ENGM 510 Course Outline: Winter 2012

Department of Mechanical Engineering
University of Alberta

ENGM 510 Quality Engineering and Management

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Teaching Resources

Professor: Dr. Stanislav Karapetrovic, P. Eng.
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Teaching Assistant: Enrique Fernandez, Ph.D. Candidate
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Telephone: (780) 492-8684
Email: efernand@ualberta.ca

AIMS-RL Web-Page: www.uofaweb.ualberta.ca/quality

Class Time: Mondays, 17:00 – 20:00

Class Location: Room 3-1, Mechanical Engineering Building

Course E-Class Page:
This page, containing most of the course materials (including assignment information and marks obtained on course evaluation components), is available by clicking on the “E-Class” link on the main university webpage (www.ualberta.ca), for the students registered in the course.
ENGM 510 Course Outline: Winter 2012

Course Objectives

ENGM 510 is an introductory course in quality. It is designed and implemented to provide you with the fundamental knowledge of the main philosophies, principles and methodologies of quality management and engineering.

Course Prerequisites

As per the University of Alberta course description for ENGM 510, the prerequisite is STAT 235 (“Introductory Statistics for Engineering”) or an equivalent course. Regardless of whether or not you took STAT 235, you are strongly advised to review Chapters 4 and 7 in the textbook (Besterfield, 2009) as soon as possible, since it will be assumed that the students taking ENGM 510 already have the related background.

Learning Outcomes

After successfully completing ENGM 510, you will have the fundamental knowledge of quality management and engineering topics specified in the University of Alberta course description for ENGM 510, namely: "Quality engineering and management evolution, definitions, concepts and principles. Essential quality management theories and models. ISO 9000 principles models and applications. Seven quality engineering and management tools. Quality function deployment. Failure analysis. Quality costing. Statistical quality."

Learning Resources

Academic Regulations:

“The University of Alberta is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect. Students are particularly urged to familiarize themselves with the provisions of the Code of Student Behavior (online at www.ualberta.ca/secretariat/appeals.htm) and avoid any behavior which could potentially result in suspicions of cheating, plagiarism, misrepresentation of facts and/or participation in an offence. Academic dishonesty is a serious offense and can result in suspension or expulsion from the University.” (GFC 29/09/03)

“Policy about course outlines can be found in Section 23.4(2) of the University Calendar.” (GFC 29/09/03)

"Recording is permitted only with the prior written consent of the professor or if recording is part of an approved accommodation plan." (VP, SEP 2010)

Course Textbook:

Course Materials:
Lecture slides will be provided in class and/or will be available through “E-Class” before each lecture. These handouts will be numbered in correspondence to the topic by a Roman numeral, and in accordance with their position inside a topic by an Arabic numeral (e.g. II-3 means “second topic”, “third lecture”). Assignment and project information will be provided in class or on the course “E-Class” page. Additional handouts and/or links to reference readings (e.g., journal papers or standards) may be provided in class or on the “E-Class” page, if necessary.
### Lectures

