University of Windsor

Sa191108
REVISED

NOTICE OF MEETING
There will be a meeting of the Senate
on, Friday, November 8, 2019, at 2:30 p.m.
Room 203 in the Anthony P Toldo Health Education Centre

AGENDA

1 Approval of Agenda (Unstarring agenda items)

2 Minutes of the meeting of October 11, 2019 SM191011

3 Business arising from the minutes

4 Outstanding Business/Action Items

5 Reports/New Business

5.1 Report from the Student Presidents (UWSA, GSS, OPUS) **UWSA/GSS/OPUS** – Information

5.2 Report of the President **Robert Gordon**

5.3 Report of the Academic Colleague **Philip Dutton**

5.4 Senate Student Caucus **Katherine Quinsey**

5.5 Program Development Committee

***5.5.1 Program/Course Changes**

***a) Languages, Literatures, and Cultures – Minor Program Changes (Form C)**
***b) Law – New Course Proposals (Form D)**

Greg Chung-Yan-Approval
Sa191108-5.5.1a-b

***5.5.2 Learning Outcomes**

***a) Chemistry and Biochemistry – Program and Course Learning Outcomes**
***b) Mathematics and Statistics – Course Learning Outcomes**

Greg Chung-Yan-Information
Sa191108-5.5.2a-b

5.6 Academic Policy Committee **Antonio Rossini**

5.7 Senate Governance Committee

5.7.1 Revisions to Bylaw 54 and 55 **Rick Caron-Approval**
Sa191108-5.7.1

5.8 Report of the Provost **Douglas Kneale**

5.9 Report of Vice-President, Research and Innovation **K W Michael Siu**

6 Question Period/Other Business

7 Adjournment

Please carefully review the 'starred' (*) agenda items. As per the June 3, 2004 Senate meeting, 'starred' items will not be discussed during a scheduled meeting unless a member specifically requests that a 'starred' agenda item be 'unstarred', and therefore open for discussion/debate. This can be done any time before (by forwarding the request to the secretary) or during the meeting. By the end of the meeting, agenda items which remain 'starred' (*) will be deemed approved or received.

President's Senate Report

Robert Gordon
University of Windsor Senate
November 8, 2019

Strategic Mandate Agreement

- SMA3 development
- Two UWindsor Town Halls conducted last month
- New web-site established
- Bi-lateral meeting with MCU is scheduled for Nov 20
- Planning for 10 metrics
  - Skills and job outcomes (6 metrics)
  - Economic and community impacts (4 metrics)
- Follow-up communications and information sessions are being planned:
  - Goal to keep our community informed on this moving forward

Employee Engagement Survey

- HR is developing an ‘employee engagement’ survey process for implementation later in 2020
  - Faculty and Staff
- To assist with planning will consult with many throughout UWindsor in the coming months
- Areas of assessment will likely include:
  - Our Work Environment
  - Performance Feedback Processes
  - Professional Growth
  - Work/Life Balance
  - Information and Communication (unit and institutionally)
  - Teamwork, Collaboration and Cooperation
  - Workplace Environment
  - Organizational Culture
  - Equity Diversity and Inclusion considerations
  - Organization Vision
- Will help to provide baseline information
- More details and consultations to follow prior to implementation

Capital Projects: Lancer Sport and Recreation Centre

- $73M budget
  - $55M student referendum - $18M from fund-raising/external support
- Approved by the Board in Spring/18
- Awarded to EllisDon/Fortis with a completion in early 2022
- Extensive addition to the St. Denis Athletic and Community Centre
  - Community space for students
  - Facility where high performance sport and recreational activities can co-exist
  - Increase capacity and diversity of programs and activities we offer
  - New facilities will include a large fitness area, three basketball/volleyball courts with seating for 2,000, an eight-lane pool, multipurpose areas, new enhanced outdoor fields, social spaces and a food outlet

Capital Projects: Law School Renovation

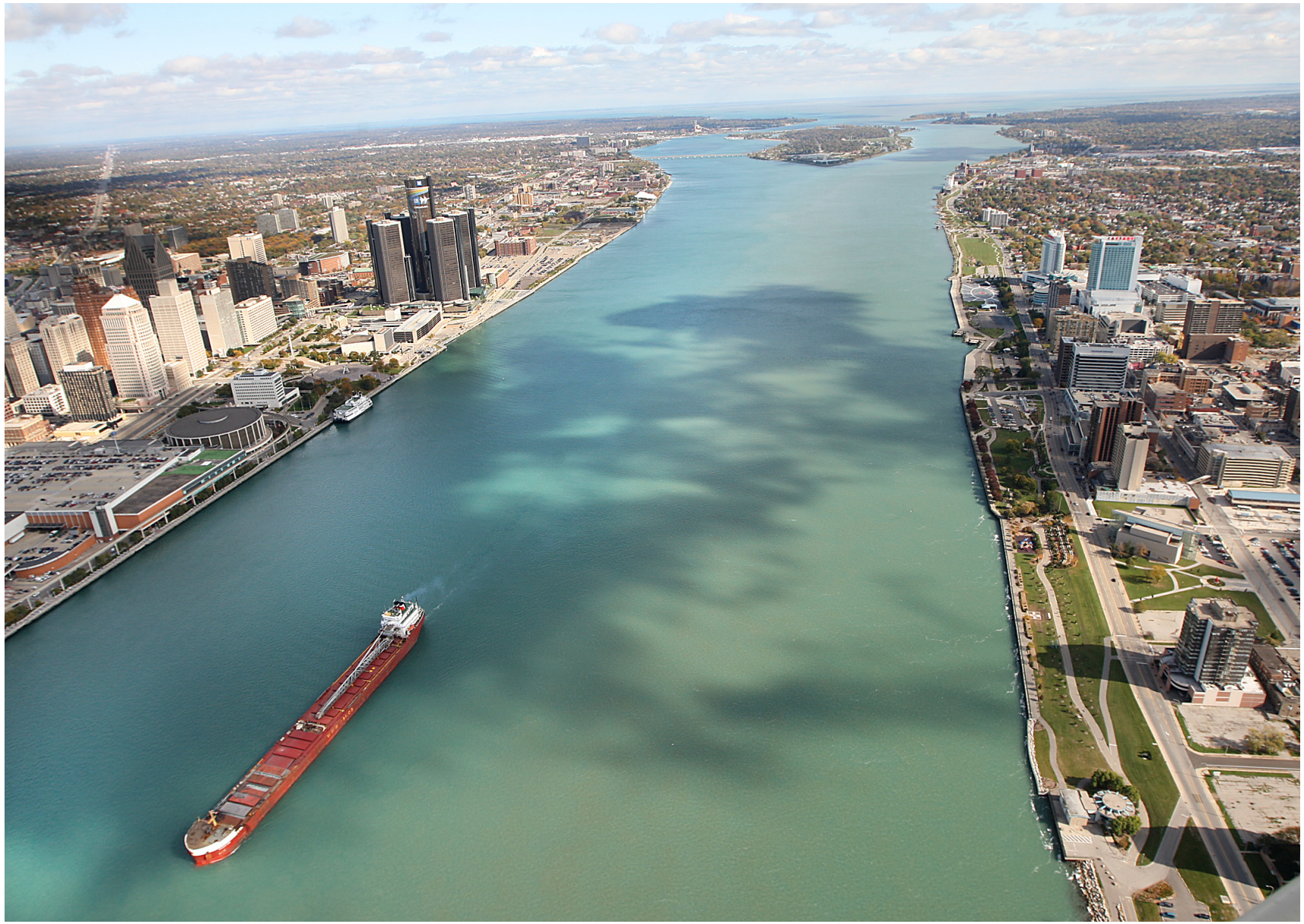
- Presently in the Design Stage
- Move to Stage 2 once Board approval (expected in Jan/20)
  - Relocation during April/20
  - Construction starting early May/20.
- Destination for the temporary locations will be finalized and communicated in Dec/Jan
- Project completion by May/22 to ensure students will be in new space for Fall/22 semester
- $30M budget
  - $6M fund-raising, $11M internal loan from Law, $13M University commitment
- The new space will provide:
  - Enhanced accessibility
  - Increased seating capacity in Moot Court and other classrooms
  - Eliminate many book stacks and have more study area for students in the library
  - Enhanced student spaces (student lounges, reception areas as well as bookable group work spaces)
  - An enhanced entrance on the north end of the building
  - Enhanced glazing to increase the amount of light into the building significantly

Economic Impact Study

- Conducting a UWindsor Economic Impact Study
  - A Steering Committee is leading with support through KPMG
- Was presented to the UWin community as part of an Information Session in Aug/19
- Assess our economic impact in relation to:
  - Higher education (knowledge economy and society, HQP development)
  - Research, Service, Innovation, Leadership
- Will be aligned with our SMA3 planning and reporting
- Preliminary interviews have been conducted
- Final report will be completed in the early New Year

Convocation Ceremonies

- During the LSRC project we will be moving convocations to the WFCU Centre
  - Anticipated for 2020-2021.
- Planned dates for spring convocations are May 26-29, 2020
- Will be working through a number of logistical issues in the coming weeks
  - Once established - will open up the application to graduate thereby enabling students to apply for early release
- Website for updates: http://www.uwindsor.ca/graduation-convocation/
- Updates will also be provided to Deans, Associate Deans and Administrative Assistants (via email) and Jan Senate meeting



University of Windsor
Senate

*5.5.1a: **Languages, Literatures, and Cultures – Minor Program Change (Form C)**

Item for: **Approval**

MOTION: That the Honours Modern Languages and Second-Language Education program and the Concurrent Modern Languages and Second Language Education (Intercultural Stream)/Bachelor of Education be changed in accordance with the program/course change forms.^

^Subject to approval of the expenditures required.

Rationale/Approvals

- The proposal has been approved by the Department of Languages, Literatures, and Cultures,, the Faculty of Arts, Humanities and Social Sciences Coordinating Council, and the Program Development Committee.
- Supporting documentation for the proposed changes can be accessed by contacting the University Secretariat at ext. 3325, or through the October 21 2019 Combined Program Development Committee PDF meeting file posted on the PDC website at: http://www.uwindsor.ca/secretariat/59/pdc-agendas-and-minutes. To access this particular item go to 4.1.

University of Windsor
Senate

*5.5.1b: **Law – New Course Proposals**

Item for: **Approval**

MOTION: **That the following courses addition be approved:^**

LAWG- 5984. Windsor Review of Legal and Social Issue – Editorial Board Member
LAWG- 5985. Windsor Review of Legal and Social Issue – Editor-in-Chief
LAWG- 5989. Law of Migrant Work

^Subject to approval of expenditures required.

Rationale/Approvals

- The proposal has been approved by the Faculty of Law, and the Program Development Committee.
- Supporting documentation for the proposed changes can be accessed by contacting the University Secretariat at ext. 3325, or through the October 21 2019 Combined Program Development Committee PDF meeting file posted on the PDC website at: http://www.uwindsor.ca/secretariat/59/pdc-agendas-and-minutes. To access this particular item go to 4.2.

