University of Macau

Faculty of Science and Technology

Department of Electrical and Computer Engineering

Part A: Course Outline

Course Title:	Industrial Planning and Programming		
Course Code:	ELEC 403	Year of Study:	4
Course Mode:	Design		
Compulsory/Elective:	Elective		
Course Prerequisites:			
Prerequisite Knowledge			
Duration	One semester	Credit Units	3
Text Books and References:	[1] Daniel Sipper; Robert L. Bulfin, JR., ***Production: Planning, Control and Integration***, McGraw-Hill, 1998. [2] Stephen J. Guastello, Human Factors Engineering and Ergonomics: A Systems Approach. Lawrence Erlbaum Associates, 2006. [3] Mark S. Sanders, and Ernest J. McCormick, Human Factors in Engineering and Design, McGraw-Hill, 1993. [4] Douglas C. Montgomery, Introduction to Statistical Quality Control, 6th edition, Wiley, 2008 [5] Chase, Aquilano, Jacobs, Production and Operations Management - Manufacturing and Services, 8th Edition, McGraw-Hill, 2001. [6] William J. Stevenson, Operations Management, 10th Edition, McGraw-Hill/Irwin, 2008.		
Course Description:	This course introduces the following concept: ● Different types of production systems; ● Project Management; ● Principles and concepts in the design and control of production systems, including organization, forecasting, work methods and human factors engineering; ● Mathematical and computer models for planning and control of facilities, human resources, projects, materials, and information in production systems.		
Topics Covered	1. Job Design ● Development and Improvement of Work Methods ● Therblig Analysis ● Motion Economy and Work Efficiency 2. Human Factors Engineering ● Physical Measurements ● Cognitive Measurements		

	● Mechanical Aids ● Operation Application and Case Study 3. Project Management ● Scheduling and Controlling Projects 4. Forecasting ● Forecasting System ● Exponential Smoothing ● Trend-Adjusted Smoothing ● Decomposition Approach ● Seasonal Variation ● Centered Moving Average
Course Objectives:	1. Introduce to students to organize the production process improvement project. [c, d, g, h] 2. Introduce to students mathematical modeling of project management and forecasting. [a, e, l] 3. Introduce to students different measurement methods for advanced production system. [k]
Course Assessment:	Homework: 10% In-class Quizzes: 15% Course Project: 30% Final Exam (Comprehensive): 40% Attendance and in-class Performance: 5%
Relationship to Program Objectives and Outcomes	This course primarily contributes to Electrical and Computer Engineering Program outcomes that develop student abilities to: (a) an ability to apply knowledge of mathematics, science, and engineering; (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability. (d) an ability to function on multidisciplinary teams; (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice appropriate to the degree discipline. The course secondarily contributes to Electrical and Computer Engineering program outcomes that develop student abilities to: (e) an ability to identify, formulate, and solve engineering problems; (g) an ability to communicate effectively; (h) the broad education necessary to understand the impact of engineering solutions in

<table>
<tr><td></td><td>a global, economic, environmental and societal context;
(l) an ability to use the computer/IT tools relevant to the discipline along with an understanding of their processes and limitations.</td></tr>
<tr><td>Course Contents and Relationship to Program Criteria:</td><td>
<table>
<tr><th>Week no.</th><th>Topics</th><th>Program Criteria</th></tr>
<tr><td>3</td><td>Job Design
Development and Improvement of Work Methods, Therblig Analysis, Motion Economy and Work Efficiency</td><td>PS, BS, CS, ES</td></tr>
<tr><td>3</td><td>Human Factors Engineering
Physical Measurements, Cognitive Measurements, Mechanical Aids, Operation Application and Case Study</td><td>PS, BS, CS, ES</td></tr>
<tr><td>3</td><td>Project Management
Scheduling and Controlling Projects</td><td>PS, CS, ES</td></tr>
<tr><td>3</td><td>Forecasting
Forecasting System, Exponential Smoothing, Trend-Adjusted Smoothing, Decomposition Approach, Seasonal Variation, Centered Moving Average</td><td>PS, CS, ES</td></tr>
<tr><td>2</td><td>Industrial Project Presentation
First, Progress, and Final Presentation for Industrial Project</td><td>PS, BS, CS, ES</td></tr>
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</td></tr>
<tr><td>Contribution of Course to meet the professional component:</td><td>This course prepares students to organize their engineering knowledge to do the production process improvement project. Students should be able to apply knowledge of mathematical modeling of project management and forecasting to solve industrial planning problems by different measurement methods.</td></tr>
<tr><td>Course Instructor(s):</td><td>Dr. Seng-Fat Wong</td></tr>
<tr><td>Prepared by:</td><td>Dr. Seng-Fat Wong</td></tr>
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Part B: General Course Information and Policies