<table>
<thead>
<tr>
<th>LECTURE CODE</th>
<th>TOPIC COVERAGE</th>
<th>PLANNED DATE</th>
<th>TEXTBOOK CHAPTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>I I-1</td>
<td>Quality Terminology and Concepts</td>
<td>09/01/12</td>
<td>1</td>
</tr>
<tr>
<td>I I-2</td>
<td>Quality Engineering and Management Principles</td>
<td>16/01/12</td>
<td>2,(4)</td>
</tr>
<tr>
<td>II II-1</td>
<td>Quality Planning</td>
<td>23/01/12</td>
<td>3</td>
</tr>
<tr>
<td>II II-2</td>
<td>ISO 9000 Systems</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>II II-3</td>
<td>Quality Function Deployment</td>
<td>30/01/12</td>
<td>3</td>
</tr>
<tr>
<td>II II-4</td>
<td>Quality Costing</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>III III-1</td>
<td>Seven Quality Engineering Tools</td>
<td>06/02/12</td>
<td>3,(4)</td>
</tr>
<tr>
<td>III III-2</td>
<td>Seven Quality Management Tools</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>III III-3</td>
<td>Failure Analysis and Reliability</td>
<td>13/02/12</td>
<td>3,11</td>
</tr>
<tr>
<td>IV IV-1</td>
<td>Quality Control Basics and Design of Experiments</td>
<td>27/02/12</td>
<td>(4),5,(7)</td>
</tr>
<tr>
<td>IV IV-2</td>
<td>Variables Charts (Part One)</td>
<td>05/03/12</td>
<td>5</td>
</tr>
<tr>
<td>IV IV-3</td>
<td>Variables Charts (Part Two)</td>
<td>12/03/12</td>
<td>6</td>
</tr>
<tr>
<td>IV IV-4</td>
<td>Attributes Charts</td>
<td>19/03/12</td>
<td>8</td>
</tr>
<tr>
<td>IV IV-5</td>
<td>Acceptance Sampling</td>
<td>26/03/12</td>
<td>9,10</td>
</tr>
</tbody>
</table>

### Evaluation

<table>
<thead>
<tr>
<th>COMPONENT</th>
<th>WEIGHT</th>
<th>DUE DATES AND TIMES</th>
<th>EXPLANATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project</td>
<td>18%</td>
<td>Proposal (4%): 30/01/12; 17:00 Presentation (4%): 05/03/12; 18:45 Plan (10%): 19/03/12; 17:00</td>
<td>See page 4. Projects are done in teams with four students in each team.</td>
</tr>
<tr>
<td>Assignments</td>
<td>24%</td>
<td>(A1, 4%): 23/01/12; 17:00 (A2, 5%): 06/02/12; 17:00 (A3, 5%): 27/02/12; 17:00 (A4, 5%): 12/03/12; 17:00 (A5, 5%): 26/03/12; 17:00</td>
<td>See page 4. Assignments must be done individually, without seeking or receiving help from anyone else.</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>18%</td>
<td>13/02/12; 17:00 – 18:30</td>
<td>See page 4. The midterm exam covers the material presented from January 9th to February 6th, inclusive.</td>
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<tr>
<td>Final Exam</td>
<td>40%</td>
<td>02/04/12; 17:00 – 20:00</td>
<td>See page 4. The final exam covers the material presented during the entire course.</td>
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<tr>
<td>Total</td>
<td>100%</td>
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</tbody>
</table>

NOTE: Project marks will be assigned to the team. Therefore, all students on the same team will receive the same project marks. Please submit your individual and team work on time, since a penalty of 10% per each day of lateness for project components and assignments, counted starting from the deadline at 17:00, is planned to assure a fair evaluation in the course. Evaluation schemes for all project components and assignment problems will be provided in class or on the course E-Class webpage at least two weeks before the due date for the related project component or assignment.
**Project Information**

The project is aimed at preparing a quality plan for a product of the team’s choice. The quality plan should be made in accordance with the ISO 10005: 2005 standard. The product should be related to the daily life of the team’s members. Please note that, due to the ethics regulations that cover “Research with Human Subjects”, you are not allowed to have any contact with any persons outside your team in order to obtain any information about, or to be used in, your project. Please contact the professor in person, e.g., before or after class, or through e-mail, in the first two weeks of the course, for a consultation regarding your product selection.

With respect to the specific project components, the “Proposal” should contain concise, but illustrative, answers to the “5W+H” questions regarding the quality plan, presented on about two to four pages. It is particularly important that the team explains in detail how it intends to develop the quality plan, including an illustration of the points specified in Clause 4 of ISO 10005: 2005. Each “Presentation” is expected to last eight minutes, with two minutes designated for questions from the other teams, for the total of 10 minutes per team. All team members must participate in the presentation. The “Plan” contains the quality plan developed in the project on about 10 to 15 pages, although no minimum or maximum number of pages is specified.