University of Windsor
Senate

*5.5.2a: **Chemistry and Biochemistry – Program and Course Learning Outcomes**

Item For: **Information**

Learning Outcomes

Programs:
BSc Honours in Biochemistry
BSc Honours in Chemistry

Courses:
BIOC-2010. Organic Chemistry of Biomolecules
BIOC-3100. Metabolism I
BIOC-3110. Metabolism II
BIOC-3130. Protein and Nucleic Acid Chemistry
BIOC-3581. Biotechnology Laboratory
CHEM-1100. General Chemistry I
CHEM-1110. General Chemistry II
CHEM-2200. Analytical Chemistry
CHEM-2300. Introductory Organic Chemistry
CHEM-2310. Introductory Organic Chemistry II
CHEM-3300. Spectroscopic Structure Identification
CHEM-3310. Intermediate Organic Chemistry
CHEM-3400. Quantum Chemistry
CHEM-3500. Organometallic Chemistry

BSc Honours in Biochemistry

Program Learning Outcomes

Last Updated: November 07, 2018

Learning Outcomes At the end of the course, the successful student will know and be able to:	**Characteristics of a University of Windsor Graduate** The University of Windsor graduate will have the ability to demonstrate:	**COU-approved Undergraduate Degree Level Expectations**
Explain and apply the major theories and concepts of chemistry and biochemistry. **(Also applies to D.)** Explain and apply the scientific method as it relates to biochemistry research and societal issues. **(Also applies to B, C, H, I.)**	**A.** the acquisition, application and integration of knowledge	1. Depth and breadth of knowledge 2. Knowledge of methodologies 3. Application of knowledge 5. Awareness of limits of knowledge
Operate standard and modern laboratory instruments for solving biochemical problems. **(Also applies to C.)** Collect, read, evaluate, and analyze relevant scientific literature to address a specific biochemistry area. **(Also applies to C, D.)**	**B.** research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)	1. Depth and breadth of knowledge 2. Knowledge of methodologies 3. Application of knowledge 5. Awareness of limits of knowledge
Access and effectively utilize the primary research literature for solving chemical and biochemical problems. **(Also applies to D.)** Correctly interpret experimental data and the accuracy of the results. **(Also applies to D.)**	**C.** critical thinking and problem-solving skills	1. Depth and breadth of knowledge 2. Knowledge of methodologies 3. Application of knowledge 5. Awareness of limits of knowledge

Write a formal scientific paper and report with the correct structure (e.g., include proper citations, references, etc.)	**D.** literacy and numeracy skills	4. Communication skills 5. Awareness of limits of knowledge
Effectively use safe laboratory practice (e.g use and handling of chemicals).	**E.** responsible behaviour to self, others and society	5. Awareness of limits of knowledge 6. Autonomy and professional capacity
Produce an effective oral and written communication on a scientific subject. Qualitatively summarize and objectively present data. Prepare written laboratory reports using conventional scientific style.	**F.** interpersonal and communications skills	4. Communication skills 6. Autonomy and professional capacity
Participate constructively and cooperatively in small group activities.	**G.** teamwork, and personal and group leadership skills	4. Communication skills 6. Autonomy and professional capacity
Describe examples that illustrate the functionality and diversity of chemistry and biochemistry Design innovative solutions to demonstrate scientific concepts.	**H.** creativity and aesthetic appreciation	2. Knowledge of methodologies 3. Application of knowledge 6. Autonomy and professional capacity
	I. the ability and desire for continuous learning	6. Autonomy and professional capacity

BSc Honours in Chemistry

Program Learning Outcomes

Last Updated: November 07, 2018

Learning Outcomes At the end of the course, the successful student will know and be able to:	**Characteristics of a University of Windsor Graduate** The University of Windsor graduate will have the ability to demonstrate:	**COU-approved Undergraduate Degree Level Expectations**
• Explain and apply the major theories and concepts of chemistry in all four traditional sub-disciplines (analytical, inorganic, organic, and physical) **(Also applies to D.)** • Explain and apply the scientific method as it relates to chemistry research and societal issues. **(Also applies to B, C, H, I.)**	**A.** the acquisition, application and integration of knowledge	1. Depth and breadth of knowledge 2. Knowledge of methodologies 3. Application of knowledge 5. Awareness of limits of knowledge
• Collect, read, analyze, synthesize and evaluate relevant scientific literature to address a specific science-relevant problem **(Also applies to C, D.)** • Operate laboratory instruments for solving chemical problems. **(Also applies to C.)**	**B.** research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)	1. Depth and breadth of knowledge 2. Knowledge of methodologies 3. Application of knowledge 5. Awareness of limits of knowledge
• Access and effectively utilize the primary research literature for solving chemical problems. **(Also applies to D.)** • Correctly interpret experimental data and the accuracy of the results. **(Also applies to D.)**	**C.** critical thinking and problem-solving skills	1. Depth and breadth of knowledge 2. Knowledge of methodologies 3. Application of knowledge 5. Awareness of limits of knowledge

• Write a formal scientific paper and report with the correct structure (e.g., include proper citations, references, etc.)	**D.** literacy and numeracy skills	4. Communication skills 5. Awareness of limits of knowledge
• Effectively use safe laboratory practice (e.g use and handling of chemicals).	**E.** responsible behaviour to self, others and society	5. Awareness of limits of knowledge 6. Autonomy and professional capacity
• Produce an effective oral and written communication on a chemistry subject. • Qualitatively summarize and objectively present data. • Prepare written laboratory reports using conventional scientific style.	**F.** interpersonal and communications skills	4. Communication skills 6. Autonomy and professional capacity
• Participate and contribute constructively and cooperatively to team work activities	**G.** teamwork, and personal and group leadership skills	4. Communication skills 6. Autonomy and professional capacity
• Describe examples that illustrate the functionality and diversity of chemical systems. • Use scientific concepts in designing solutions to chemistry problems.	**H.** creativity and aesthetic appreciation	2. Knowledge of methodologies 3. Application of knowledge 6. Autonomy and professional capacity

	l. the ability and desire for continuous learning	6. Autonomy and professional capacity

BIOC-2010. Organic Chemistry of Biomolecules
Formerly known as: 59-261

Learning Outcomes
Last Updated: March 26, 2019

Learning Outcomes At the end of the course, the successful student will know and be able to:	**Characteristics of a University of Windsor Graduate** The University of Windsor graduate will have the ability to demonstrate:
• Apply prior knowledge to new concepts and practical (experimental) applications, solve problems, and answer questions using the knowledge gained.	**A.** the acquisition, application and integration of knowledge
• Use the primary literature, databases, and textbooks for preparation of laboratory reports.	**B.** research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
• Analyze information and issues associated with application of the scientific method to research hypotheses in biochemistry. • Integrate elements of chemical and biochemical knowledge to formulate answers to problems.	**C.** critical thinking and problem-solving skills
• Assess information in the literature and display written information using conventional scientific style. • Employ mathematical operations to analyze experimental data and to solve numerical problems.	**D.** literacy and numeracy skills
• Apply safe and responsible practices in a laboratory setting.	**E.** responsible behaviour to self, others and society

• Work as a team in the laboratory context. **(Also applies to G.)** • Prepare written laboratory reports using conventional scientific style. **(Also applies to G.)**	**F.** interpersonal and communications skills
	G. teamwork, and personal and group leadership skills
	H. creativity and aesthetic appreciation
• Relate chemical and biochemical knowledge to topical problems in such fields as human and animal health, ecology, nutrition, environmental science, pharmaceutical development.	**I.** the ability and desire for continuous learning

BIOC-3100. Metabolism I
Formerly known as: 59-362

Learning Outcomes
Last Updated: March 26, 2019

Learning Outcomes At the end of the course, the successful student will know and be able to:	**Characteristics of a University of Windsor Graduate** The University of Windsor graduate will have the ability to demonstrate:
• Describe basic thermodynamic principles in relation to energy conversion in living system. • Explain the complex and systematic sequence of catabolic reactions leading to the production of ATP and reducing powers in the cells.	**A.** the acquisition, application and integration of knowledge
• Explain the control of catabolic reactions at molecular level. • Explain the importance of metabolic regulations, and the role of cofactors and micronutrients in energy metabolism. • Interpret the relationships between metabolic deficiency and diseases. • Illustrate possible reasons for health related issues, such as obesity, diabetes and cardiovascular diseases.	**B.** research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
• Formulate the overall pathways involving chemical reactions leading to production of ATP and reducing powers in the cells and their regulations under different circumstances (e.g. starvation, diabetes and obesity).	**C.** critical thinking and problem-solving skills
	D. literacy and numeracy skills
	E. responsible behaviour to self, others and society

• Discuss and respectfully respond to questions from their peers and instructors	**F.** interpersonal and communications skills
	G. teamwork, and personal and group leadership skills
	H. creativity and aesthetic appreciation
• Integrate the chemical and biological knowledge in solving critical and complex health related problems such as metabolic syndromes by preventative and curative measures. • Evaluate the impact and relevance of recent discoveries on chemistry and biochemistry.	**I.** the ability and desire for continuous learning

BIOC-3110. Metabolism II
Formerly known as: 59-363

Learning Outcomes
Last Updated: March 26, 2019

Learning Outcomes At the end of the course, the successful student will know and be able to:	**Characteristics of a University of Windsor Graduate** The University of Windsor graduate will have the ability to demonstrate:
• Explain the complex and systematic sequence of anabolic reactions, which are responsible for the production various large biomolecules from smaller biomolecules. • Recall fundamental metabolic reactions and their role in humans. • Identify reactants, products, energetic and regulatory requirements.	**A.** the acquisition, application and integration of knowledge
• Discuss the importance of metabolic regulations, role of cofactors and micronutrients in energy metabolism	**B.** research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
• Solve word and reaction problems pertinent to biochemical reactions. • Organize and construct appropriate answers to queries.	**C.** critical thinking and problem-solving skills
• Explain the biochemical processes.	**D.** literacy and numeracy skills
	E. responsible behaviour to self, others and society
	F. interpersonal and communications skills

• Discuss and respectfully respond to questions of their peers **(Also applies to F.)**	**G.** teamwork, and personal and group leadership skills
	H. creativity and aesthetic appreciation
• Assess the limitations and advancement of biochemical knowledge and its relevant issues in health and society.	**I.** the ability and desire for continuous learning

BIOC-3130. Protein and Nucleic Acid Chemistry
Formerly known as: 59-365

Learning Outcomes
Last Updated: March 26, 2019

Learning Outcomes At the end of the course, the successful student will know and be able to:	**Characteristics of a University of Windsor Graduate** The University of Windsor graduate will have the ability to demonstrate:
• Explain the theory and fundamental techniques used in purifying and handling of proteins and nucleic acids. • Apply techniques in the characterization of proteins and nucleic acids	**A.** the acquisition, application and integration of knowledge
• Explain the applications of fundamental methods in protein and/or nucleic purification in research settings as described/exemplified in published literature.	**B.** research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
• Sort and solve problems relevant to techniques used in the purification and characterization of protein and nucleic acids.	**C.** critical thinking and problem-solving skills
• Explain the processes of protein purification and characterization • Use basic numerical skills to assess the technique precision and accuracy.	**D.** literacy and numeracy skills
• Conduct himself/herself as conscientious, dependable persons in preparation for his/her future profession, be it in science, health, or another profession	**E.** responsible behaviour to self, others and society
	F. interpersonal and communications skills
	G. teamwork, and personal and group leadership skills

	H. creativity and aesthetic appreciation
• Differentiate the limitations and challenges in scientific discoveries using current reports and documentation in the relevant topics in proteins and nucleic acids.	**I.** the ability and desire for continuous learning

BIOC-3581. Biotechnology Laboratory
Formerly known as: 59-380

Learning Outcomes
Last Updated: March 26, 2019

Learning Outcomes At the end of the course, the successful student will know and be able to:	**Characteristics of a University of Windsor Graduate** The University of Windsor graduate will have the ability to demonstrate:
• Explain and draw connections among the theories and applications of modern biotechnology methodologies and instruments used in biochemical and biological research.	**A.** the acquisition, application and integration of knowledge
• Express, isolate, and identify recombinant proteins using bacterial and mammalian cell culture systems. • Evaluate results of colourimetric imaging techniques. • Complete research objectives within the allotted time.	**B.** research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
• Record technical and experimental data. • Review proper experimental approaches. • Repeat procedure to achieve research objective(s).	**C.** critical thinking and problem-solving skills

• Calculate protein concentration using colourimetric assays and standard curves. • Operate bio-analytical instruments following written protocols. • Identify an unknown protein using mass spectrometry fragmentation data and bioinformatic tools.	**D.** literacy and numeracy skills
• Efficiently perform the experiments in a research team. **(Also applies to G.)** • Efficiently use and maintain share research equipment and space.	**E.** responsible behaviour to self, others and society
• Compose manuscript-style laboratory reports. • Discuss biological meaning of observed results. • Review concisely the major theories behind the experimental approaches employed.	**F.** interpersonal and communications skills
• Help describe protocol information to partner(s) who are having difficulty grasping concepts.	**G.** teamwork, and personal and group leadership skills
	H. creativity and aesthetic appreciation

