

# University of Manitoba Faculty of Agricultural & Food Sciences Department of Biosystems Engineering

Course	Details

Course Title & Number:	BIOE 7270 Advanced Seminar in Biosystems Engineering
Number of Credit Hours:	3
Class Times & Days of Week:	Tuesdays and Thursdays, 10:00 - 11:15 am
Location for classes/labs:	TIER Rm: 405
Pre-Requisites:	Students must be registered in the Biosystems Engineering PhD Program. Students registered in the Graduate Specialization in Engineering Education within the Biosystems PhD Program should also enroll in this course.
Instructors:	Kari Zacharias, Centre for Engineering Professional Practice and Engineering Education <u>kari.zacharias@umanitoba.ca</u> Wen Zhong, Department of Biosystems Engineering
	wen.zhong@umanitoba.ca

## **Course Description:**

A series of seminars to be given by Ph.D. candidates on research topics of current interest in Biosystems Engineering and Engineering Education.

# **General Course Information**

## Who should take this course?

This is a required course for Ph.D. students in Biosystems Engineering, including those in the Graduate Specialization in Engineering Education.

## Why is this course useful?

Biosystems Engineering is a broad discipline that spans many research areas. Although the individual student cannot be expected to become an expert in all sub-disciplines within Biosystems Engineering, it is important that an individual graduating from this department be aware of the breadth of sub-disciplines that comprise the discipline of Biosystems Engineering. The course will also introduce doctoral students to post-PhD life in the Canadian context, with an emphasis on grantsmanship and the review/evaluation of technical papers.

# **Course Objectives**

To give Ph.D. students:

- 1. Exposure to the breadth of research topics within the discipline of Biosystems Engineering.
- 2. Insights into post-PhD life in the Canadian context.
- 3. Experience in grantsmanship and the review/evaluation of research proposals.
- 4. Experience in the review/evaluation of technical papers.

## **Textbook, Readings, Materials**

All required course materials will be posted on the UM Learn Portal.

## **Class Schedule**

Sep 10:	Course overview; orientation to Department of Biosystems Engineering. Discussion of Literature Survey assignment.	
Sep. 12:	Discussion: Strategies for reading academic writing	
Sep 17:	Grantsmanship: Writing for the purpose of securing research funding (differences between basic & applied research, differences between a research project & a research program); EDI in research. Discussion of Research Proposal assignment.	
Sep. 19:	Reading discussion: Writing effective proposals (read in advance: Adam Przeworski & Frank Salomon, "On the Art of Writing Proposals")	
Sep 24:	Students will present the results of the Literature Survey assignment.	
Sep. 26:	Discussion/group feedback on Literature Survey presentations	
Oct 1:	Understanding the role of peer review in the scientific process; technical society journals vs predatory journals; strategies for reviewing a manuscript. Discussion of Manuscript Review assignment.	
Oct. 3:	Reading discussion: Merit and academic norms (read in advance: Mary Blair-Loy & Erin A. Cech, Chapter 1: Misperceiving Merit, Excellence, and Devotion in Academic STEM, in <i>Misconceiving Merit: Paradoxes of Excellence and Devotion in Academic Science and Engineering</i> )	
Oct 8:	The importance of technical societies for lifelong learning and professional development.	
Oct. 10:	Reading discussion: Time and time management (read in advance: Oili-Helena Ylijoki & Hans Mäntylä, "Conflicting time perspectives in academic work")	

- **Oct 15:** Class time devoted to discussion of scientific manuscript reviews for peer reviewed journals.
- **Oct. 17:** Discussion: Designing a research question
- Oct 22: Preparing for a career in academia I
- Oct. 24: Reading discussion: Mental health in academia (read in advance: Maria Alejandra Quijada, "My Mental Health Struggles in Academia: What I Wish All Business School Faculty, Students, and Administration Knew")
- **Oct 29:** Strategies for evaluation of research proposals.
- Oct 31: Reading discussion: Collaboration in academia (read in advance: Diane Sonnenwald, "Scientific Collaboration")
- **Nov 5:** Preparing for a career in academia II
- **Nov. 7:** Group review of research proposals
- **Nov 19:** Preparing for a career outside of academia I
- **Nov. 21:** Group review of research proposals
- **Nov 26:** Preparing for a career outside of academia II
- **Nov. 28:** Discussion: Sharing/presenting your research effectively
- Dec 3: Students will make an oral presentation describing the content of their research proposal.