**Assignment Information**

Assignments are largely aimed at solving problems related to the quality fundamentals, frameworks, tools and techniques covered in the course. They each contain a number of specific “exercises” given in the course textbook (Besterfield, 2009), at the back of the textbook chapters.

**Exam Information**

Both exams may include multiple-choice, true-false, fill-in-the-blanks, circle-the-correct-answer and short-answer questions, as well as longer problems with calculations and detailed technical questions. The exams are “closed book”, with the necessary formulae and tables provided.

Please note that you are responsible for learning all the material covered in the course, including the lecture handouts, the assignment notes and the textbook. Everything taught in the course may be tested. Sample questions for the midterm exam and the final exam will be provided in class or on the course E-Class webpage at least a week before the exam date.

**Evaluation Scheme**

Student evaluation will be performed and expressed in raw marks (out of 100% for each evaluation component) during the course delivery. Mark total for the course will be obtained by assigning component weights given above to the marks obtained in the course, and summing up the weighed marks. The letter grade system will then be applied to the final total mark only. The application of the grade system will be based on a combination of absolute accomplishment and relative performance in class. The final grade will remain unofficial until approved by an appropriate university body.
Student Feedback:
Your questions, comments and suggestions regarding the course, as well as the teaching and learning processes and related outcomes, will be greatly appreciated. To book an appointment with the professor, ask a question or provide a comment or a suggestion, please use the phone number or the e-mail address provided on page 1. Electronic means of communication are preferred. Please send your questions from the University of Alberta account with “ENGM 510” in the message subject. You can also provide comments, complaints, compliments and/or suggestions for course improvement anonymously.

Standards Application:
This course is delivered based on and in the spirit of the principles contained in the ISO 9001: 2008 (quality management system), ISO 10001: 2007 (customer satisfaction codes of conduct) and ISO 10002: 2004 (complaint handling) standards. For example, your questions about the course will be answered in accordance with the “Response Code” for student satisfaction, and the review of the midterm exam will follow the “Review Code”. Both codes were established as per ISO 10001. Your e-mailed comments, complaints, compliments and suggestions for course improvement will be acknowledged as per the time limit set in the “Response Code”, and processed in accordance with a system established to follow ISO 10002. The application of these standards in ENGM 510 is a part of a research study conducted by your professor and his colleagues. More information on this study is provided on pages 6 and 7 of the course outline.

Response Code:

• I will respond to any inquiry regarding the course within 24 hours of receiving it, or I will provide:
  - to the inquirer – an explanation, the response and a chocolate bar of at least 100 grams or another type of a snack (as selected by the inquirer), and
  - to all students (appearing in the class when the chocolate bar or the snack is given to the inquirer) – a small chocolate.

• This code is valid 24 hours a day, 7 days a week, for e-mailed inquiries sent from January 9 to April 13, 2012, inclusive, from a University of Alberta account, with “ENGM 510” in the message subject.
• I cannot guarantee the 24-hour response for inquiries sent during the reading week (from February 18 to 26, 2012), statutory holidays (April 6 to 9, 2012), or in cases of natural or technical events outside of my control.
• The dates mentioned above each start at 00:00:00 hours and end at 23:59:59 Mountain Time.
• The chocolates or snacks will be given in one of the three classes immediately following the expiry of the 24-hour period for the inquiry requiring the provision of the chocolates or snacks.
• The terms “I” and “me” in this code refer to the professor.
• Please let me know through e-mail in the case that I did not respond to your inquiry within the promised time.