• Propose follow-up studies that should be employed based on current results. • Recognize how techniques taught are used in basic science research and clinical health research.	**I.** the ability and desire for continuous learning

CHEM-1100. General Chemistry I
Formerly known as: 59-140

Learning Outcomes
Last Updated: March 26, 2019

Learning Outcomes At the end of the course, the successful student will know and be able to:	**Characteristics of a University of Windsor Graduate** The University of Windsor graduate will have the ability to demonstrate:
• List and define five major classes of chemical reactions • Discuss the electronic structure of atoms and extend the discussion to valence bond and molecular orbital theory for diatomic and polyatomic molecules. • Incorporate multiple chemical and physical concepts to manage problem solving. • Apply mathematical equations to appropriate reactions.	**A.** the acquisition, application and integration of knowledge
	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
• Translate word problems to chemical and mathematical equations. • Use conceptual planning principles to develop approach to problem solving	**C.** critical thinking and problem-solving skills

• Determine molecular formula from given data. • Write molecular structure diagrams, including the prediction and explanation of molecular shape, and bond and molecular polarity. • Carry out complex algebraic calculations and demonstrate the use of principles of dimensional analysis. • Prepare written laboratory reports and abstracts including theory, discussion, examples of calculations and conclusions based upon collected data.	**D.** literacy and numeracy skills
	E. responsible behaviour to self, others and society
• Communicate verbally with others to effectively carry out experimental procedures. • Communicate concepts of chemistry in writing through preparation of laboratory reports, laboratory abstracts and though submission of written examinations.	**F.** interpersonal and communications skills
• Work effectively and safely with a laboratory partner to carry out chemical experiments including chemical handling, manipulation of glassware and collection of data.	**G.** teamwork, and personal and group leadership skills
	H. creativity and aesthetic appreciation
	I. the ability and desire for continuous learning

CHEM-1110. General Chemistry II
Formerly known as: 59-141

Learning Outcomes
Last Updated: March 26, 2019

Learning Outcomes At the end of the course, the successful student will know and be able to:	**Characteristics of a University of Windsor Graduate** The University of Windsor graduate will have the ability to demonstrate:
• Recall, select and apply concepts of physical chemistry which relate to behavior in solution in a variety of real world contexts. • Express the physical and chemical transformations that substances undergo through a proper formulation of chemical compounds and balanced chemical equations. • Express the chemical behavior in solution using appropriate chemical vocabulary, symbols, mathematical equations, units, notation, terminology and nomenclature. • Apply principles of qualitative and quantitative analysis to interpret physical data.	**A.** the acquisition, application and integration of knowledge
• Apply basic laboratory techniques to other chemical practices. • Record observations and report findings in an appropriate scientific style.	**B.** research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)

• Explain and use chemical equations for the purposes of monitoring concentrations of species at various times during a reaction under various conditions of concentration and temperature. • Collect, process, interpret and present scientific data using appropriate graphical, numeric and computational techniques. • Analyze real chemical data on equilibria and reaction energetics to determine important physical constants, exemplified by equilibrium constants and reaction rates and activation energies	**C.** critical thinking and problem-solving skills
• Analyze chemical processes using multi-variable algebra and simple calculus.	**D.** literacy and numeracy skills
• Recall and apply safety guidelines for the handling and disposal of hazardous materials.	**E.** responsible behaviour to self, others and society
• Communicate verbally with graduate assistants, laboratory partner and groups to effectively carry out experimental procedures. • Communicate concepts of chemistry in writing through preparation of laboratory reports, laboratory abstracts and though submission of written examinations.	**F.** interpersonal and communications skills
• Work effectively with a laboratory partner to carry out chemical experiments including chemical handling, manipulation of glassware and collection of data.	**G.** teamwork, and personal and group leadership skills
	H. creativity and aesthetic appreciation
	I. the ability and desire for continuous learning

CHEM-2200. Analytical Chemistry
Formerly known as: 59-220

Learning Outcomes
Last Updated: March 26, 2019

Learning Outcomes At the end of the course, the successful student will know and be able to:	**Characteristics of a University of Windsor Graduate** The University of Windsor graduate will have the ability to demonstrate:
• Explain the fundamental concepts of chemical equilibrium. • Identify solution behavior and calculate solution concentrations given the appropriate equilibrium constants. • Explain the fundamentals of analytical chemistry and steps of a characteristic analysis.	**A.** the acquisition, application and integration of knowledge
• Use electrochemical methods, including potentiometry, voltammetry, and ion selective electrodes in the investigation of solution behavior. • Determine systematic method(s) for solving the multiple-equilibrium problems.	**B.** research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
• Explain the concepts and knowledge of equilibrium constraints to a range of systems of interest including solubility, acid/base chemistry, complex formation, oxidation/reduction. • Evaluate the effects of systematic errors on analytical results.	**C.** critical thinking and problem-solving skills

• Use appropriate terms such as standard solution, titration, back titration, equivalence point, end point, primary and secondary; expresses the terms such as electrolyte, acid, base, conjugate acid/base in describing chemicals and their properties. • Define the properties of precipitate and precipitating reagents. • Interpret statistical data and tests.	**D.** literacy and numeracy skills
• Select and employ the required safety procedures for each lab procedure	**E.** responsible behaviour to self, others and society
• Effectively plan experiment activities as a team. **(Also applies to G.)** • Articulate technical information clearly and effectively in written reports.	**F.** interpersonal and communications skills
• Coordinate and delegate individual tasks of lab experiments	**G.** teamwork, and personal and group leadership skills
• Display and present technical information effectively through graphs, figures, images, and informational schematic diagrams.	**H.** creativity and aesthetic appreciation
• Evaluate the impact, relevance, and importance of reports of chemical analysis in popular and technical press and articles.	**I.** the ability and desire for continuous learning

CHEM-2300. Introductory Organic Chemistry
Formerly known as: 59-230

Learning Outcomes
Last Updated: March 26, 2019

Learning Outcomes At the end of the course, the successful student will know and be able to:	**Characteristics of a University of Windsor Graduate** The University of Windsor graduate will have the ability to demonstrate:
• Identify and discuss some basic concepts in organic chemistry and chemistry in general. • Apply these concepts especially when they analyze and solve problems. • Describe interconnected scientific knowledge.	**A.** the acquisition, application and integration of knowledge
• Retrieve and evaluate information that is provided in books, on-line data basis, and specific software packages. • Use all provided sources of information for the preparation of laboratory reports.	**B.** research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
• Recognize and express a specific problem, to propose a solution, and to reason and defend their proposed solution.	**C.** critical thinking and problem-solving skills
• Draw mechanistic diagrams that can be used to explain chemical reactions. • Prepare written laboratory reports and abstracts including theory, discussion, examples of calculations and conclusions based upon collected data. (Also apply to F) **(Also applies to F.)**	**D.** literacy and numeracy skills

• Recall and apply safety guidelines for the handling and disposal of hazardous materials.	**E.** responsible behaviour to self, others and society
• Communicate verbally with laboratory partners and groups to effectively carry out experimental procedures. • Communicate concepts of organic chemistry in writing	**F.** interpersonal and communications skills
• Work effectively with a partner to carry out chemical experiments including chemical handling, manipulation of glassware and collection of data.	**G.** teamwork, and personal and group leadership skills
	H. creativity and aesthetic appreciation
	I. the ability and desire for continuous learning

CHEM-2310. Introductory Organic Chemistry II

Learning Outcomes

Last Updated: March 26, 2019

Learning Outcomes At the end of the course, the successful student will know and be able to:	**Characteristics of a University of Windsor Graduate** The University of Windsor graduate will have the ability to demonstrate:
• Identify and discuss some fundamental simple-to intermediate level concepts in organic chemistry and chemistry in general. • Apply these concepts especially when they analyze and solve problems. • Recognize that all scientific knowledge is interconnected.	**A.** the acquisition, application and integration of knowledge
• Retrieve and evaluate information that is provided in books, on-line data basis, and specific software packages. • Identify reactive features in molecules.	**B.** research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
• Recognize and express a specific problem, to make a critical evaluation of a problem, to propose a solution, and to reason and defend their proposed solution. • Dissect a problem with multiple possible solutions.	**C.** critical thinking and problem-solving skills

• Draw mechanistic diagrams that can be used to explain chemical reactions. • Identify and describe the properties of chemicals based on their numerical (spectral) data. • Recognize and describe stoichiometric implications of chemical compounds.	**D.** literacy and numeracy skills
• Recognize potential chemical hazards.	**E.** responsible behaviour to self, others and society
• Communicate concepts of organic chemistry in writing.	**F.** interpersonal and communications skills
	G. teamwork, and personal and group leadership skills
	H. creativity and aesthetic appreciation
	I. the ability and desire for continuous learning

CHEM-3300. Spectroscopic Structure Identification
Formerly known as: 59-330

Learning Outcomes
Last Updated: June 26, 2019

Learning Outcomes At the end of the course, the successful student will know and be able to:	**Characteristics of a University of Windsor Graduate** The University of Windsor graduate will have the ability to demonstrate:
Collect data through operation of spectroscopic instrumentation, and critical analysis of results, identify chemical structures of unknown materials	**A.** the acquisition, application and integration of knowledge
Identify the structure of an unknown compound through access and retrieval of information related to spectroscopic analyses. Demonstrate ability to search both print and online databases for chemical structures (in whole or part) and related spectroscopic properties for relation to spectroscopic properties of unknown compounds. Access primary literature and compendia of properties to positively identify unknowns by comparison to previously reported results.	**B.** research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
Identify necessary tests related to the properties of a known or unknown compound and critically assess the data obtained for the purposes of identification or characterization.	**C.** critical thinking and problem-solving skills
Demonstrate an ability to read and interpret both spectral and experimental data and reports. Prepare and deliver both written and verbal reports that demonstrate both understanding and critical thinking in the processes of structure identification Develop arguments for structure of compounds based upon spectral data and estimations of spectral properties calculated using established methods in the field and additional intuition.	**D.** literacy and numeracy skills
	E. responsible behaviour to self, others and society
Demonstrate interpersonal and communication skills, through in-class discussions, working in teams in laboratories, and written laboratory reports **(Also applies to G.)**	**F.** interpersonal and communications skills

	G. teamwork, and personal and group leadership skills
	H. creativity and aesthetic appreciation
	I. the ability and desire for continuous learning

CHEM-3310. Intermediate Organic Chemistry
Formerly known as: 59-331

Learning Outcomes
Last Updated: June 26, 2019

Learning Outcomes At the end of the course, the successful student will know and be able to:	**Characteristics of a University of Windsor Graduate** The University of Windsor graduate will have the ability to demonstrate:
Discuss intermediate-to-advanced level concepts in organic chemistry and chemistry in general, and apply these concepts especially when the students analyze and solve problems. Recognize that all scientific knowledge is interconnected.	**A.** the acquisition, application and integration of knowledge
Retrieve and evaluate information that is provided in books, on-line data basis, and specific software packages. **(Also applies to D.)** Use all provided sources of information for the preparation of laboratory reports. **(Also applies to D.)**	**B.** research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
Recognize and express a specific problem, to make a critical evaluation of a problem, to propose a solution, and to reason and defend their proposed solution. Dissect a problem with multiple possible solutions.	**C.** critical thinking and problem-solving skills
Prepare written laboratory reports including theory, discussion, examples of calculations based upon collected data. **(Also applies to C.)**	**D.** literacy and numeracy skills
Recall and apply safety guidelines for the handling and disposal of hazardous materials. Assess environmental consequences of the proposed chemistry. Practice proper disposal of chemicals.	**E.** responsible behaviour to self, others and society
Communicate concepts of organic chemistry in writing through preparation and submission of assignments, tests of written examinations. Communicate verbally with graduate assistants, the laboratory partner, and groups to effectively carry out experimental procedures.	**F.** interpersonal and communications skills