Instructor: Dr. Seng-Fat Wong Office: N403

Office Hour: By appointment Phone: 4453

e-mail: fstsfw@umac.mo

Programme Educational Objectives

1. **Problem Solving:** Graduates have the ability to think in a critical and evaluative manner and to consider a broad perspective, in order to solve technical and nontechnical problems.
2. **Leadership and Communication:** Graduates will provide effective leadership, act in an ethical manner and skills will include the ability to communicate well and to work

successfully within diverse groups.

3. **Market Acceptance:** Graduates will have successful careers in the academic environment, industrial and government organizations.
4. **Technical Competence:** Graduates will be technically competent and have a thorough grounding in the fundamentals of math and science in electrical and electronics engineering and experience in engineering design. They will be able to use modern engineering techniques, skills, and tools to fulfill societal needs.

Scale: 1 (Highest) to 4 (Lowest)

	Problem Solving	**Leadership and Communication**	**Market Acceptance**	**Technical Competence**
Industrial Planning and Programming	1	1	2	3

Remark:

- Objective for "Problem Solving" can be achieved by assignments, quizzes, mid-term exam, final exam and projects.
- Objective for "Leadership and Communication" can be achieved by report writing and presentation. However, leadership training is not given by this course.
- Objective for "Market Acceptance" can be achieved by the course subject that is related to renewable energy and power system.
- Objective for "Technical Competence" can be achieved by using fundamentals of math and science in electrical and electronics engineering and experience in engineering project design and computer simulation.

Program Criteria Policy:

Course VS Program Criteria

Scale: 1 (Highest) to 4 (Lowest)

Course	PS	DIC	BS	CS	ES	DE	LA	CV	DM
Industrial Planning and Programming	2		2	2	1				

Terms:

Probability and Statistics (PS), Differential and Integral Calculus (DIC), Basic Science (BS), Computer Science (CS), Engineering Science (ES), Differential Equation (DE), Linear Algebra (LA), Complex Variables (CV), Discrete Mathematics (DM)

Program Outcome Policy:

Course VS Course Outcomes

(H= Highly Related, S = Supportive, N = None)

Course	a	b	c	d	e	f	g	h	i	j	k	l
Industrial Planning and Programming	H	N	H	H	S	N	S	S	N	N	H	S

The electrical and electronics engineering program outcomes are:

a. Ability to apply knowledge of mathematics, science and engineering.

b. Ability to design and conduct experiments.

c. Ability to design a system, component or process to meet desired needs.

d. Ability to function on multidisciplinary teams.

e. Ability to identify, formulate and solve engineering problems.

f. Understanding of professional and ethical responsibility.

g. Ability to communicate effectively.

h. Broad education necessary to understand the impact of engineering solutions in global and societal context.

i. Recognition of the need for and an ability to engage in life-long learning.

j. Knowledge of contemporary issues.

k. Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

l. Ability to use the computer/IT tools relevant to the discipline along with an understanding of their processes and limitations

Curriculum Detail

ELEC 403 Industrial Planning and Programming

Timetabled work in hours per week			**No of teaching weeks**	**Total hours**	**No /Duration of exam papers**	**Max marks available from:**	
Lecturer	**Tutor**	**Practice**				**Exams**	**Course**
2	1	1	14	56	1/3 hours	40	60

Term: 7th

Hours			**Percentage content of**					
Lecturer	Lab/tut	Other	Maths	Basic Science	Engineering Science	Engineering Design and Synthesis	Complementary Studies	Computer Studies

28	28	0	15	15	20	20	15	15

Design Elements

% of Design Content	Design Content in Course Work	Design Project	Design Content in Laboratories
30%	1	1	X

Course Assessment Policy:

- There will be approximately 7 homework assignments.
- Homework is due one week after assignment unless otherwise noted, no late homework is accepted.
- Possible revision of homework grades may be discussed with the grader within one week from the return of the marked homework
- The course grade will be based on the average of the homework grades.
- Approximately 4 quizzes and one final exam will be held during the semester.