NEW COURSE PROPOSAL

College: **[Department: [MSEM]**
Engineering and Computer Science]

Note: Use this form to request a single course that can be offered independently of any other course, lab or activity.

1. **Course information for Catalog Entry**
   Subject Abbreviation and Number: **[MSE606]**
   Course Title: **[Production and Operations Management for Engineers]**
   Units: **[3]** units
   Course Prerequisites: **[MSE 600]** *(if any)*
   Course Corequisites: **[ ]** *(if any)*
   Recommended Preparatory Courses: **[ ]** *(if any)*

2. **Course Description for Printed Catalog:** *Notes:* If grading is NC/CR only, please state in course description. If a course numbered less than 500 is available for graduate credit, please state "Available for graduate credit in the catalog description."

   [MSE 606. Production and Operations Management for Engineers (3)
   Prerequisite: MSE 600. This course explores a wide variety of production and operations management topics. Topics considered include managing operations related to production planning processes, manufacturing, and service organizations **]**

3. **Date of Proposed Implementation: (Semester/Year): [Fall] / [ ]** *The form does not allow to enter the date as Fall 2015 which is when the course is expected to be offered..*

4. **Course Level**
   [☐]Undergraduate Only [☒]Graduate Only [☐]Graduate/Undergraduate

5. **Course Abbreviation "Short title" (maximum of 17 characters and spaces)**
   Short Title: **[P•R•O•D• •&• •O•M• •F•O•R• •E•M•]**

6. **Basis of Grading:**
   [☐]Credit/No Credit Only [☒]Letter Grade Only [☐]CR/NC or Letter Grade

7. **Number of times a course may be taken:**
   [☒] May be taken for credit for a total of **[**1**]** times, or for a maximum of **[**3**]** units
   [☐] Multiple enrollments are allowed within a semester

8. **C-Classification:** *(e.g., Lecture-discussion (C-4).)*
   [3] units @ **[C-5] [ ]**

9. **Replaces Current Experimental Course?**
   [☐] YES [☒] NO
   Replaces Course Number/Suffix:**[ ]**
   Previously offered **[ ]** times.

10. Proposed Course Uses: *(Check all that apply)*

[☒]Own Program: [☐]Major [☐]Minor [☒]Masters [☐]Credential [☐]Other

[☐] Requirement or Elective in another Program
[☐] General Elective
[☐] General Education, Section [ ]
[☐] Meets GE Information Competence (IC) Requirement
[☐] Meets GE Writing Intensive (WI) Requirement
[☐] Community Service Learning (CS)
[☐] Cross-listed with: *(List courses)* [ ]

11. Justification for Request: *Course use in program, level, use in General Education, Credential, or other. Include information on overlap/duplication of courses within and outside of department or program. (Attach)*

12. Estimate of Impact on Resources within the Department, for other Departments and the University. *(Attach)*
(See Resource List)

13. Course Outline and Syllabus *(Attach) Include methods of evaluation, suggested texts, and selected bibliography.*
Describe the difference in expectations of graduates and undergraduates for all 400 level courses that are offered to both.

14. Indicate which of the PROGRAM'S measurable Student Learning Outcomes are addressed in this course. *(Attach)*

15. Assessment of COURSE objectives *(Attach)*

A. Identify each of the course objectives and describe how the student performance will be assessed

(For numbers 14 and 15, see Course Alignment Matrix and the Course Objectives Chart)

16. If this is a General Education course, indicate how the General Education Measurable Student Learning Outcomes (from the appropriate section) are addressed in this course. *(Attach)*

17. Methods of Assessment for Measurable Student Learning Outcomes *(Attach)*

A. Assessment tools
B. Describe the procedure dept/program will use to ensure the faculty teaching the course will be involved in the assessment process (refer to the university's policy on assessment.)

18. Record of Consultation: *(Normally all consultation should be with a department chair or program coordinator.) If more space is needed attach statement and supporting memoranda.*

Date:	Dept/College:	Department Chair/ Program Coordinator	Concur (Y/N)
[3/12/2014]	[MSEM]	[Ileana Costea, Chair]	[Y]
[3/14/2014]	[CEAM/ CECS]	[Nazaret Dermendjian, Chair]	[Y]
[3/14/2014]	[CS/ CECS]	[Steven Stepanek, Chair]	[Y]
[3/14/14]	[ECE/ CECS]	[Ali Amini, Chair]	[Y]
[3/14/2014]	[ME/ CECS]	[Hamid Johari, Chair]	[Y]
[3/14/2014]	[COBAE]	[Christopher Jones, Interim Associate Dean]	[Y]

Consultation with the Oviatt Library is needed to ensure the availability of appropriate resources to support proposed course curriculum.