Work effectively with a partner to carry out chemical experiments including chemical handling, manipulation of glassware and collection of data.	**G.** teamwork, and personal and group leadership skills
Compare and evaluate multiple, creative solutions to the same problem.	**H.** creativity and aesthetic appreciation
appraise continued advances in the field of study. Value the knowledge needed for a more sophisticated understanding of a topic.	**I.** the ability and desire for continuous learning

CHEM-3400. Quantum Chemistry
Formerly known as: 59-340

Learning Outcomes
Last Updated: June 26, 2019

Learning Outcomes At the end of the course, the successful student will know and be able to:	**Characteristics of a University of Windsor Graduate** The University of Windsor graduate will have the ability to demonstrate:
Identify quantum chemical problem-types; then use the corresponding 'solution approach' to solve the required equations.	**A.** the acquisition, application and integration of knowledge
Identify quantum chemical problem-types. State the fundamental postulates and mathematical equation of quantum chemistry.	**B.** research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
Apply the skills learnt in the course to solve undergraduate level quantum chemistry problems. Assess the 'correctness' of their solution.	**C.** critical thinking and problem-solving skills
Analyze the resulting solutions for their 'chemical implications'. Explain basic quantum chemical principles. Describe the main ab initio approaches to solution of the electronic Schrödinger equation. Solve second-order differential equations as found in undergraduate quantum chemistry.	**D.** literacy and numeracy skills
	E. responsible behaviour to self, others and society
	F. interpersonal and communications skills
	G. teamwork, and personal and group leadership skills
	H. creativity and aesthetic appreciation
	I. the ability and desire for continuous learning

CHEM-3500. Organometallic Chemistry
Formerly known as: 59-350

Learning Outcomes
Last Updated: June 26, 2019

Learning Outcomes At the end of the course, the successful student will know and be able to:	**Characteristics of a University of Windsor Graduate** The University of Windsor graduate will have the ability to demonstrate:
Acquire the fundamental knowledge of organometallic chemistry (e.g. molecular orbital theory, reaction types). Explain the methods of characterization and elucidation of reaction mechanism such as IR and NMR spectroscopy, kinetic isotope effects, tracer studies, reaction order, and product distributions and the principle of microscopic reversibility, .	**A.** the acquisition, application and integration of knowledge
Locate and use journal articles in the library for application in either course work or the laboratory.	**B.** research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
Use knowledge learned in this course to determine reaction pathways. Predict reaction products, rationalize reaction products and mechanisms, and propose mechanistic studies to probe systems.	**C.** critical thinking and problem-solving skills
Write up lab reports.	**D.** literacy and numeracy skills
	E. responsible behaviour to self, others and society
Work in groups in the lab component. **(Also applies to G.)** Give in class presentations. **(Also applies to G.)**	**F.** interpersonal and communications skills
	G. teamwork, and personal and group leadership skills
	H. creativity and aesthetic appreciation
Assess wide ranging applications, which includes organic synthesis, materials chemistry, polymers, medicine, bioinorganic chemistry, catalysis, fundmentals of bonding.	**I.** the ability and desire for continuous learning

University of Windsor
Senate

*5.5.2b: **Mathematics and Statistics – Course Learning Outcomes**

Item For: **Information**

Learning Outcomes:
MATH-1020. Mathematical Foundations
MATH-1280. Access to Linear Algebra
MATH-1730. Integral Calculus
MATH-2250. Linear Algebra II
MATH-2251. Linear Algebra III
MATH-2780. Vector Calculus
MATH-2790. Differential Equations
MATH-3150. Introduction to Graph Theory
MATH-3160. Combinatorics
MATH-3200. Abstract Algebra
MATH-3270. Number Theory
MATH-3550. Introduction to Fourier Series and Special Functions
MATH-3580. Introduction to Analysis I
MATH-3581. Introduction to Analysis II
MATH-3590. Complex Variables
MATH-3800. Numerical Methods
MATH-3940. Numerical Analysis for Computer Scientists
MATH-3980. Theory of Interest
MATH-4220.Introduction to Group Theory
MATH-4300. General Topology
MATH-4570. Functional Analysis
MATH-4580. Measure Theory and Integration
MATH-4581. Real Analysis II
MATH-4980. Actuarial Mathematics I
MATH-4981. Actuarial Mathematics II
STAT-2920. Introduction to Probability
STAT-2950. Introduction to Statistics
STAT-3920. Probability
STAT-3950. Statistics
STAT-4980. Experimental Design
STAT-4981. Sampling Theory

COURSE NUMBER AND TITLE: MATH-1020 Mathematical Foundations

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate** A U of Windsor graduate will have the ability to demonstrate:
A. Construct and deconstruct mathematical and general statements using propositions and connectives, conditionals and biconditionals, negations, and quantifiers Prove simple results by contradiction, directly, by exhaustion, and by mathematical induction (also relevant to B and C) Write proofs of statements using basic set operations, including those over an indexed family Recognize and use equivalence relations, order relations Discuss functions, algebras of functions, invertibility, injectivity, surjectivity, bijections, domain, codomain, image, preimage	A. the acquisition, application and integration of knowledge
B. Appraise a given problem and determine the appropriate solution strategy (relevant to C as well) Find creative mathematical proofs of simple results without being given prescribed methods of solution (also relevant to C, G, H, and I)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C. Recognize, evaluate, and construct clear formal solutions to problems within a logical framework (also relevant to D and E)	C. critical thinking and problem-solving skills
D.	D. literacy and numeracy skills
E.	E. responsible behaviour to self, others and society
F. Orally present logical solutions to mathematical problems Work with peers to solve problems (also relevant to G)	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H. Explain the logical foundations of mathematics	H. creativity and aesthetic appreciation
I. Apply the foundational mathematical skills acquired to analyze problems in disparate areas within a logical framework	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-1280 Access to Linear Algebra

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate** A U of Windsor graduate will have the ability to demonstrate:
A. Define and perform basic matrix operations Use matrices to solve systems of linear equations of at most three variables by elimination, Cramer's rule, or using inverses Define and compute determinants for 2x2 and 3x3 matrices Define and compute the inverse of a matrix Determine the set of solutions to linear inequalities in two variables Solve linear programming questions in two variables Perform vector operations in two and three dimensions (addition, subtraction, scaling, dot product, cross product, length, angle between) Find expressions for lines and planes in two and three dimensions Compute the distance between points, lines, and planes in two and three dimensions Use basic counting principles Prove basic results by mathematical induction All the above are relevant to D as well.	A. the acquisition, application and integration of knowledge
B. Appraise a given problem and determine the appropriate solution strategy (relevant to C as well)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C. Use basic definitions, theorems, and techniques of linear algebra to solve problems	C. critical thinking and problem-solving skills
D. Identify and formulate problems using appropriate linear algebra terminology and techniques and compute solutions to those problems Compose organized and logical solutions to linear algebra problems (relevant to F and H also)	D. literacy and numeracy skills
E.	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H.	H. creativity and aesthetic appreciation
I.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-1730 Integral Calculus

Learning Outcomes: At the end of this course, the successful student will know and be able to:	**Characteristics:** A U of Windsor graduate will have the ability to demonstrate:
A. Compute standard integrals Use the Fundamental Theorem of Calculus Apply the theory of integrals to compute areas, volumes, and arc lengths Use the following techniques of integration: the substitution rule, integration by parts, trigonometric substitution, partial fractions (to integrate rational functions), trigonometric identities (to integrate trigonometric polynomials) Test sequences and series for convergence and estimate and determine their limits Represent functions as power series and discuss radius of convergence All the above are relevant to D as well.	A. the acquisition, application and integration of knowledge
B. Appraise a given problem and determine the appropriate solution strategy (relevant to C as well) Use basic definitions, theorems, and techniques of integral calculus to prove simple results without being given a prescribed method (also relevant to C, G, and H)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C.	C. critical thinking and problem-solving skills
D. Identify and formulate problems using appropriate integral calculus terminology and techniques and compute solutions to those problems Compose organized and logical solutions to integral calculus problems (relevant to F and H also)	D. literacy and numeracy skills
E. Recognize, evaluate and construct logically sound arguments and deductions in differential calculus Discuss and test the limitations of integral calculus theory	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H. Apply integral calculus methods to problems in numerous subject areas	H. creativity and aesthetic appreciation
I. Synthesize the problem-solving techniques of integral calculus and adapt them to disparate problems	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-2250 Linear Algebra II

Learning Outcomes: At the end of this course, the successful student will know and be able to:	**Characteristics:** A U of Windsor graduate will have the ability to demonstrate:
A. Explain the theoretical basis of Gaussian elimination Define, use, and prove properties of pseudo-inverses Determine and use applications of the LU or LDU decomposition of a matrix and explain the theoretical basis of the decomposition Define and recognize finite and infinite-dimensional abstract vector spaces and subspaces Define and recognize linear independence and bases for abstract vector spaces and compute coordinates with respect to a basis Determine and find bases of the fundamental subspaces of a matrix and explain the theory behind the methods of determination Define, use applications of, compute using multiple methods, explain theoretical basis of methods of computing, and prove properties of determinants Use Cramer's Rule and explain its theoretical foundation Define and recognize abstract linear transformations between abstract vector spaces Determine matrix representations of linear transformations with respect to different input and output bases, compute change of coordinates matrices, and explain the theoretical foundation of these computations Define and compute eigenvalues, eigenspaces Determine if a matrix is diagonalizable and if so diagonalize it. Apply the theory of diagonalization to solve systems of first order linear differential equations. Define and recognize complex and real inner product spaces. Define and determine length, distance, orthogonality, angle between vectors Define and prove properties of unitary and orthogonal matrices. Prove and apply the Gram-Schmidt Orthogonalization Process for inner product spaces Find the QR decomposition of a matrix and explain the theoretical foundation of the decomposition. Define, compute, and explain the theoretical foundation of orthogonal projections. Compute and explain the theoretical foundation of least squares solutions. Classify unitarily and orthogonally diagonalizable matrices, prove Schur's Lemma, prove the Spectral Theorem, and prove the Principal Axis Theorem. Define, recognize, and prove properties of normal matrices. All the above are relevant to D as well.	A. the acquisition, application and integration of knowledge
B. Appraise a given problem and determine the appropriate solution strategy (relevant to C as well) Use definitions, theorems, and techniques of linear algebra to prove moderately difficult results without being given a prescribed method (also relevant to C, G, and H)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C. Explain how the different topics of the course are interrelated (relevant to H as well)	C. critical thinking and problem-solving skills

Learning Outcomes: At the end of this course, the successful student will know and be able to:	**Characteristics:** A U of Windsor graduate will have the ability to demonstrate:
D. Identify and formulate problems using appropriate linear algebra terminology and techniques and compute solutions to those problems Compose organized and logical solutions to linear algebra problems (relevant to F and H also)	D. literacy and numeracy skills
E. Recognize, evaluate and construct logically sound arguments and deductions in linear algebra	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H. Apply linear algebra techniques and framework to disparate problems (relevant to I as well)	H. creativity and aesthetic appreciation
I.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-2251 Linear Algebra III

Learning Outcomes: At the end of this course, the successful student will know and be able to:	**Characteristics:** A U of Windsor graduate will have the ability to demonstrate:
A. Recognize, use in applications, and prove properties of real symmetric matrices and positive definite matrices Use in applications, compute, prove properties of, and prove the theoretical foundation of the Singular Value Decomposition State, use, and prove the Cayley-Hamilton Theorem Define and compute the Jordan Canonical Form of a matrix and explain the theoretical basis of the Jordan Canonical Form Theorem Define and compute the Rational Canonical Form of a matrix and explain the theoretical basis of the Rational Canonical Form Theorem Define and compute the exponential of a square matrix and explain the theoretical foundation of the definition and computation. Use the exponential to solve systems of differential equations of the form du/dt = Au. Describe, perform, and explain the theoretical foundations of computational methods of approximating eigenvalues and solutions to systems of linear equations Describe, perform, and explain the theoretical foundation of error management algorithms in numerical linear algebra.	A. the acquisition, application and integration of knowledge
B. Appraise a given problem and determine the appropriate solution strategy (relevant to C as well) Use definitions, theorems, and techniques of linear algebra to prove moderately difficult results without being given a prescribed method (also relevant to C, G, and H)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C. Explain how the different topics of the course are interrelated (relevant to H as well)	C. critical thinking and problem-solving skills
D. Identify and formulate problems using appropriate linear algebra terminology and techniques and compute solutions to those problems Compose organized and logical solutions to linear algebra problems (relevant to F and H also)	D. literacy and numeracy skills
E. Recognize, evaluate and construct logically sound arguments and deductions in linear algebra Discuss limitations of computers (error management in numerical linear algebra)	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H. Apply linear algebra techniques and framework to disparate problems (relevant to I as well)	H. creativity and aesthetic appreciation
I.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-2780 Vector Calculus

