CAMOSUN COLLEGE
School of Trades and Technology
Department of Mechanical Engineering

Manufacturing Processes 3 and Quality Control - Summer 2019

COURSE OUTLINE

The calendar description is available on the web @
http://camosun.ca/learn/calendar/current/web/meng.html#MENG245

Instructors: Salah Elfurjani
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Tel: TBA
Lecture Hours: Thu 8:30-10:30am (**TEC 175**)
Office Hours: Thu 11:00 – 12:00
Fri 12:30 – 13:15

Lab and Tutorials

Composite Labs
Composite Lab: May 16, 23 &30 ***(Jack White Bulding*-102)**
Thursday 12:30-14:30-X01A
14:30-16:30-X01B
Composite Lab: May 17, 24 &31 ***(Jack White Bulding*-102)**
Friday 08:30-10:30-X01C
10:30-12:30-X01D

Welding Labs
*Welding: Lab-***(CTEI 141A)**
Thursday June 28- Full day (X01A&B)
Friday June 29- Full day (X01C&D)

Corrosion Labs
Corrosion: Lab (Case study) - (TEC-110)
Thursday (July 4&11) 12:30-14:30-X01A
14:30-16:30-X01B
Friday (July 5&12) 08:30-10:30-X01C
10:30-12:30-X01 D

Quality Control Tutorials
Tutorials **(TEC 174& Computer Lab-TBA)**
Thursday (July 18&25) 12:30-14:30-X01A
14:30-16:30-X01B
Friday (July 19&26) 08:30-10:30-X01C
10:30-12:30-X01 D

Calendar Description:

Students will be introduced to manufacturing processes including welding and composites. Corrosion protection methods will be discussed. Quality control methods will also be introduced.

Pre-requisites

- MENG 141
- MATH 193

Detailed description:

The course will introduce the students to the manufacturing processes including welding and composites. This hands-on course will focus on fundamentals of arc welding processes. Topics related with weldability of metals (mild steel, carbon steels, stainless steels, alloy steels and non-ferrous metals). Also, the welding processes covered are Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding (MIG), and Gas Tungsten Arc Welding (TIG). Topics include safety, setup of equipment, electrode selection, shielding gases.

Further, students will be introduced to the composite manufacturing processes and will be able to know the safety procedures when working with composites. Processes will be applied including hand lay-up, bonding, and the composite layup process explain the role of matrix and resin, hardener, how to prepare and lay out all materials and tooling to work with composites.

In addition, the students will be introduced to the knowledge of corrosion phenomenon and become familiar with the most common forms of corrosion that are encountered in industry. As well, how one can protect metals and alloys against corrosion. Laboratory exercises will enable students to observe the Electrochemistry and types of corrosion and a case study on corrosion failures in industry will be covered.

Moreover, define, understand and the importance of the concepts underlying statistical quality control process in maintaining the standards in now days industrial world. During the lectures and tutorial sessions, students will be able to apply the principles and tools to solve challenging industry based quality control problems. Topics covered in the quality control course also emphasize Inspection tools – OC curve, DMAIC, Pareto Diagram, Histograms, Cause and Effect Diagram and statistical thinking.

Intended Learning Outcomes:

- Describe and specify commonly used welding processes used in manufacturing.
- Identify and explain the types of composite materials and their characteristic features including advantages, disadvantages, and applications.
- Prepare a mold and layup a composite part.

- Describe attributes of corrosion protection processes including electroplating, painting and powder coating and specify the appropriate process when corrosion protection is required.
- Specify quality control measures for a manufacturing operation.
- Determine the average, range and standard deviation of part characteristics

Specifically, students will learn to:

- Employ the vocabulary and terms used in the quality field correctly, like non-conformance, specifications, differentiate between quality assurance and quality control
- Develop OC curves to decide the probability of accepting the lot
- Illustrate the meaning of Lean Manufacturing, Six Sigma and its relevance in today's business.
- Construct Pareto Diagram, Histogram, cause and effect diagram, check sheet, flow charts and tree diagrams
- Understand the mechanisms of corrosion; costs of corrosion across industry
- Recognize the importance of corrosion prevention and control planning
- Considerations for different material selection and design to minimize corrosion
- Describe safe working practices in welding shop
- Identify components of welding equipment
- Understand and explain the methods employed in composite fabrication
- Learn basic hand skills for the layup of composites materials using fiberglass, carbon fiber and polyester resin.

