

CHEM 4100: Materials Chemistry

Department of Chemistry, Faculty of Science, University of Manitoba

General Information

Class time: Tuesday/Thursday 1:00-2:15 PM (3 credit hours)

Location: 350 Helen Glass Centre

First class: 5 September 2019

Last class: 5 December 2019

Instructors

Prof. Scott Kroeker (coordinator)
458 Parker Building

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204-474-9335

Dr. Angela Kuchison
520D Parker Building

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Office hours by appointment

Evaluation

Evaluation will be based on the following components:

- written assignments (2) 2x10%
- test 1 30%
- oral/written presentation 20%
- test 2 30%

A 90-minute test will be held during class-time on Tuesday, 15 October 2019.

A 90-minute test emphasizing the second half of the course will be held during class-time on Thursday, 5 December 2019.

There will be no deferred tests. Alternate assignments will be given to those who cannot attend the tests for eligible and documented reasons.

Feedback prior to deadline for voluntary withdrawal (18 November 2019) will consist of two assignments and the first test.

Further details will be provided separately about the presentation. Briefly, it will consist of a proposal (due mid-October), an abstract (due early November), an oral presentation (19-26 November 2019) and a written paper (due December 3).

Grading Scheme

95-100%	A+	75-79%	C+
90-94%	A	70-74%	C
85-89%	B+	60-69%	D
80-84%	B	0-59%	F

Academic Integrity

The University of Manitoba takes academic integrity seriously. There are many supports available to assist you in completing your studies with integrity. Please see the following webpages for resources and more information:

<https://www.sci.umanitoba.ca/undergraduate-students/academic-resources/academic-integrity-2/>
<http://umanitoba.ca/academicintegrity/>

Student Accessibility

Students with disabilities should contact Student Accessibility Services to facilitate the implementation of accommodations. Please contact the instructors to discuss their recommended accommodations.

Course Content

Prerequisites: CHEM 3400 and its prerequisites

General overview: This course emphasizes the synthesis, processing, properties and applications of a wide range of materials, providing insight into the chemistry behind many common and high-tech materials.

Textbook

Mary Anne White, *Physical Properties of Materials*, Second Edition, CRC Press, 2011 (Or Third Edition, Routledge, 2018)

Topical Outline (tentative):

Sept. 5	Zeolite structure and function	SK
Sept. 10	Microporous catalysts	SK
Sept. 12	Mesoporous materials	SK
Sept. 17	Fundamentals of glass science	SK
Sept. 19	Glass optical fibres	SK
Sept. 24	Bioactive and nuclear waste glasses	SK
Sept. 26	Electrical conductivity	SK
Oct. 1	Semiconductor junctions	SK
Oct. 3	Light-emitting diodes and lasers	SK
Oct. 8	Thin-film photovoltaics	SK
Oct. 10	Dye-sensitization of metal oxides	AK
Oct. 15	<i>Midterm test</i>	
Oct. 17	Characteristics of dye-sensitized solar cells (DSCs)	AK
Oct. 22	Inorganic dye design in DSCs	AK
Oct. 24	Organic dye design in DSCs	AK
Oct. 29	History and conductivity of conjugated polymers	AK
Oct. 31	Organic solar cells	AK
Nov. 5	Organic light emitting diodes	AK
Nov. 7	Polyaniline in medical devices	AK
Nov. 12	<i>Fall Term Break - no classes</i>	
Nov. 14	<i>Fall Term Break - no classes</i>	
Nov. 19	<i>Student presentations</i>	SK/AK
Nov. 21	<i>Student presentations</i>	SK/AK
Nov. 26	<i>Student presentations</i>	SK/AK
Nov. 28	H ₂ generation from dyes	AK
Dec. 3	H ₂ generation from nanoparticles (<i>Project paper due</i>)	AK
Dec. 5	<i>Final test</i>	