Learning Outcomes: At the end of this course, the successful student will know and be able to:	**Characteristics:** A U of Windsor graduate will have the ability to demonstrate:
A. Express, sketch, and classify quadric surfaces Take derivatives and integrals of vector-valued curves Compute arc length and curvature of curves Compute and interpret tangent vectors, normal vectors, and binormal vectors to space curves Sketch, interpret, and determine limits and continuity of multivariable functions Compute partial derivatives of multivariable functions Compute tangent planes to functions of two variables Compute and interpret differentials of multivariable functions Apply the multivariable Chain Rule Compute directional derivatives and the gradient Find maximum and minimum values of multivariable functions by taking partial derivatives and by Lagrange multipliers Compute multiple integrals Apply change of variables in computing multiple integrals Use and compute (where applicable) the following concepts in vector calculus: vector fields, line integrals, the Fundamental Theorem for Line Integrals, Green's Theorem, curl, divergence, Stokes' Theorem, the Divergence Theorem All the above are relevant to D as well.	A. the acquisition, application and integration of knowledge
B. Use definitions, theorems, and techniques of multivariable calculus to prove simple results (also relevant to G and H) and solve problems (also relevant to C)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C.	C. critical thinking and problem-solving skills
D. Identify and formulate problems using appropriate integral calculus terminology and techniques and compute solutions to those problems Compose organized and logical solutions to integral calculus problems (relevant to F and H also)	D. literacy and numeracy skills
E. Recognize, evaluate and construct logically sound arguments and deductions in differential calculus Discuss and test the limitations of multivariable calculus theory	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H. Apply multivariable calculus methods to problems in numerous subject areas	H. creativity and aesthetic appreciation
I. Synthesize the problem-solving techniques of multivariable calculus and adapt them to disparate problems	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-2790 Differential Equations

Learning Outcomes: At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate:** A U of Windsor graduate will have the ability to demonstrate:
A. Identify and solve first order differential equations of the following types: separable, linear, exact, those solvable by substitution (homogeneous, Bernoulli, reducible to separable); Define and compute the Wronskian and use it to determine if a set of solutions to a homogeneous linear differential equation is fundamental Identify and solve higher order homogeneous differential equations of the following types: linear with constant coefficients, Cauchy-Euler equations; Identify and solve higher order non-homogeneous differential equations using the following techniques: reduction of order, undetermined coefficients, variation of parameters; Solve systems of linear differential equations by elimination; Use the Laplace transform and the inverse transform to solve differential equations; Construct and interpret simple models using appropriate differential equations to solve real world problems (also relevant to B); All the above are relevant to D as well.	A. the acquisition, application and integration of knowledge
B. Appraise a given differential equations problem and determine the appropriate solution strategy (also relevant to C and D)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C.	C. critical thinking and problem-solving skills
D. Compose organized and logical solutions to differential equations problems using appropriate terminology and framework (also relevant to F and H)	D. literacy and numeracy skills
E. Construct logically sound deductions in differential equations, apply sound theoretical framework to real world problems based on differential equations theory	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H	H. creativity and aesthetic appreciation
I.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-3150 Introduction to Graph Theory

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate** A U of Windsor graduate will have the ability to demonstrate:
A. Define, recognize, prove results concerning, and use in proofs: graphs, subgraphs, cycles, trees, connectedness, bipartite graphs, Eulerian graphs, Hamiltonian graphs, planar graphs, dual graphs, coloring maps, chromatic polynomials, digraphs, matchings State, recall proofs of, and use: Euler's formula, Brooks' Theorem, Menger's Theorem, Hall's Theorem, Tutte's Theorem	A. the acquisition, application and integration of knowledge
B. Use the definitions, theorems, and techniques of graph theory to prove results of moderate difficulty without being given a prescribed method and solve problems (relevant to C, G, and H as well)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C.	C. critical thinking and problem-solving skills
D. Discuss and solve graph theory problems using ring/field/Galois theory terminology, computations, and structural framework Compose organized and logical solutions to graph theory problems (also relevant to F and H)	D. literacy and numeracy skills
E. recognize, evaluate and construct logically sound arguments and deductions in graph theory	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H. Observe and discuss how an abstract theoretical framework may be constructed to rigourously solve a collection of real-world problems	H. creativity and aesthetic appreciation
I.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-3160 Combinatorics

Learning Outcomes: At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate:** A U of Windsor graduate will have the ability to demonstrate:
A. Solve problems using various basic counting techniques including: the pigeonhole principle, enumeration of sets, permutations, combinations, partitions and binomial theory. Compute generating functions and apply them to combinatorial problems. Set up and solve a linear recurrence relation. Apply the inclusion/exclusion principle. Apply combinatorial tools to solve real world problems. Use classical methods of combinatorial counting to determine exact and asymptotic values. Apply basic combinatorial principles to count the number of elements in various sets, establish formulas for counting in two ways, and establish bijections between sets of equal cardinalities. All the above are relevant to C as well.	A. the acquisition, application and integration of knowledge
B. Appraise a given problem and determine the appropriate solution strategy. Apply foundation in combinatorics to further studies and other subject areas. (also relevant to I)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C.	C. critical thinking and problem-solving skills
D. Write solutions to mathematical problems and proofs of theorems that meet rigourous standards based on, organization, logical correctness, argument and support. Apply the logical structure of proofs and work with definitions to produce logically valid, correct and clear arguments. All the above are relevant to F as well.	D. literacy and numeracy skills
E.	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
Apply combinatorics techniques and framework to disparate problems.	H. creativity and aesthetic appreciation
I.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-3200 Abstract Algebra

Learning Outcomes: At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate:** A U of Windsor graduate will have the ability to demonstrate:
A. Define, recognize, and use in computational problems and proofs: groups, subgroups, cosets, normal subgroups, factor groups/quotients, group isomorphisms and homomorphisms, external and internal direct products Illustrate group theory concepts using dihedral groups, cyclic groups, and permutation groups and discuss their properties Recall, use and prove the Fundamental Theorem of Finite Abelian Groups, Cayley's Theorem, and Lagrange's Theorem Define, recognize, and use in computational problems and proofs: rings ,subrings, ideals, quotient/factor rings, prime and maximal ideals, integral domains, fields, the field of fractions, the characteristic of a ring, ring homomorphisms and isomorphisms, polynomial rings, the division algorithm, irreducible and primes in integral domains, unique factorization domains, Euclidean domains All the above are also relevant to D.	A. the acquisition, application and integration of knowledge
B. Use the definitions, theorems, and techniques of group, ring, and field theory to prove results of moderate difficulty without being given a prescribed method relevant to C, G, and H as well)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C.	C. critical thinking and problem-solving skills
D. Identify and formulate problems using appropriate group, ring, and field theory terminology and techniques and compute solutions to those problems Compose organized and logical solutions to group, ring, and field theory problems (relevant to F and H also)	D. literacy and numeracy skills
E. Recognize, evaluate and construct logically sound arguments and deductions in group, ring, and field theory	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H.	H. creativity and aesthetic appreciation
I. Observe and discuss how natural, classical questions and theories in algebra may be abstracted, generalized, and extended Apply their foundation in abstract algebra to further studies	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-3270 Number Theory

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate** A U of Windsor graduate will have the ability to demonstrate:
A. Define divisibility and use it in moderately difficult proofs Define, compute, and use in moderately difficult proofs: prime factorization, greatest common divisor, Euclidean Algorithm, lowest common divisor Define modular arithmetic, including polynomial congruences, and use it in moderately difficult proofs State and prove the following theorems and use them in computational problems and proofs: Chinese Remainder Theorem, Fermat's Little Theorem, Wilson's Theorem, Euler's Theorem, Lagrange's Theorem Define primitive roots, prove existence results, and use them in moderately difficult proofs Define quadratic residue and the Legendre symbol, use them in computational and moderately difficult proof problems, and recall and prove standard theories about them such as Euler's Criterion and quadratic reciprocity. All the above apply to D as well.	A. the acquisition, application and integration of knowledge
B. Extend definitions, theorems, and techniques of number theory to prove results of moderate difficulty without being given a prescribed method of solution (relevant to G and H as well) (relevant to C as well)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C.	C. critical thinking and problem-solving skills
D. Identify and formulate problems using appropriate analysis terminology and techniques and compute solutions to those problems Compose organized and logical solutions to analysis problems (relevant to F and H also)	D. literacy and numeracy skills
E. Recognize, evaluate and construct logically sound arguments and deductions in number theory	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H. Discover structure hidden in the integers	H. creativity and aesthetic appreciation
I.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-3550 Introduction to Fourier Series and Special Functions

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate** A U of Windsor graduate will have the ability to demonstrate:
A. Define, compute, and prove results concerning Fourier series Apply the theory of linear operators and inner product spaces to spaces of functions: L^2-spaces, orthogonal bases, eigenfunctions Define, recognize, and solve Sturm-Liouville problems Define and use properties of Bessel functions, Gamma functions, Legendre polynomials	A. the acquisition, application and integration of knowledge
B. Appraise a given problem and determine the appropriate solution strategy (relevant to C as well) Use the definitions, theorems, and techniques of special functions to prove moderately difficult results without being given a prescribed method (also relevant to C, G, and H)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C.	C. critical thinking and problem-solving skills
D. Identify and formulate problems using appropriate special functions terminology and techniques and compute solutions to those problems Compose organized and logical solutions to special functions problems (relevant to F and H also)	D. literacy and numeracy skills
E. Recognize, evaluate and construct logically sound arguments and deductions in special functions	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H. Observe and discuss how techniques from vector calculus and differential equations are combined to study special functions (also relevant to I)	H. creativity and aesthetic appreciation
I.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-3580 Introduction to Analysis I

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate** A U of Windsor graduate will have the ability to demonstrate:
A. Rigourously construct the real and complex numbers and Euclidean spaces Define, recognize, and use basic objects and concepts in pointset topology (in the setting of metric spaces): open and closed sets, closures, complements, neighbourhoods, limit points, interior, perfect sets, bounded sets, density Define and assess convergence, absolute convergence, and limits of sequences and series in metric spaces Define and use the metric space limit and topological definitions of continuity Prove results about differentiation and derivatives using the theoretical framework developed for continuity and limits in metric spaces All the above apply to D as well.	A. the acquisition, application and integration of knowledge
B. Use the definitions, theorems, and techniques of analysis to prove results of moderate difficulty without being given a prescribed method of solution (relevant to G and H as well) (relevant to C as well)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C.	C. critical thinking and problem-solving skills
D. Identify and formulate problems using appropriate analysis terminology and techniques and compute solutions to those problems Compose organized and logical solutions to analysis problems (relevant to F and H also)	D. literacy and numeracy skills
E. Recognize, evaluate and construct logically sound arguments and deductions in analysis	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H. Observe and discuss how natural, classical questions and theories in analysis may be abstracted, generalized, and extended	H. creativity and aesthetic appreciation
I. Apply their foundation in analysis to further studies	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-3581 Introduction to Analysis II

