**MEMORIAL UNIVERSITY OF NEWFOUNDLAND**

**Academic Council of the School of Graduate Studies**

**May 16, 2016 (via email)**

Academic Council considered, via email, the requests for approval of the slate of names for the new Nominating Committee, and four new Engineering courses, for approval. It was moved by Dr. Lye, and seconded by Dr. Coady that the items of business be approved. The motion (22 yeas)

CARRIED

1. Nominating Committee – New Membership

Dr. Peggy Coady (Faculty of Business Administration) – Chair

Dr. Leonard Lye (Faculty of Engineering & Applied Science)

Dr. J.C. Loredo-Osti (Department of Mathematics & Statistics)

Student Representative

1. Engineering & Applied Science

ENGI 9310 Advanced Reactor Analysis and Bioreactors

The purpose of this course is to provide graduate students with a strong foundation in the engineering of chemical/biochemical reactions and reactors. The course will cover detailed discussion of advanced reactor designs common in processing plants. This includes fluidized beds, moving bed reactors, membrane reactors, and bioreactors. Non-ideal reactor analysis through RTD analysis is included. It also considers various aspects of catalysis including effectiveness factors, catalyst deactivation and catalyst characterization. The coupling of transport phenomena with reactor design will also be introduced. Particular focus will be given to bioreactors (with an overview on biological systems) and the differences/similarities between these reactors and typical chemical reactors. This course will build on undergraduate courses in reaction design with a more analysis of reactor designs involving complex fluid flow and/or complex kinetics and catalysts (chemical and biological). Strong links to the research in several areas will be established, with an emphasis on the generality of the underlying conceptual foundation and its utility in the research pursed by the enrolled students.

ENGI 9320 Advanced Separation Processes

The purpose of this course is to introduce students to the scientific background, designs and applications of advanced separation processes. The module starts with the fundamentals of diffusive and convective mass transfer principles and operations. This is followed by the introduction of several important advanced separation processes, including absorption with chemical reaction, adsorption and chromatography, solvent extraction and ultrafiltration. Detailed mass transfer rate equations and corresponding designs of the aforementioned processes will be addressed in this course. This module is targeted at graduate students who are interested in applying advanced separation techniques to food, biofuel and biopharmaceutical engineering processes.

ENGI 9330 Abnormal Situation Management and On-line Monitoring

Abnormal situation management and on-line monitoring is key to operating process in a safe manner. The research on process monitoring has been going on for over thirty years now. Many advanced monitoring techniques both in the model based monitoring and data based monitoring have now reached to a mature stage. The course will cover detailed discussion of different layers of process control, monitoring, and safety layer. It will start with univariate monitoring techniques to the most recent multivariate techniques for process monitoring. Important concepts of model based monitoring using observers and state estimators will be discussed at length in this course. Multivariate statistical technique based monitoring techniques will be covered in this course. Specific focus will be given to principal component analysis (PCA), canonical variate analysis (CVA), partial least squares method (PLS). Residual analysis for decision making and the minimum requirements of fault isolation will be discussed. More recent concepts of linking fault diagnosis with fault consequence and integration of knowledge based methods with quantitative methods for building intelligent systems will be introduced in this course. This course will provide graduate students the research base for process fault detection, diagnosis and abnormal situation management.

ENGI 9340 Materials Degradation in Process Facilities

Materials degradation in process facilities is a course of study that will address a wide range of materials such as metals, metal alloys, polymer, wood, glass, cement and concrete to various types of environments including aqueous, chemical, thermal, photochemical, and high energy radiation that are known to degrade. Materials degradation mechanisms, surface engineering, and application of control techniques to industrial situations are described. Characterization of surface, coating, and methods of analyzing materials degradation lead to understanding the problems of materials degradation prior to creating solutions through materials selection and surface engineering which are explained using examples, case studies, and financial analytical models.

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Faye Murrin, Chair