Collection Development Coordinator, Mary Woodley **Date**

Please send an email to: collection.development@csun.edu

[03/14/14]

19. Approvals:

Department Chair/Program Coordinator:	Date:	[3/14/2014]
College (Dean or Associate Dean):	Date:	[ ]
Educational Policies Committee:	Date:	[ ]
Graduate Studies Committee:	Date:	[ ]
Provost:	Date:	[ ]

Attachments for MSE606. Production and Operations Management for Engineers

11. Justification for request
This course will be developed for the new program MS in EM with an option in Entrepreneurship and Innovation effective Fall 2015. Most of the topics related to Operations Research, Operations Management, Decision-making, and quantitative tools of Engineering Management that graduate students of EM should be familiar with are carefully divided in to two courses in this new program: MSE600. Decision Tools for Engineers and MSE606. Production and Operations. These two courses will offer the students taking the new MS program with concepts which in the general MS in EM program are presented in the current residential program in the pair of courses MSE606A (an operations research for engineering course) and MSE 601 (a statistics course for engineers). MSE 606 will cover topics that are required for engineering managers to know in today's competitive business environment.

12. Estimate of impact on resources

This course will be taught by existing faculty within the MSEM department. Additionally, the MSEM department has also recommended the names of industry experts who can teach this course, if the demand increases. We do not anticipate any new space being needed to accommodate this course and no new software is needed at this time for this course.

This course is being introduced to replace an earlier course on operations management that was being offered in the EM program and hence it should not affect faculty load.

Additionally, we do not expect any additional cost for administrative or technical support staff or for library resources for this class.
Lastly, the MSE programs have always had high enrollments, particularly for the core courses, with most sections having close to 30 students.

13. Course Outline and Syllabus

MSE 606 - Production and Operations Management for Engineers
Fall 2015

Instructor: **Alireza Kabirian, Ph.D.**
Email: **akabirian@csun.edu**

Course Text: Operations Management (11th Edition) by Heizer and Render; Upper Saddle River, Prentice Hall; CD is not required.

Course Purpose: Production and Operations Management for Engineers is the process of converting resources into products. Resources may include materials, equipment, capital, and labor. Products may include manufactured goods or services. "Operations" is defined here as the set of activities directed toward the conversion of resources into goods and services. Production/operations management is concerned with an almost unlimited spectrum of organized efforts -- from the manufacture of printed electronic circuit boards to the delivering of a social service by a local government; from the fast-food business to the health services industry. All of these involve activities directed toward the conversion of

resources into products. Production/operations management has its roots in a number of areas of study, such as industrial engineering, materials/inventory management, manufacturing management, production scheduling, quality management, etc. Examples of questions that are of concern in the field of engineering operations management are:

- How do we cut costs in our firm?
- How do we increase our workers' productivity in The Registrar's Office?
- Are we having quality problems with our heart surgeries?
- Where should we locate our new central distribution facility for Sara Lee?
- What route should a caseworker follow in handling his/her caseload?
- How many Beanie Babies should we carry in December's inventory?
- How many Honda lawnmowers will we sell next year?
- Should we work overtime in Asheboro or hire new production workers in Mexico to make more Dustbusters?
- Can we afford to automate part of our production process to make Snakelights?
- How do we manage and control the installation a new natural-gas pipeline from Alaska to the continental US and Canada?

Tentative Topics:

- Engineering Operations and Productivity
- Engineering Project Management
- Design of Innovative Goods and Services for Manufacturing Industries
- Quality Management
- Manufacturing Process Strategies
- Manufacturing Capacity Planning
- Facilities and Location Planning
- Time Study and Work Measurement
- Inventory Management
- Aggregate Manufacturing Planning
- Maintenance and Reliability

Evaluation

Midterm 1	*20%*
Midterm 2	*20%*
Final Exam (comprehensive)	*35%*
HWs	*15%*
In-Class Assignments	*10%*

A	93-100 points
A-	90-93
B+	87-90
B	83-87
B-	80-83
C+	77-80
C	73-77
C-	70-73
D+	67-70
D	63-67
D-	60-63
F	<60

Assignments

1. All assignments are done **individually** unless otherwise specified.
2. **No late assignment will be accepted.**
3. *All assignments are posted on Moodle.* ***Submissions are through Moodle only! I will not accept e-mail submissions or hard copies or any other method under any circumstances.*** *You should upload* ***a single file (either MS Word or PDF)*** *on Moodle for every assignment. You will need to use Excel for some problems; but do not submit Excel files on Moodle; copy and paste your spreadsheet into MS Word and upload. I prefer that you do problems by hand and scan your work and make an MS Word or PDF file. But you are fine if you want to type your solutions directly into MS Word.*

Examinations:

1. There are 2 midterms and a final. Midterm 1 covers materials covered just before the exam; Midterm 2 covers materials after midterm 1 and before midterm 2. Final exam is comprehensive.
2. If you do not attend one of the midterms, you should either provide me with documents about your emergency situations due to which you were unable to attend the midterm. Then I may let you make it up. Examples of good reasons to miss an exam are jury duty, documented medical illness, or CSUN-related business. Personal problems or non-CSUN work schedules are not considered good reasons.
3. The exams will be graded by the instructor and the grades will be posted online.