Learning Outcomes: At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate:** A U of Windsor graduate will have the ability to demonstrate:
A. Define, compute, and prove using a rigourous framework properties of the Riemann-Stieltjes integral of a real or vector valued function over a closed interval Define, recognize, prove properties of, and use (for sequences and series of functions) the following: pointwise convergence, uniform convergence, pointwise and uniform boundedness, equicontinuity State, recall the proof of, and use the Stone-Weierstrass Theorem Assess convergence of power series to analytic functions and discuss special functions define and compute the derivative of multivariable vector valued functions and use partial derivatives to represent derivatives with respect to a particular basis state, recall the proof of, and use the Inverse Function Theorem state, recall the proof of, and use the Implicit Function Theorem recall and use the basic theory of linear operators All the above are relevant to D as well.	A. the acquisition, application and integration of knowledge
B. Use the definitions, theorems, and techniques of analysis to prove results of moderate difficulty without being given a prescribed method of solution (relevant to G and H as well) (relevant to C as well)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C.	C. critical thinking and problem-solving skills
D. Identify and formulate problems using appropriate analysis terminology and techniques and compute solutions to those problems Compose organized and logical solutions to analysis problems (relevant to F and H also)	D. literacy and numeracy skills
E. Recognize, evaluate and construct logically sound arguments and deductions in analysis	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H. Observe and discuss how natural, classical questions and theories in analysis may be abstracted, generalized, and extended (relevant to I as well)	H. creativity and aesthetic appreciation
I. Apply their foundation in analysis to further studies	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-3590 Complex Variables

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate** A U of Windsor graduate will have the ability to demonstrate:
A. Define, recognize, and use properties of analytic functions Compute and apply the theory of contour integrals State, recall the proof of, and use Cauchy's Integral Theorem and Cauchy's Integral Formula Recall and apply the theory of series representation of analytic functions, Laurent series State, recall the proof of, and apply Cauchy's Residue Theorem Recall and apply the theory of conformal mappings	A. the acquisition, application and integration of knowledge
B. Appraise a given problem and determine the appropriate solution strategy (relevant to C as well) Use the definitions, theorems, and techniques of complex analysis to prove moderately difficult results without being given a prescribed method (also relevant to C, G, and H)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C.	C. critical thinking and problem-solving skills
D. Identify and formulate problems using appropriate complex analysis terminology and techniques and compute solutions to those problems Compose organized and logical solutions to complex analysis problems (relevant to F and H also)	D. literacy and numeracy skills
E. Recognize, evaluate and construct logically sound arguments and deductions in complex analysis	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H. Observe and discuss how classical questions and theories for real functions extend with remarkable differences to complex functions (relevant to I as well)	H. creativity and aesthetic appreciation
I.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-3800 Numerical Methods

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristics:** A U of Windsor graduate will have the ability to demonstrate:
A. Define, discuss, and analyze round-off error, approximation algorithms and convergence State, perform, and explain the theory of the following algorithms for root-solving: bisection method, fixed-point iteration, Newton's method, Müller's method State, perform, and explain the theory of interpolation methods: Lagrange polynomials, Neville's method, divided differences, Hermite polynomials, cubic splines; extend to approximate parametric curves e.g. Bezier curves State, perform, and explain the theory of numerical differentiation and integration: three-point formulas, five-point formulas, Richardson's extrapolation, numerical quadrature, the Trapezoidal Rule, Simpson's Rule, closed Newton-Cotes formulas, Romberg integration, adaptive quadrature, Gaussian quadrature, Simpson's double integral, Gaussian multiple integral State, perform, and explain the theory of numerical methods for solving initial-value problems for ODEs: Euler's method, Taylor methods, Runge-Kutta-Fehlberg method, multistep methods (e.g. fourth-order Adams-Bashforth technique, fourth-order Adams-Moulton technique), variable step-size multistep methods, Runge-Kutta method for systems, Stiff differential equations State, perform, and explain the theory of numerical linear algebra: pivoting strategies, matrix operations, inverses, determinants, PLU factorization, LDL^t factorization of positive-definite matrices, Cholesky LL^t factorization of positive-definite matrices, Crout factorization for tridiagonal linear systems State, perform, and explain the theory of numerical solutions to nonlinear systems of equations: fixed point methods for functions of several variables, Newton's method for systems, Sherman-Morrison formula, Broyden's method, steepest descent techniques, homotopy/continuation method All the above are relevant to C and D as well.	A. the acquisition, application and integration of knowledge
B.	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C.	C. critical thinking and problem-solving skills
D. Identify and formulate problems using appropriate numerical methods terminology and techniques and compute solutions to those problems Compose organized and logical solutions to problems solved by numerical methods (relevant to F and H also)	D. literacy and numeracy skills

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristics:** A U of Windsor graduate will have the ability to demonstrate:
E. Evaluate computational algorithms for accuracy, stability, convergence, limitations.	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H. Recognize and discuss how to approach problems in previously studied areas of mathematics numerically and computationally. Relevant to I as well.	H. creativity and aesthetic appreciation
I.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-3940 Numerical Analysis for Computer Scientists

Learning Outcomes: At the end of this course, the successful student will know and be able to:	**Characteristics:** A UWindsor graduate will have the ability to demonstrate:
A. State, perform, and explain the theory of the following algorithms for root-solving: iteration/fixed point, bisection method, Newton-Raphson method, secant method State, perform, and explain the theory of the theory of numerical linear algebra: upper triangularization, back substitution, pivoting, LU and PLU factorization, Jacobi iteration, Gauss-Seidel iteration, Seidel iteration for nonlinear systems, Newton's method for nonlinear systems State, perform, and explain the theory of interpolation and polynomial approximation methods: Taylor series, Lagrange polynomial approximation, Newton polynomials State, perform, and explain the theory of curve fitting: least-squares line, power fit, and polynomial; data linearization; splines State, perform, and explain the theory of numerical differentiation: central-difference formulas, Richardson's extrapolation, Lagrange polynomial, Newton polynomial State, perform, and explain the theory of numerical integration: closed Newton-Cotes quadrature formula, composite trapezoidal rule, Simpson's rule, adaptive quadrature State, perform, and explain the theory of numerical optimization: bracketing search methods (golden ratio search, Fibonacci search), methods using derivatives (bracketing the minimum, quadratic interpolation, cubic approximation) State, perform, and explain the theory of algorithms for finding and estimating eigenvalues and eigenvectors: symmetric matrices A = QDQ', Gerschgorin's Circle Theorem, Spectral Radius Theorem, the power method, shifted-inverse power method All the above are relevant to C and D as well.	A. the acquisition, application and integration of knowledge
B. Fit curves to data.	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C.	C. critical thinking and problem-solving skills
D. identify and formulate problems using appropriate numerical methods terminology and techniques and compute solutions to those problems compose organized and logical solutions to problems solved by numerical methods (relevant to F and H also)	D. literacy and numeracy skills
E. Evaluate computational algorithms for accuracy, stability, convergence, limitations.	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills

Learning Outcomes: At the end of this course, the successful student will know and be able to:	**Characteristics:** A UWindsor graduate will have the ability to demonstrate:
H. Recognize and discuss how to approach problems in previously studied areas of mathematics numerically and computationally. Relevant to I as well.	H. creativity and aesthetic appreciation
I.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-3980 Theory of Interest

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate:** A U of Windsor graduate will have the ability to demonstrate:
A. Recall important results about, explain the theory of, and solve problems about interest, bonds, loans, and investment portfolios: compound interest, force of interest, annuities, perpetuities, loan repayment, amortization, sinking funds, bond valuation, rate of return, spot rates, forward rates, duration, immunization, dividend discount model Also relevant to C and D.	A. the acquisition, application and integration of knowledge
B. Recognize different types of investment strategies and be able to create and analyze new types of investment tools as government regulations change.	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C. Employ mathematical finance tools to predict outcomes that have effects on insurance rates, health insurance, and pension funds.	C. critical thinking and problem-solving skills
D. Solve mathematical problems related to investments to demonstrate a detailed understanding of interest rates and their effect. Communicate clearly using the terminology and framework of interest rates.	D. literacy and numeracy skills
E. Make reasonable and ethical predictions of investment outcomes based on interest rate and stock evaluations.	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H. Solve problems in interest and investments creatively.	H. creativity and aesthetic appreciation
I. Recognize that the world's economy is continually changing	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-4220 Introduction to Group Theory

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate** A U of Windsor graduate will have the ability to demonstrate:
A. Illustrate a fundamental knowledge of group theory using the dihedral, cyclic, symmetric, and matrix groups Define, recognize, compute (where relevant) and apply to proofs the following concepts: homomorphisms, isomorphisms, cosets, group actions, orbits, centralizers, normalizers, stabilizers, kernels, composition series (also relevant to D) State and use the four isomorphism theorems State and use Sylow's Theorem Construct and deconstruct groups using direct products, semidirect products, quotients Recall proofs of major results in the course	B. the acquisition, application and integration of knowledge
B. Apply given definitions and theorems to prove complex results in group theory without being given a prescribed method (also relevant to C, G, and H, and I)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C.	C. critical thinking and problem-solving skills
D. Discuss and solve group theory problems using group theory terminology and structural framework compose organized and logical solutions to group theory problems (also relevant to F and H)	D. literacy and numeracy skills
E. recognize, evaluate and construct logically sound arguments and deductions in group theory	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H.	H. creativity and aesthetic appreciation
I.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH- 4300 General Topology

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristic:** A U of Windsor graduate will have the ability to demonstrate:
A. Discuss the concept of cardinality in the context of infinite sets. Apply definitions to prove statements about the cardinality of sets and relations between cardinalities. Apply definitions and theorems to derive the various relationships among normed spaces, metric spaces, topological spaces, Hausdorff spaces, limits, continuity, compactness, completeness, connectedness, and homeomorphisms. Identify, using the terminology of Hausdorff space, Lindelhof space, matric space, first-countable, second-countable, etc., the relationship between convergence and compactness. Apply these abstract relationships to specific examples (for example, the Bolzano-Weierstrass theorem in the real numbers). (also relevant to I) Identify the relationships between boundedness, compactness, continuity, closure, and completeness in abstract topological space or metric space, and apply these relationships in various examples (for example, proving the Heine-Borel theorem or the Intermediate Value theorem in the real numbers). (also relevant to I) Use key theorems in topology (such as the Stone-Weierstrass theorem, Tychonoff's theorem) and reproduce their proofs.	A. the acquisition, application and integration of knowledge
Apply given definitions and theorems to prove novel statements in the domains of set theory, normed and metric spaces, and topological spaces. (also relevant to C, H, and I)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C. See A and B	C. critical thinking and problem-solving skills
D. Interpret and discuss mathematical statements using the technical terminology in the domain of Topology, such as countable, norm, metric, open, closed, compact, connected, complete, second-countable, Hausdorff, Lindelhof, etc. (also relevant to F) Compose well-structured and logically valid proofs of statements in set theory and topology. (also relevant to F and H)	D. literacy and numeracy skills
E. Deconstruct logical arguments in topology and set theory to assess their validity.	E. responsible behaviour to self, others and society
F. Communicate mathematical ideas using the appropriate language, rigour, and detail, given the level of the course.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H. Assess some of the mathematical concerns that underlie set theory, such as cardinality, the axiom of choice, and Russell's paradox. Interpret abstract topological concepts as generalizations of familiar concepts from Calculus and the real numbers, such as limits, continuity, boundedness, etc. (also relevant to I)	H. creativity and aesthetic appreciation

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristic:** A U of Windsor graduate will have the ability to demonstrate:
I. Apply the theorems from the general setting of abstract topological space to particular topological spaces in various areas of mathematics and recognize the variety of uses of set theoretic topology when applied to different mathematical domains. (also relevant to H)	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-4570 Functional Analysis