Review Code:

• If the results of the midterm exam are not reviewed on February 27, 2012, an explanation will be announced in this class, while the corresponding review will be conducted and chocolates will be provided to all students in the class following the announcement.
• This code does not apply in cases of unforeseen natural or technical events.
• Please let me know through e-mail in case of any enquiry about this code.
Study Title:
Application of Quality Standards in Engineering Courses

Principal Investigator:
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Research Information:

Purpose, Background and Benefits
This study is aimed at the development, application and evaluation of various quality methodologies in engineering education. Specifically, international standards for quality management and customer satisfaction systems, as well as statistical quality tools, will be used throughout the delivery of this course. The main objectives of the research are to provide more effective assurances of quality in the course delivery to you and different other stakeholders of engineering education, and to facilitate improvements in the teaching process and in the teaching and learning performance overall.

Description
To study the application of the ISO 10001 standard for customer satisfaction codes of conduct, several such codes will be implemented in the course, including the “response code” which guarantees the professor’s and/or the teaching assistant’s response to your questions and comments within a certain time period, as well as the “schedule code” and the “review code”, which relate to the timely coverage of course topics. Your questions, comments and feedback regarding the course delivery and content will be processed in accordance with the ISO 10002 standard on complaint handling for customer satisfaction. The data collection for this part of the study involves recording the time when you posed your question, the time when the response was made, the time when particular course topics were covered in class, as well as your questions, comments, suggestions, complaints and/or compliments. Your feedback may also be collected through optional written surveys. The overall framework for the course quality management will be provided by the ISO 9001 standard for quality management systems.

Voluntary Character
You are under no obligation to participate in this study. The participation is completely voluntary, and your choice whether to participate or not will bear no consequences or effects on your mark in this course or your relationship with the instructor and/or the teaching assistant.
Research Information (Continued):

Confidentiality

Study participants will not be individually identified in any published or presented material.

To ensure confidentiality, the following procedure will be implemented for the information collected through e-mail. Any questions, comments and feedback sent by e-mail, including your name and e-mail address, may be forwarded to the research assistant and will be retained in electronic format on the recipient’s and research assistant’s office computers and/or his/her/their designated folders of the university server. Fourteen days after the last day of classes in the term in which the course was given, all e-mails and other personal information related to this research study will be deleted from the recipient’s and research assistant’s computers and his/her/their designated folders. Summary information, including the date and time of each e-mail, the date and time of the corresponding response(s), the nature of the questions, comments, suggestions, complaints and/or compliments related to the course delivery and content, as well as an anonymous unique identifier for the sender, will be retained electronically in a designated folder of the office computers of the study investigators for five years after the last day of classes of the term in which the course was offered. After this period, all files containing the summary information will be destroyed. The unique identifiers mentioned will be matched to specific students during the academic term in which the course is delivered. The encoding scheme used and all personally-identifiable information will be deleted fourteen days after the last day of classes of that academic term.

The part of this study conducted by means of questionnaires, surveys and written comments is completely anonymous. If you choose to participate, please do not write any personally-identifiable information, such as your name or student number, on any questionnaire, survey or written comment submitted. Please leave your questionnaires, surveys and written comments in the designated box in the classroom or on the instructor’s console. Written comments can also be left anonymously in the instructor’s or teaching assistant’s departmental mailbox. Data collected during the study will be accessible to the investigators only and kept for five years in a cabinet located in the Auditing and Integration of Management Systems Research Laboratory (6-27 Mechanical Engineering Building). After this period, all questionnaires, surveys and written comments will be destroyed.

Consent to Participate

If you decide to participate, your e-mailed questions sent to the professor and/or the teaching assistant, your written answers to questionnaires and surveys, and/or your written comments will constitute your written consent to participate in this study.

If you decide not to participate, please send an e-mail to the professor with the sentence: “I decline to participate in the QSEC study” or leave your questionnaires, surveys and written comments in the designated box or on the professor’s console with the statement: “Declined to participate”.

Further Information

If you have any further questions regarding this study, please do not hesitate to contact me and/or the study investigators (Dr. Stanislav Karapetrovic and Dr. John Doucette). Any questions or concerns regarding the ethical considerations in conjunction with this study should be directed to Dr. James Miller, Chair of the Engineering Faculty Ethics Committee, at 492-4443. Dr. Miller has no direct involvement with this project.