# **Course Evaluation Methods**

Students will be expected to complete the following term assignments.

Assignment	Allocation	Description	Due Date
Literature	15%	Biosystems Engineering and Engineering Education are both broad	Sep 24
Survey		disciplines that span many research areas. Although an individual	
		student cannot be expected to become an expert in all sub-	
		disciplines within their field, it is important to be aware of the	
		breadth of sub-disciplines that comprise it. For this assignment,	
		each student will write and present a short literature review of	
		recent scholarship in the sub-discipline of Biosystems Engineering	
		or Engineering Education that relates to their own thesis project.	
		This assignment has two parts:	
		i) Find 5 papers related to your sub-discipline that have been	
		published in refereed scientific journals in the past 3 years and	

		prepare a written document in the format of an annotated	
		hibliography	
		i) Prenare an oral presentation in which you introduce this sub-	
		discipline to your colleagues by providing an overview of the	
		research described in the 5 papers	
Literatura	50/	Students are required to write a 1.2 perceraph reflection for each	Oat 1
Literature	5%	Students are required to write a 1-2 paragraph reflection for each	0011
Survey		Interature survey presentation given by members of the class.	
Reflection		Students are asked to describe what they learned about each sub-	
		discipline within the broad discipline of Biosystems Engineering.	0.17
Manuscript	15%	Those who have earned a doctorate are often called upon to review	Oct 15
Review		technical papers written by others. This is a critical step in the	
		scientific process as peer review of scientific work is needed to	
		ensure credibility of the published work. In the academic	
		environment, it is also necessary to evaluate student work. For this	
		assignment, students will be required to review two manuscripts	
		written by undergraduate Biosystems Engineering students in	
		course BIOE 4240 Graduation Project. The course instructor will	
		provide a "reviewer response form".	
Research	40%	Many individuals who successfully complete a doctoral program	Nov 5
Proposal		will find themselves in careers where it is essential to write funding	
Draft #1		proposals to secure research money (referred to as grantsmanship)	
Diale		Students are required to identify a research tonic of interest and	
		prepare a research proposal using a format provided by the course	
		instructor. For the purposes of this assignment, any research tonic	
		is accortable (including the area of angineering advection). The	
		is acceptable (including the area of engineering education). The	
		intent of the assignment is to give students the opportunity to write	
		a funding proposal in response to the guidelines and instructions	
		imposed by the funding agency. The course instructor will explain	
		the instructions and provide a template for the research proposal.	
		Students may discuss the research topic with their academic	
		advisor, but the research proposal should be written without	
		editorial input from the academic advisor.	
Critique of	10%	A task that is often assigned to those holding a doctoral degree is	Nov 19
Research		the evaluation of research proposals written by others. Critique of	
Proposal		research proposals written by others is a necessary step in the	
		academic process – it is how decisions are made regarding funding	
		of research. Sometimes we are asked to review proposals that	
		perfectly align with our own expertise. More often, however, we	
		are asked to review proposals that do not perfectly align with our	
		expertise. For this assignment, students will be given the task of	
		evaluating the research proposal draft written by one of their peers.	
		Evaluation criteria will be provided by the course instructor. The	
		feedback will be shared with the author of the research proposal	
		Students will be graded on the thoroughness of the critique and the	
		quality of the feedback provided to the author	
Research	10%	Using the feedback provided students will have opportunity to	Nov 26
Droposol	1070	ravise their research proposel. In addition to submitting the ravised	100 20
Droft #2		research proposal students will be required to propore a one page	
Dialt #2		research proposal, students will be required to prepare a one-page	
		facedback received	
D1	50/	Reduback received.   Qr 1	D. 2
Research	5%	Students will give a ~15 min presentation describing the content of	Dec 3
Proposal		their research proposal.	
Presentation			

**Grading** The grading scale used for this course is shown below.

Letter Grade	Percentage out of 100
A+	92-100
А	85-91
B+	78-84
В	72-77
C+	66-71
С	60-65
D	50-59
F	Less than 50