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate:** A U of Windsor graduate will have the ability to demonstrate:
A. Define, state and prove Hilbert space concepts and properties: inner product, norm, distance, completeness, orthogonality, Pythagorean Theorem, linear functional (equivalence of boundedness and continuity), Riesz Representation Theorem, orthonormal sets and bases, Gram-Schmidt Orthogonalization Process, Fourier transform for the circle, the Riemann-Lebesgue Lemma, direct sums Define, state and prove concepts and properties of operators on Hilbert spaces: bounded linear operators, continuity (equivalence with continuity at 0 or an arbitrary point, boundedness), norms, adjoint of an operator, Hermitian/self-adjoint, normal, unitary, normal isometry, projections, idempotents, compactness, finite rank, separability, eigenvalue, Spectral Theorem for compact self-adjoint operators, Spectral Theorem for compact normal operators, partition of the identity, unitary equivalence Define, state and prove concepts and properties of Banach spaces: norm, normed space, Banach space (constructions from spaces of functions, duals), equivalent norms, finite dimensional normed spaces, quotients and products of normed spaces, ℓ^p, Riesz Representation Theorem, the Hahn-Banach Theorem, Runge's Theorem, quotient space and subspace duals, reflexive spaces, the Inverse Mapping Theorem, the Open Mapping Theorem, the Closed Graph Theorem, the Principle of Uniform Boundedness, weak and weak* topologies All the above are relevant to C and D as well.	B. the acquisition, application and integration of knowledge
B. Extend given definitions, techniques, and theorems to prove complex results in functional analysis without being given a prescribed method (also relevant to C, G, and H, and I)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C.	C. critical thinking and problem-solving skills
D. discuss and solve functional analysis problems using real analysis terminology and structural framework compose organized and logical solutions to functional analysis problems (also relevant to F and H)	D. literacy and numeracy skills
E. recognize, evaluate and construct logically sound arguments and deductions in functional analysis	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H.	H. creativity and aesthetic appreciation
I.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-4580 Measure Theory and Integration

Learning Outcomes: At the end of this course, the successful student will know and be able to:	**Characteristics:** A UWindsor graduate will have the ability to demonstrate:
A. Define, recognize, discuss, prove properties of, and employ orderings, cardinality, metric spaces, σ-algebras Define, recognize, discuss, prove properties of and employ measures, measurable sets, measure spaces Define and prove properties of outer measures. Prove the construction of measure spaces from outer measures using Caratheodory's Theorem. Define and prove standard properties of Borel measures Define and prove standard properties of Lebesgue measure Define, recognize, and prove standard properties of measurable functions on sets with σ-algebras and on metric spaces Integrate measurable functions (non-negative, real, complex) State, prove, and employ the Monotone Convergence Theorem, Fatou's Lemma, and the Dominated Convergence Theorem Discuss and prove equality of the Riemann integral and Lebesgue integral Define, recognize, and employ sequences that are Cauchy in measure and sequences which converge in measure Define and employ product measures. State and prove standard properties and Fubini's Theorem Extend Lebesgue measure to $\mathbb{R}^n$ and discuss and prove standard properties and the properties of Lebesgue measurable functions Define and discuss signed measures. State, prove, and apply the Hahn Decomposition Theorem and the Jordan Decomposition Theorem State, prove, and employ the Radon-Nikodym Theorem. Define, recognize, and prove properties of L^p spaces and their duals including Minkowski's and Holder's Inequalities. All the above are relevant to C and D as well.	A. the acquisition, application and integration of knowledge
B. Extend given definitions, techniques, and theorems to prove complex results in real analysis without being given a prescribed method (also relevant to C, G, and H, and I)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C.	C. critical thinking and problem-solving skills
D.Discuss and solve real analysis problems using real analysis terminology and structural framework Compose organized and logical solutions to real analysis problems (also relevant to F and H)	D. literacy and numeracy skills
E. Recognize, evaluate and construct logically sound arguments and deductions in real analysis	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills

Learning Outcomes: At the end of this course, the successful student will know and be able to:	**Characteristics:** A UWindsor graduate will have the ability to demonstrate:
H. Discuss how the classical theory of integration is generalized	H. creativity and aesthetic appreciation
I.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-4581 Real Analysis II

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate:** A U of Windsor graduate will have the ability to demonstrate:
A. Define, state and prove metric space concepts and properties: open and closed sets, neighbourhood, separability, continuous functions, homeomorphisms, convergence, completeness, uniform continuity, subspaces, compactness (equivalence with Bolzano-Weierstrass property and sequential compactness), Baire Category Theorem, Ascoli-Arzela Theorem Define, state and prove topological space concepts and properties: open and closed sets, bases, countability, continuous functions, separation axioms (T_1/Tychonoff, T_2/Hausdorff, T_2/regular, T_4/normal spaces), Urysohn's Lemma, Tietze's Extension Theorem, Urysohn Metrization Theorem, connectedness, products of topological spaces, convergence, nets Define, state and prove concepts and properties of compact and locally compact topological spaces: compactness, countably compact (equivalence with Bolzano-Weierstrass property, sequential compactness), products and Tychonoff's Theorem, σ-compactness, paracompact spaces, manifolds, Stone-Cech Compactification, Stone-Weierstrass Theorem All the above are relevant to C and D as well.	A. the acquisition, application and integration of knowledge
B. Extend given definitions, techniques, and theorems to prove complex results in real analysis without being given a prescribed method (also relevant to C, G, and H, and I)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C.	C. critical thinking and problem-solving skills
D. Discuss and solve real analysis problems using real analysis terminology and structural framework Compose organized and logical solutions to real analysis problems (also relevant to F and H)	D. literacy and numeracy skills
E. Recognize, evaluate and construct logically sound arguments and deductions in real analysis	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H.	H. creativity and aesthetic appreciation
I.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-4980 Actuarial Mathematics I

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate** A U of Windsor graduate will have the ability to demonstrate:
A. Recall important results about, explain the theory of, and solve problems about life contingency models: life insurance, pensions, future lifetime random variable, curtate future lifetime, life tables, survival models, insurance benefits, annuities, premiums	A. the acquisition, application and integration of knowledge
B. Analyze life contingencies models.	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C. Employ mathematical tools to study life contingencies.	C. critical thinking and problem-solving skills
D. Communicate clearly using the terminology and framework of life contingencies. (Also relevant to F.) Solve mathematical problems related to life contingencies.	D. literacy and numeracy skills
E. Responsibly apply the theory of life contingencies in insurance and pensions.	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H. Show in mathematical solution of problems in life contingencies	H. creativity and aesthetic appreciation
I.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: MATH-4981 Actuarial Mathematics II

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate** A U of Windsor graduate will have the ability to demonstrate:
A. Recall important results about, explain the theory of, and solve problems about life contingency models: policy values, future loss random variable, Thiele's differential equation, multiple state models (alive-dead, permanent disability, joint life and last survivor), Kolmogorov's forward equations, pensions, interest rate risk, profit testing for life insurance	A. the acquisition, application and integration of knowledge
B. Analyze life contingencies models.	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C. Employ mathematical tools to study life contingencies.	C. critical thinking and problem-solving skills
D. Communicate clearly using the terminology and framework of life contingencies. (Also relevant to F.) Solve mathematical problems related to life contingencies.	D. literacy and numeracy skills
E. Responsibly apply the theory of life contingencies in insurance and pensions.	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H. Show creativity in mathematical solution of problems in life contingencies	H. creativity and aesthetic appreciation
I.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: STAT-2920: Introduction to Probability

Learning Outcomes: At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate:** A U of Windsor graduate will have the ability to demonstrate:
A Define and describe statistical experiments, events (outcomes of experiments), probability of events; random variables; Distinguish between discrete and continuous random variables Define and describe distribution of random variables such as: Bernoulli, Binomial, Negative binomial, Geometric, hypergeometric, Uniform discrete, Uniform continuous, Beta family, Gamma family, Normal, Student's t, Chi square, and F-distribution. Define and describe quantities such as mean, variance, and standard deviation of random variables(distributions) Define and describe moments of random variables Compute moments of some commonly used distributions	B. the acquisition, application and integration of knowledge
B. Identify the types of outcomes of interest for a given real-life experiment (phenomena) and describe a suitable distribution for the outcomes identified. Compute means, variances and probabilities related to the outcomes of interest	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
Critically evaluate the adequacy and accuracy of probability models used in describing real-life phenomena in area such as finance.	C. critical thinking and problem-solving skills
Analyze and evaluate probability models and apply them to real life data problems when reading applied and empirical statistics and financial literature.	D. literacy and numeracy skills
Assess carefully any application of statistical methods to the analysis of data knowing that the conclusions thereof are to be used in making decisions that influence the society	E. responsible behaviour to self, others and society
Communicate the findings of the analysis and application of probability models in a clear and understandable way.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
Independently formulate applied problems in probability theory.	H. creativity and aesthetic appreciation
Expand his or her knowledge of probability theory by reading academic papers involving financial models.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: STAT-2950: Introduction to Statistics

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate** A U of Windsor graduate will have the ability to demonstrate:
A Define and compute descriptive statistics for a given data set (mean, median, variance, standard deviation, quartiles and graphical descriptions) Describe and recognize the probability models associated with more than one variable and their moments Define and describe conditional probabilities and conditional moments Perform Statistical inferences such as estimation and hypothesis testing for a given statistical model. Apply these inference techniques to financial and other applied real-life data sets.	H. the acquisition, application and integration of knowledge
B. Formulate hypotheses and estimation problems related to questions of interest and identify associated statistical populations to a given sample data. Read research literature in applied scientific areas and identify the statistical tools used for testing, estimation and inference about the questions of interest	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
Critically evaluate the adequacy and accuracy of statistical methods in applied works.	C. critical thinking and problem-solving skills
Identify the statistical methodologies used to solve real life data analysis problems when reading applied, empirical, and financial literature.	D. literacy and numeracy skills
Assess carefully any application of statistical methods to the analysis of data knowing that the conclusions thereof are to be used in making decisions that influence society	E. responsible behaviour to self, others and society
Communicate the findings resulting from the application of Statistical models in a clear and understandable way.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H. Independently formulate real-life questions in statistical models.	H. creativity and aesthetic appreciation
I. Expand his or her knowledge of statistical methodologies by reading academic papers involving statistical and financial models.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: STAT-3920: Probability

Learning Outcomes: At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate:** A U of Windsor graduate will have the ability to demonstrate:
A Define, explain, and solve problems related to probability theory (axioms of theory of probability, discrete and continuous probability distributions including binomial, Poisson, exponential, normal, chi-square, gamma, t, and F distributions; multivariate distributions, conditional distributions, independence, expectation; moment generating functions, characteristic functions; transformation of random variables, order statistics, law of large numbers and central limit theorem); Apply the knowledge to financial problems.	A. the acquisition, application and integration of knowledge
B. Recognize contexts and circumstances where more complex probabilistic problems arise Describe suitable probabilistic models to deal with problems in statistics and finance.	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C. Critically evaluate the adequacy and accuracy of probability models in statistics and other applied works.	C. critical thinking and problem-solving skills
D. Analyze and evaluate probability models and apply them to real life data problems when reading applied and empirical statistics and financial literature.	D. literacy and numeracy skills
E.	E. responsible behaviour to self, others and society
F. Orally present logical solutions to probability problems Work with a group of peers to solve probability problems. (Both of the above are also relevant to G)	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
Independently formulate and solve applied problems in probability theory.	H. creativity and aesthetic appreciation
Expand his or her knowledge of probability theory by reading academic papers involving financial models.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: STAT-3950: Statistics

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate** A U of Windsor graduate will have the ability to demonstrate:
A Define, explain and solve problems related to statistical theory (estimation: point and interval estimations, properties of estimators, methods of estimation: least squares, maximum likelihood and Bayesian, Rao-Blackwell theorem, hypothesis testing and data analysis); and Apply this knowledge to financial problems.	A. the acquisition, application and integration of knowledge
B. Recognize contexts and circumstances where more complex statistics problems arise Describe suitable methodologies to deal with problems in statistics and finance.	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C. Critically evaluate the adequacy and accuracy of statistical methods in theoretical statistics and other applied statistical works.	C. critical thinking and problem-solving skills
D. Evaluate statistical methodologies to apply them to real life data analysis problems when reading applied and empirical statistics and financial literature.	D. literacy and numeracy skills
E.	E. responsible behaviour to self, others and society
F. Orally present logical solutions to statistical problems Work with a group of peers to solve statistics problems. (Both of the above are also relevant to G)	F. interpersonal and communications skills
G. .	G. teamwork, and personal and group leadership skills
H. Independently formulate applied problems in statistics Provide solutions.	H. creativity and aesthetic appreciation
I. Expand his or her knowledge of statistical methodologies by reading academic papers involving statistical and financial models.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: STAT-4980 Experimental Design