Integrity:

Cheating on the assignments or the exams will result in no credit for the assignment or exam in question, and you will be referred to the college administration. This is university policy and there will be no exceptions.

14. & 15. Measurable Student Learning Outcomes

The graduate engineering management program objectives are to:

a) Identify, analyze, and solve engineering management problems quantitatively.
b) Explain management techniques and strategies applied in engineering and high-tech firms.
c) Explain and analyze contemporary issues and developments in operations management of engineering firms.

The course objectives for this course are as follows:

Course Objective 1: Understanding strategic importance of operations management
Course Objective 2: Designing the operating system and understanding its components
Course Objective 3: Applying operational decision making tools
Course Objective 4: Ensuring meeting of overall quality requirements

Matrix A, shown below, matches the program outcomes with the course objectives for this course.

Prg Outcomes / Course Objectives	Program Outcome 1	Program Outcome 2	Program Outcome 3
Course Objective 1	**D**	**I**	**I**
Course Objective 2	**D**		
Course Objective 3	**D**	**I**	
Course Objective 4	**I**		**I**

Additionally, Please refer Matrix B, shown below, in which it is explained how each course objective will be assessed:

Course Objective	Assessment Tool used to evaluate student performance
Course Objective 1: Understanding strategic importance of operations management	Exams and HW Assignments, including use of excel.
Course Objective 2: Designing the operating system and understanding its components	Exams and HW Assignments, including use of excel
Course Objective 3: Applying operational decision making tools	Exams and HW Assignments, including use of excel
Course Objective 4: Ensuring meeting of overall quality requirements	Case Studies and homework assignments and reports, including the use of Excel

16. If this is a General Education course, indicate how the General Education Measurable Student Learning Outcomes (from the appropriate section) are addressed in this course.

N/A

17. Methods of assessment for measurable Student Learning Outcomes

A) Assessment tools

As mentioned in Section 15 above (Matrix B), a variety of assessment tools will be used. This may include, but is not limited to, case studies, homework assignments, including the use of Excel software and exams – both a midterm and a final.

B) Describe the procedure the dept/program will use to ensure faculty teaching the course will be involved in the assessment process

All faculty involved in teaching this course will be required to participate in the assessment process and follow the CSUN university policy on assessment. The department has a program assessment in place which the full time faculty are closely involved and the industry experts who are hired to teach the course will be trained on how to do the assessments. A full time faculty member will be assigned to each industry expert teaching the course to explain to them the assessment process and will be available to assist in case any questions come up.

Assessment is also a topic discussed in department meetings and the industry experts teaching the classes will be kept informed on updates regarding the assessment process

MSE 606
Sample Quiz

1. A way of prohibiting a shipping path in a transportation problem is to assign a shipping cost m to this path. False True
2. If you have 5 managers that need assignments and 4 projects that need project manager you must add one dummy project to balance the problem. False True
3. Given the following integer programming model: maximize Z=$110x1+ l50x2. If the variable x1 has a value of 2.22, and variable x2has a value of 5.55, the upper bound of node 1 is 1076.70 and a lower bound of 970. True False
4. All the constraint coefficients in a transportation model are one. False True
5. The number of allocated cells in a balanced transportation model with 3 sources and 3 destinations in order not to be degenerate should be:
   a. 3
   b. 6
   c. 5
   d. 7
6. If you are using the branch and bound method and you are at a node with the UB = 3000 ($x_1 = 1.35$, $x_2 = 6$) and LB = 1000 (x1 =2, x2 = 5), the constraints added to the next relaxed LP will be;
   a) x1 = 1, X2 = 6
   b) $X2 \leq 6$, $X2 \geq 6$
   c) $x1 \leq 1$, $x \geq 1$
   d) $x \leq 1$, $x \geq 2$
7. The optimal integer solution is reached when a feasible integer solution is generated at a node, and the upper bound at that node is greater than or equal to the upper bound at any other ending node. True False
8. The optimal integer solution will always be between the upper and lower bounds at one of the nodes. True False
9. A "relaxed" solution for an integer programming model:
   a) is the regular simplex solution of a linear programming model without integer restrictions
   b) cannot contain negative numbers
   c) can only be used with whole numbers
   d) will not define the infeasible solution area
10. The branch and bound method begins by using:
    a) the rounded down integer solution
    b) graphical solution
    c) the simplex method to solve the relaxed model
    d) all $\geq$ constraints

