PHS6317
NANO-ENGINEERING OF THIN FILMS

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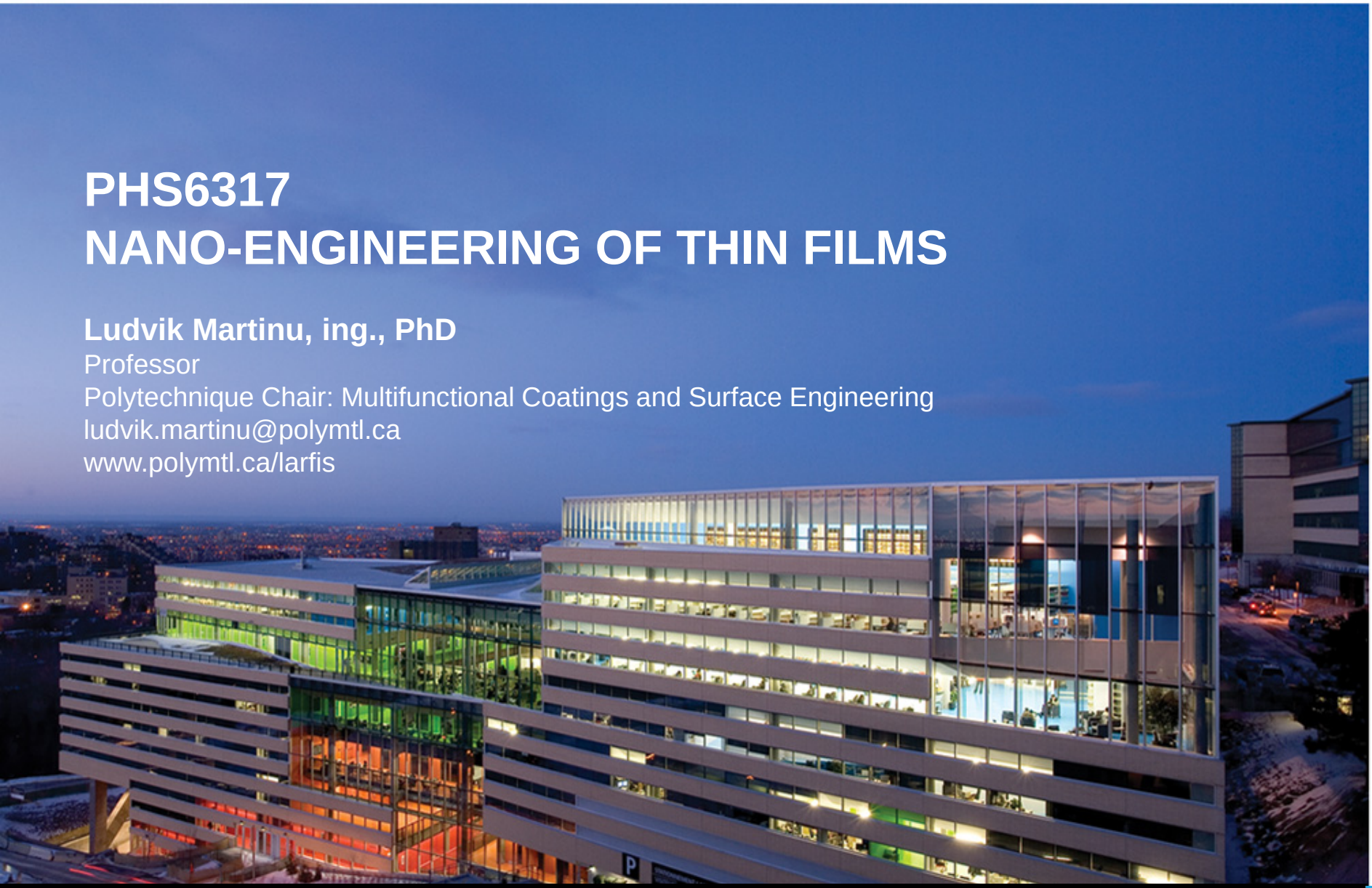