Textbooks:

1. Sanjay K Mazumdar - Composites manufacturing materials, product, and process engineering (2002, CRC Press)
2. Welding Principles and Applications by Larry Jeffus (2011, 7th Edition)
3. 'Juran's Quality Handbook: The Complete Guide to Performance Excellence, Seventh Edition, McGraw Hill.

Supplies: Personal Protective Equipment

In order to attend the welding Lab, it is mandatory to have steel-toed shoes.

Important Notes:

In order to pass the course, attendance is mandatory during lectures, tutorials and successful completion of all labs.

There will be no make-up quizzes, assignments or exams. If you miss any, you will be assigned a grade of Zero for that particular evaluation type.

Evaluation Method:

Category	Assignments	Labs / Case study	Exams
1. Composite materials	5	14	20
2. Welding process	5	14	
3. Corrosion protection	5	12	20
4. Quality control	5	-	
Total	20	40	40

College Supports, Services and Policies

Immediate, Urgent, or Emergency Support

If you or someone you know requires immediate, urgent, or emergency support (e.g. illness, injury, thoughts of suicide, sexual assault, etc.), **SEEK HELP**. Resource contacts @ http://camosun.ca/about/mental-health/emergency.html or http://camosun.ca/services/sexual-violence/get-support.html#urgent

College Services

Camosun offers a variety of health and academic support services, including counselling, dental, disability resource centre, help centre, learning skills, sexual violence support & education, library, and writing centre. For more information on each of these services, visit the **STUDENT SERVICES** link on the College website at http://camosun.ca/

College Policies

Camosun strives to provide clear, transparent, and easily accessible policies that exemplify the college's commitment to life-changing learning. It is the student's responsibility to become familiar with the content of College policies. Policies are available on the College website at http://camosun.ca/about/policies/. Education and academic policies include, but are not limited to, Academic Progress, Admission, Course Withdrawals, Standards for Awarding Credentials, Involuntary Health and Safety Leave of Absence, Prior Learning Assessment, Medical/Compassionate Withdrawal, Sexual Violence and Misconduct, Student Ancillary Fees, Student Appeals, Student Conduct, and Student Penalties and Fines.

A. **GRADING SYSTEMS** *http://www.camosun.bc.ca/policies/policies.php*

The following two grading systems are used at Camosun College:

1. Standard Grading System (GPA)

Percentage	Grade	Description	Grade Point Equivalency
90-100	A+		9
85-89	A		8
80-84	A-		7
77-79	B+		6
73-76	B		5
70-72	B-		4
65-69	C+		3
60-64	C		2
50-59	D		1
0-49	F	Minimum level has not been achieved.	0

2. Competency Based Grading System (Non GPA)

This grading system is based on satisfactory acquisition of defined skills or successful completion of the course learning outcomes

Grade	Description
COM	The student has met the goals, criteria, or competencies established for this course, practicum or field placement.
DST	The student has met and exceeded, above and beyond expectation, the goals, criteria, or competencies established for this course, practicum or field placement.
NC	The student has not met the goals, criteria or competencies established for this course, practicum or field placement.

B. Temporary Grades

Temporary grades are assigned for specific circumstances and will convert to a final grade according to the grading scheme being used in the course. See Grading Policy at http://www.camosun.bc.ca/policies/E-1.5.pdf for information on conversion to final grades, and for additional information on student record and transcript notations.

Temporary Grade	Description
I	*Incomplete*: A temporary grade assigned when the requirements of a course have not yet been completed due to hardship or extenuating circumstances, such as illness or death in the family.
IP	*In progress*: A temporary grade assigned for courses that are designed to have an anticipated enrollment that extends beyond one term. No more than two IP grades will be assigned for the same course.
CW	*Compulsory Withdrawal*: A temporary grade assigned by a Dean when an instructor, after documenting the prescriptive strategies applied and consulting with peers, deems that a student is unsafe to self or others and must be removed from the lab, practicum, worksite, or field placement.