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate** A U of Windsor graduate will have the ability to demonstrate:
A. Design experiments using factorial designs with and without interactions, randomized block, Latin square, balanced incomplete block, nested design, confounding factorial and other designs. Utilize fixed, random and mixed models. All the above are relevant to C and D as well.	F. the acquisition, application and integration of knowledge
B. Extend given definitions, techniques, and theorems to prove complex results in experimental design without being given a prescribed method. Recognize relevant examples, formulate conjectures based on these examples, prove/disprove/discard as intractable these conjectures. (also relevant to C, G, and H, and I)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C.	C. critical thinking and problem-solving skills
D. discuss and solve experimental design problems using the relevant terminology and structural framework compose organized and logical solutions to experimental design problems (also relevant to F and H)	D. literacy and numeracy skills
E. Recognize, evaluate and construct logically sound arguments and deductions in experimental design.	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H.	H. creativity and aesthetic appreciation
I.	I. the ability and desire for continuous learning

COURSE NUMBER AND TITLE: STAT-4981 Sampling Theory

Learning Outcomes At the end of this course, the successful student will know and be able to:	**Characteristics of a UWindsor Graduate** A U of Windsor graduate will have the ability to demonstrate:
A. Utilize sampling methods including simple random, stratified, cluster, PPS and multistage, ratio and regression estimates. All the above are relevant to C and D as well.	G. the acquisition, application and integration of knowledge
B. Extend given definitions, techniques, and theorems to prove complex results in the theory of sampling and surveys without being given a prescribed method. Recognize relevant examples, formulate conjectures based on these examples, prove/disprove/discard as intractable these conjectures. (also relevant to C, G, and H, and I)	B. research skills, including the ability to define problems and access, retrieve and evaluate information (information literacy)
C.	C. critical thinking and problem-solving skills
D. Discuss and solve problems in the theory of sampling and surveys using the relevant terminology and structural framework Compose organized and logical solutions to sampling and surveys problems (also relevant to F and H)	D. literacy and numeracy skills
E. Recognize, evaluate and construct logically sound arguments and deductions in the theory of sampling and surveys.	E. responsible behaviour to self, others and society
F.	F. interpersonal and communications skills
G.	G. teamwork, and personal and group leadership skills
H.	H. creativity and aesthetic appreciation
I.	I. the ability and desire for continuous learning

University of Windsor
Senate

5.7.1: **Revisions to Bylaws 54 and 55**

Item for: **Approval**

Forwarded by: **Senate Governance Committee, SGC Bylaw Review Committee**

MOTION: That proposed revisions to Bylaw 54 and Bylaw 55 be approved.

Proposed Revisions to Bylaw 54:
[changes are in bold and strikethrough]

[…]

2.1 By the first day of each course, the Instructor must provide students with a course outline (hard copy or electronic) which includes precise information concerning the following:

[…]

2.1.2 the approximate dates for tests, handing in assignments, and all other activities (except unannounced quizzes), which will affect the final course grade~~, as well as the dates of the final examination period and the date, given in Schedule A, that the non-optional final exam schedule will be posted~~**.**

[…]

2.1.8 information regarding the University's mental health resources.

2.1.**9**~~8~~ and any other matters mandated by University, Senate, or Faculty Policy.

[…]

2.9 In exceptional circumstances, where it is necessary for an Instructor to schedule a test outside of the regularly scheduled class time, ~~s/he shall make~~ appropriate alternative arrangements **shall be made** to accommodate students who have a class schedule conflict at that time or for whom the scheduled tests cause extraordinary hardship.

[…]

2.12.2 Students have the right to review the instructor's marking/answer guide, when available, and to examine their final examination answer papers; such papers shall be made available in the Instructor's office or, where more appropriate, in the AAU office(s) or other university office(s), for a period of not less than twelve months. (It is understood that availability implies the student's right of access to the answer paper, and may even include, in cases where it is obvious or the student confirms in writing that no appeal is contemplated and that ~~s/he~~ **the instructor** does not desire that the paper be retained, return of the paper to the student before the expiration of the twelve-month holding period.)

[…]

2.18 Considerations for Health, Bereavement, or Extenuating Circumstances

2.18.1 Informal Request: A student who wishes to receive consideration on matters affecting or shown to affect ~~his/her~~ academic performance **based on medical or compassionate grounds**, such as, **bereavement, or**

serious **mental or physical** health circumstances ~~or bereavement based on medical or compassionate grounds~~, or unanticipated extenuating circumstances beyond the control of the student (e.g., jury duty, caring for an ill family member, labour disputes, etc.), should communicate with the Instructor as soon as possible, prior to, during, and subsequent to the examination period, or at the time when a student's performance is evaluated for the purpose of assigning a grade, taking into account the severity of the illness, bereavement, or other extenuating circumstance. The instructor may choose to handle the matter informally. Whether or not informal resolution is obtained, a formal request through the Office of the Registrar is also possible in accordance with paragraph 2.18.2.

2.18.2 Formal Request: A student who wishes to receive consideration on matters affecting or shown to affect ~~**his/her**~~ academic performance **based on medical or compassionate grounds**, such as, **bereavement, or** serious **mental or physical** health circumstances ~~or bereavement based on medical or compassionate grounds~~, or unanticipated extenuating circumstances beyond the control of the student (e.g., jury duty, caring for an ill family member, labour disputes, etc.), should communicate with the Office of the Registrar as soon as possible, prior to, during, and subsequent to the examination period, or at the time when a student's performance is evaluated for the purpose of assigning a grade, taking into account the severity of the illness, bereavement, or other extenuating circumstance. A letter of rationale, requesting alternate evaluation or accommodation, and supporting documents (e.g. ~~**the attending physician's letter**~~ **a completed medical note from a regulated health care professional (see Policy on Medical Notes from Regulated Health Care Professionals)**, the call to jury duty) must be submitted to the Office of the Registrar forthwith and will be forwarded to the Dean of the Faculty in which the course is offered. If the Dean of the Faculty offering the course finds the grounds sufficient, the student's request will be forwarded to the Instructor who shall provide an alternate evaluation or accommodation. The Dean of the Faculty offering the course shall inform the student and the Office of the Registrar of the approved alternate evaluation or accommodation.

2.18.2.1 Following receipt of the letter of rationale and supporting documents by the Office of the Registrar, and until the Dean of the Faculty offering the course has communicated ~~**his/her**~~ **a** decision to the Office of the Registrar, a stay on all decisions affecting a student's standing in a program or eligibility to proceed with a course of study, shall be in effect until a final decision has been reached. The Dean of the Faculty offering the course shall communicate ~~**his/her**~~ **the** decision in writing or electronically to the Office of the Registrar within four weeks of receipt of the letter of rationale and supporting documents by the Office of the Registrar.

Proposed Revisions to Bylaw 55:
[changes are in bold and strikethrough]

[…]

1.1 By the first day of each course, the Instructor must provide students with a course outline (hard copy or electronic) which includes precise information concerning the following:

[…]

1.1.2 the approximate dates for tests, handing in assignments, and all other activities (except unannounced quizzes), which will affect the final course grade~~**, as well as the dates of the final examination period and the date, given in Schedule A, that the non-optional final exam schedule will be posted**~~.
[…]

1.1.8 information regarding the University's mental health resources.

1.1.~~**9**~~**8** and any other matters mandated by University, Senate, or Faculty Policy.

[…]

1.11 Considerations for Health, Bereavement, or Extenuating Circumstances

1.11.1 Informal Request: A student who wishes to receive consideration on matters affecting or shown to affect ~~his/her~~ academic performance **based on medical or compassionate grounds**, such as, **bereavement, or** serious **mental or physical** health circumstances ~~or bereavement based on medical or compassionate grounds~~, or unanticipated extenuating circumstances beyond the control of the student (e.g., jury duty, caring for an ill family member, labour disputes, etc.), should communicate with the Instructor as soon as possible, prior to, during, and subsequent to the examination period, or at the time when a student's performance is evaluated for the purpose of assigning a grade, taking into account the severity of the illness, bereavement, or other extenuating circumstance. The instructor may choose to handle the matter informally. Whether or not informal resolution is obtained, a formal request is also possible in accordance with paragraph 1.11.2.

1.11.2 Formal Request: A student who wishes to receive consideration on matters affecting or shown to affect ~~his/her~~ academic performance **based on medical or compassionate grounds**, such as, **bereavement, or** serious **mental or physical** health circumstances ~~or bereavement based on medical or compassionate grounds~~, or unanticipated extenuating circumstances beyond the control of the student (e.g., jury duty, caring for an ill family member, labour disputes, etc.), should communicate with the Head of the AAU offering the course and the Faculty of Graduate Studies as soon as possible, prior to, during, and subsequent to the examination period, or at the time when a student's performance is evaluated for the purpose of assigning a grade, taking into account the severity of the illness, bereavement, or other extenuating circumstance. A letter of rationale, requesting alternate evaluation or accommodation, and supporting documents (e.g. ~~**the attending physician's letter**~~ **a completed medical note from a regulated health care professional (see Policy on Medical Notes from Regulated Health Care Professionals)**, the call to jury duty) must be submitted to the Faculty of Graduate Studies forthwith and will be forwarded to the Head of the AAU offering the course. The Head of the AAU offering the course shall consult with the instructor and make a recommendation to the Dean of Graduate Studies. If the Dean of Graduate Studies approves the recommendation, the Head of the AAU offering the course shall make appropriate arrangements for the alternate evaluation or accommodation. The Dean of Graduate Studies shall inform the student and the Office of the Registrar of the approved alternate evaluation or accommodation.

1.11.2.1 Stays: Following receipt of the letter of rationale and supporting documents, and until the Dean of Graduate Studies has communicated ~~**his/her**~~ **a** decision to the Office of the Registrar, a stay on all decisions affecting a student's standing in a program or eligibility to proceed with a course of study, shall be in effect until a final decision has been reached. The Dean of Graduate Studies shall communicate ~~**his/her**~~ **the** decision to the Office of the Registrar within four weeks of receipt of the letter of rationale and supporting documents.

[…]

1.12.2 Formal Grade Appeals

1.12.2.1 Any formal grade appeal must be accompanied by $20.00 fee which will be refunded to the student if ~~**his/her**~~ **the** grade is raised.

1.12.2.2 Where the student is contemplating a formal appeal, ~~**s/he**~~ **the student** shall have the right to review ~~**his/her**~~ **the** work for which a grade has been assigned, upon reasonable notice to the instructor.

1.12.2.3 Where an individual Instructor's grade is in question, a formal letter of appeal, including reasons for the appeal and any factual information bearing on the appeal, shall be addressed to the Dean of Graduate Studies. Appeals must be received no later than three weeks after the final mark has been released by the Office of the Registrar. The Dean of Graduate Studies will then contact the AAU Head of the academic unit offering the course and request an academic investigation into the appeal. The AAU Head concerned will consult the Instructor involved and at least one other faculty member of the AAU in evaluating the appeal;

if the AAU Head is the Instructor, ~~**a designate of**~~ the Dean of Graduate Studies will **assign a designate** ~~act in his/her place~~. After the AAU Head submits a report to the Dean of Graduate Studies, the appeal will be submitted to the Graduate Executive Committee for a decision.

Rationale:

- Wording was added to ensure that students are informed of the dates of the exam period and the date of the posting of the official exam schedule, and to underscore that it is their responsibility to ensure that they are available to write the exam at the officially announced time.
- As directed by Senate at its May 10, 2019 meeting, the Bylaw Review Committee considered how best to underline the importance of mental health issues and mental health considerations in bylaws 54 and 55. The Bylaw Review Committee agreed that the bylaws should require that course syllabi include information on the University's mental health resources (which can be found at www.uwindsor.ca/wellness). The Committee also made adjustments to the language to explicitly establish that mental health issues will be considered under bylaw 54, 2.18 and bylaw 55, 1.11.
- Housekeeping changes to remove gender binary language.