Winter 2024

Bienvenue - Welcome

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PHS 6317 Nanoengineering of thin films

Course schedule – Winter 2024

12 January	Introduction – Scientific and technological challenges
19	Fabrication methods – Vacuum physics and vapor-phase techniques
26*	Fabrication methods – Plasma processes
2 February	Fabrication methods - Plasma-surfaces interactions and diagnostics
9*	Fabrication methods – Thermal/Plasma spray technologies
16***	Optics of thin films 1, optical characterization, *Miniquiz1 (5%)*
23**	Optics of thin films 2, design of optical filters
1* March	*Presentations – Emerging fabrication techniques (30%)*
March 4-8 - Winter/Spring break	
15***	Tribomechanical properties of films and coatings
22**	Electrochemical properties – corrosion and tribo-corrosion*(filter-20%)*
5 April	Passive functional films and coatings, *Miniquiz 2 (5%)*
12	Active functional films and coatings
16	Life cycle analysis and environmental impact
19***	*Presentations – Emerging applications of nanostructured films (40%)*

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Deadlines:

Project #1 – Fabrication technique:

Choice of the subject: **26 January**

Abstract and references: **9 February**

Report and presentation: **1st March**

Projet #2 – Design of an optical filter:

Choice of the subject: **16 February**

Report: **22 March**

Projet #3 – Application of nanostructred thin films:

Choice of the subject: **16 February**

Abstract and references: **15 March**

Report and presentation: **19 April**

Evaluation

1. **Project 1:** Bibliographic research on an emerging fabrication technique of thin films - Report and presentation 30%

2. **Project 2:** Design of an optical filter - Report 20%

3. **Project 3:** Bibliographic research on a specific application of the nano- engineering of thin films - Report and presentation 40%

4. **Miniquiz** 1 and 2 (@ 5%) 10%

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Project 1: Bibliographic reserach on an emerging fabrication technique; Report and presentation (20% + 10% = 30%)

Deliverables: Report – max 10 pages (letter size, 2 cm margins, Times New Roman 12 pts single space)

Structure and contents:

Summary – abstract

Introduction: challenges, possible approaches, choice of the subject and its justification

Scientific description of the fabrication technique: principles of operation, background theory, experimental set up, advantages and disadvantages, open questions

Conclusions

Bibliography – papers from refereed journals

Evaluation:

Scientific depth – 50%
Structure, clarity, consistency, critical sense – 30%
Form – how smooth reading and listening, quality of figures and tables, language – 20%

Deadlines:

Choice of the subject: ..... **26 January**
Summary (150 words) and list of references: **9 February**
Report and presentation: ..... **1st March**

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Project 2: Design of an optical filter (20%)

Specific requirements:

Deliverables: Report, maximum 8 pages (letter size paper, 2 cm margins, Times new roman 12 pts)

Structure and contents:

- Introduction – describe the choice of the specific filter
- Optical specifications of the filter: spectral characteristics in T and R, tolerances
- Methodology of the design (architecture, materials, optimization,…)
- Discussion of the performance and sensitivity to the fabrication process
- Conclusions

Deadlines:

Choice of the filter: .. **16 February**

Report: …….. **22 March**

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Project 3: Bibliographic reserach on an emerging application of the nanoengineering of thin films; Report and presentation (30% + 10% = 40%)

Deliverables: Report – max. 16 pages (letter size, 2 cm margins, Times New Roman 12 pts single space)

Structure and contents:

Summary – abstract

Introduction: challenges and problems, possible approaches

Scientific description of the solution: principles of operation, background theory, experimental set up, advantages and disadvantages, impact, open questions

Conclusions

Bibliography – papers from refereed journals

Evaluation:

Scientific depth – 50%
Structure, clarity, consistency, critical sense – 30%
Form – how smooth reading and listening, quality of figures and tables, language – 20%

Deadlines:

Choice of the subject:	**26 January**
Summary (150 words) and list of references:	**9 February**
Report and presentation:	**1st March**