MSE 606

SAMPLE HW Assignments

1. HiDec produces two models of electronic gadgets that use resistors, capacitors, and chips. The following table summarizes the data of the situation:

	Unit Resource Requirements		
Resource	**Model 1 (units)**	**Model 2 (units)**	**Maximum Availability (units)**
Resistor	2	3	1200
Capacitor	2	1	1000
Chips	0	4	800
Unit Profit ($)	3	4	

Let x_1 and x_2 be the amounts produced of Models 1 and 2, respectively. Following are the LP model and its associated optimal simplex tableau.

Maximize $z = 3x_1 + 4x_2$

Subject To:

$2x_1 + 3x_2 \le 1200$

$2x_1 + x_2 \le 1000$

$4x_2 \le 800$

$x_1, x_2 \ge 0$

Basic	x_1	x_2	s_1	s_2	s_3	Solution
z	0	0	1 1/4	1/4	0	1750
x_1	1	0	- 1/4	3/4	0	450
s_3	0	0	-2	2	1	400
x_2	0	1	1/2	- 1/2	0	100

a) Determine the status of each resource.
b) In terms of the optimal profit, determine the worth of one resistor. One capacitor. One Chip.
c) Determine the range of applicability of the dual prices for each resource.
d) If the available number of resistors is increased to 1300 units, find the new optimum solution.
e) If the available number of chips is reduced to 350 units, will you be able to determine the new optimum solution directly from the given information? Explain.
f) If the availability of capacitors is limited by the range of applicability computed in (c), determine the corresponding range of the optimal profit and the corresponding ranges for the number of units to be produced of Models 1 and 2.
g) A new contractor is offering to sell HiDec additional resistors at 40 cents each but only if HiDec would purchase at least 500 units. Should HiDec accept the offer?

2. Gapco has a daily budget of 320 hours of labor and 350 units of raw material to manufacture two products. If necessary, the company can employ up to 10 hours daily of overtime labor hours at the additional cost of $2 an hour. It takes 1 labor hour and 3 units of raw material to produce one unit of product 1, and 2 labor hours and 1 unit of raw material to produce 1 unit of product 2. The profit per unit of product 1 is $10, and that of product 2 is $12. Let x_1 and x_2 define the daily

number of units produced of products 1 and 2, and x_3 the daily hours of overtime used. The LP model and its associated optimal simplex tableau are then given as:

Maximize: $Z = 10x_1 + 12x_2 - 2x_3$

Subject to:

$$x_1 + 2x_2 - x_3 \le 320 \quad \text{(Labor Hours)}$$

$$3x_1 + x_2 \le 350 \quad \text{(Raw Material)}$$

$$x_3 \le 10 \quad \text{(Overtime)}$$

$$x_1, x_2, x_3 \ge 0$$

Basic	x_1	x_2	x_3	s_1	s_2	s_3	Solution
z	0	0	0	5 1/5	1 3/5	3 1/5	2256
x_2	0	1	0	3/5	- 1/5	3/5	128
x_1	1	0	0	- 1/5	2/5	- 1/5	74
x_3	0	0	1	0	0	1	10

a) Determine the optimal solution of the problem.
b) Determine the dual prices and the applicability ranges of their associated resources.
c) Examine the dual prices for labor hours (constraint 1) and overtime hours (constraint 3). Shouldn't these two values be the same? Explain.
d) Gapco currently pays an additional $2 per overtime hour. What is the most the company should be willing to pay?
e) If Gapco can acquire an additional 100 units of raw material daily at $1.50 a unit, would you advise the company to do so? What if the cost of raw material is $2 a unit?
f) Suppose that Gapco can acquire at most 200 additional units of raw material a day, determine the associated optimal solution.
g) Suppose that Gapco can use no more than 8 hours of overtime daily; find the new optimum solution.

3. Consider the HiDec model in Problem 4.

a) Use TORA Execl Solver to determine the optimal iteration.
b) Find the unit profit range for Model 1 that will maintain the optimality of the current solution.
c) Find the unit profit range for Model 2 that will keep the current solution optimal.
d) If the unit profit of Model 1 is increased to $6, determine the new solution.
e) If the unit profit of Model 2 is changed to $1, determine the new optimum solution.