveness analysis, cost-benefit analysis, economic impact analysis, life cycle cost analysis. <i>This course is not eligible for Credit/D/Fail grading.</i></p> <p>ENPP 596 (6) M.Eng. Project in Engineering and Public Policy Carry out a project and prepare an engineering report under the supervision of faculty members and/or researchers/scientists from project sponsoring organizations. <i>This course is not eligible for Credit/D/Fail grading.</i></p> <p>ENPP 597 (1) Seminar Presentations and discussions of current topics in the area of engineering and public policy. <i>This course is not eligible for Credit/D/Fail grading.</i></p>	<p>(Check the box if the course is NOT eligible for Cr/D/F grading. Note: Not applicable to graduate-level courses.)</p> <p>For ENPP 597 (1) Seminar X Pass/Fail or <input type="checkbox"/> Honours/Pass/Fail grading (Check one of the above boxes if the course will be graded on a P/F or H/P/F basis. Default grading is percentage.)</p> <p>Document ID#: Nov10 U/G G3</p>
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Combined Doctor of Philosophy in Craniofacial Science/Diploma in Endodontics

Faculty of Graduate Studies

Faculty of Dentistry

UBC Admission Proposal Form

<p>Faculty: Dentistry Department: Oral Biological and Medical Sciences Faculty Approval Date: May 11, 2010 Effective Session: 2011 Winter Session</p>	<p>Date: April 26, 2010 Contact Person: Dr. Jeff Coil Phone: 604.822.4159 Email: jcoil@interchange.ubc.ca</p>
<p>http://www.students.ubc.ca/calendar/index.cfm?tree=12,201,429,0</p> <p>Proposed Calendar Entry:</p> <p>Combined PhD in Craniofacial Science/Diploma in Endodontics</p> <p>This combined program option is a clinical specialty program that is offered in conjunction with a PhD in Craniofacial Science. The program provides education and training for potential clinicians, research workers, and teachers. Completion of the Diploma in Endodontics requires completion of the clinical and didactic requirements associated with the diploma program in the Faculty of Dentistry, and successful completion of the PhD in Craniofacial Science course requirements, and successful defense and submission of their dissertation to the Faculty of Graduate Studies. In this program option, the degree and the diploma are awarded conjointly and both must be completed to graduate. The combined program will require a minimum of six years to prepare the student for clinical practice and a teaching/research career. Graduates will be eligible to take the examination for specialty certification in endodontics offered by The Royal College of Dentists of Canada and The American Board of Endodontics.</p> <p>Applicants to the program must satisfy the requirements for admission to the Faculty of Graduate Studies and Dentistry. Applicants must hold a Doctor of Dental Surgery or Dental Medicine or equivalent from a recognized university. Applicants for the Ph.D. degree must hold a D.D.S., D.M.D., M.D., or D.V.M., or equivalent, or an M.Sc. in dental science or a related discipline. Students entering directly with a DDS, DMD, or international equivalent without a Master's degree must, during the first year of study, complete 12 credits with a first class average of which at least nine credits must be at the 500-level or above and at least nine credits must be no less than A- (at UBC, 80%), to</p>	<p>Type of Action: - Calendar Description http://www.students.ubc.ca/calendar/index.cfm?tree=12,201,429,0 To be inserted before the Combined MSc in Craniofacial Science/Diploma in Endodontics description.</p> <p>Action: To create a combined program option in endodontics to be done in conjunction with a PhD in Craniofacial Science.</p> <p>Rationale: To provide a research-intense opportunity for endodontic graduate students.</p>

<p>maintain registration as a doctoral student. The TOEFL score requirement for graduate from a country where English is not the primary language is 580 (paper-based) or 93 (internet-based). The application deadline for this combined program is October 1 and enrollment is limited.</p>	
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Combined Doctor of Philosophy in Craniofacial Science/Diploma in Periodontics

Faculty of Graduate Studies

Faculty of Dentistry

UBC Admission Proposal Form

<p>Faculty: Dentistry Department: Oral Biological and Medical Sciences Faculty Approval Date: May 11, 2010</p> <p>Effective Session: 2011 Winter Session</p>	<p>Date: April 26, 2010 Contact Person: Dr. Jeff Coil Phone: 604.822.4159 Email: jcoil@interchange.ubc.ca</p>
<p>http://www.students.ubc.ca/calendar/index.cfm?tree=12,201,429,0</p> <p>Proposed Calendar Entry:</p> <p>Combined PhD in Craniofacial Science/Diploma in Periodontics</p> <p>This combined program option is a clinical specialty program that is offered in conjunction with a PhD in Craniofacial Science. The program provides education and training for potential clinicians, researchers, and teachers. Completion of the Diploma in Periodontics requires completion of the clinical and didactic requirements associated with the diploma program in the Faculty of Dentistry, and successful completion of the PhD in Craniofacial Science course requirements, and successful defense and submission of their dissertation to the Faculty of Graduate Studies. In this program option, the degree and the diploma are awarded conjointly and both must be completed to graduate. The combined program will require a minimum of six years to prepare the student for clinical practice and a teaching/research career. Graduates will be eligible to take the examination for specialty certification in prosthodontics offered by The Royal College of Dentists of Canada and the American Board of Periodontics.</p> <p>Applicants to the program must satisfy the requirements for admission to the Faculties of Graduate Studies and Dentistry. Applicants must hold a Doctor of Dental Surgery or Dental Medicine or equivalent from a recognized university. All applicants must meet FoGS minimum academic standards for admission. Applicants for the Ph.D. degree must hold a D.D.S., D.M.D., M.D., or D.V.M., or equivalent, or an M.Sc. in dental science or a related discipline. The TOEFL score requirement for</p>	<p>Type of Action: - Calendar Description http://www.students.ubc.ca/calendar/index.cfm?tree=12,201,429,0</p> <p>To be inserted between ‘Combined M.Sc. in Craniofacial Science/Diploma in Pediatric Dentistry’ and ‘Combined M.Sc. in Craniofacial Science/Diploma in Periodontics’</p> <p>Action: To create a combined program option in periodontics to be done in conjunction with a PhD in Craniofacial Science.</p> <p>Rationale: To provide a research-intense opportunity for periodontic graduate students.</p>

graduate from a country where English is not the primary language is 580 (paper-based) or 93 (internet-based). The application deadline for this combined program is October 1 and enrollment is limited.

NOTE: Students entering directly with a DDS, DMD, or international equivalent without a Master's degree must, during the first year of study, complete 12 credits with a first class average of which at least nine credits must be at the 500-level or above and at least nine credits must be no less than A- (at UBC, 80%), to maintain registration as a doctoral student.